Comments Received during the Public Review Period on the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013

Commenter: Roger Johnson
National Farmer's Union (NFU)

Comment: NFU appreciates the work EPA has undertaken to successfully inventory greenhouse gas (GHG) emissions and fluxes in the U.S., summarize and present them by source category and sector. Collecting and presenting this information is extremely important because the accumulation of GHGs in the atmosphere resulting from human activity is expected to impact global climate patterns. NFU's policy, which is subject to annual review by NFU membership, states, "NFU is concerned about the effects of climate change and believes further research and analysis is necessary to determine its actual and potential impacts."

Family farmers and ranchers are faced with many perils in a changing climate including mounting weather volatility, changes in water resources, increasing heat stress for crops and livestock and pressure from invasive species, pests, and weeds. Producers across the U.S. are already feeling the impact of increasing weather volatility, one among many of the hazards to agriculture attendant to climate change.

Extreme weather events limit workable field days, exacerbate productivity and environmental issues related to soil erosion, and harm the economy by increasing crop insurance claims. Potential impacts on water resources are also of grave concern because adequate water is absolutely essential to farmers' ability to produce the crops upon which we all rely.

Taken together, the challenges to agriculture inherent to climate change could severely increase food prices and significantly disrupt our ability to provide adequate food for a growing world population.

These challenges make clear the importance of examining factors contributing to climate change so that plans for resiliency and mitigation can be established. NFU appreciates EPA's efforts toward making such information accessible through the Inventory.

NFU appreciates EPA's work inventorying GHG emissions as a step toward facilitating family farmers' participation in enhancing climate resilience.

Commenter: David Lyon
Environmental Defense Fund (EDF)

Comment: EDF supports the use of IPCC Fourth Assessment Report (AR4) global warming potential (GWP) values in the 2015 Inventory. The AR4 GWP values are based on updated scientific knowledge of the relative climate impacts of individual greenhouse gases. To reflect further advancement in climate

science, future inventories should use IPCC Fifth Assessment Report (AR5) GWP values as soon as allowed by the UNFCCC reporting guidelines.

Comment: The proposed revisions to the Greenhouse Gas Reporting Program (GHGRP) Subpart W include a requirement for emissions reporting from oil well completions and workovers with hydraulic fracturing. Once that data is available, a methodology similar to the one currently used in the Inventory to estimate emissions from gas well completions with hydraulic fracturing could be used for oil well completions. Until that time, EDF recommends that oil well completion emission factors in the Inventory are updated with currently available data such as the sources discussed in EDF's peer review comments on the EPA White Paper Oil and Natural Gas Sector Hydraulically Fractured Oil Well Completions and Associated Gas during Ongoing Production. Based on a conservatively low assumption of 7.7 tons methane per completion event and 75% of new oil wells using hydraulic fracturing, emissions would be over a factor of 400X higher than the current Inventory estimate for oil well completions, which is based on an emission factor inappropriate for hydraulically-fractured oil wells.

Comment: Two recent national studies of methane emissions from natural gas production sector pneumatic controllers have reported that the Inventory underestimates emissions from these devices (Allen et al. 2013, Allen et al. 2015). EPA should consider revising the current approach used for natural gas systems production sector pneumatic devices, which applies an emission factor to a single category of pneumatic devices to estimate potential emissions, then calculates net emissions by subtracting voluntary emission reductions based on Natural Gas STAR reports of industry replacement of high-bleed and intermittent-bleed devices with low-bleed or no-bleed devices. An alternative approach is to estimate net emissions from separate categories of pneumatic controller types and eliminate the application of voluntary reductions. Emission reductions resulting from the conversion of pneumatic controllers would be captured by changes in the activity factors of the different controller types. A three category division analogous to the Greenhouse Gas Reporting Program (low-bleed continuous, high-bleed continuous, intermittent-bleed) may be the most straightforward approach, but EPA should evaluate alternatives such as a two-category division (continuous, intermittent).

For petroleum systems production field operations pneumatic devices, EPA estimated net emissions for high-bleed and low-bleed devices in previous inventories. For the 2015 inventory, EPA is proposing to apply a fraction of the Natural Gas STAR reductions to petroleum systems pneumatics. An alternative approach is to update the activity factors by device type and not apply voluntary reductions. Aligning the petroleum systems pneumatic controller types with natural gas systems (low-bleed continuous/high-bleed continuous/intermittent or continuous/intermittent) is likely to simplify the methodologies.

Comment: There are two approaches that EPA could use to estimate pneumatic controller activity factors: 1) apply a ratio of pneumatic controllers per well to the Inventory well counts, or 2) extrapolate values from the GHGRP data for onshore petroleum & natural gas systems pneumatic controllers.

The first approach could use ratios reported by recent studies (2.7 controllers per well, Allen et al. 2015; 3.6 controllers per well, OIPA 2014), which would result in combined petroleum & natural gas systems activity factors of 3.5 – 4.6 million devices, about 3X – 4X higher than the corrected 2012 estimate in the 2015 inventory. Separate activity factors for natural gas and petroleum systems could be estimated using the proportion of gas and oil wells. It may be appropriate to apply distinct ratios of controllers per well to natural gas and petroleum systems if data sources indicate different average controller counts by well type.

The second approach using 2013 GHGRP data would result in an unadjusted activity factor of 412,000 devices for petroleum and natural gas systems. This value was estimated from 2013 reported emissions of pneumatic devices by assuming 78.8% methane and continuous operation; in future years, the device count will be directly reported by the operators. Since the GHGRP only includes data from facilities emitting ≥25,000 metric tons CO_2e per year, GHGRP activity factors need to be adjusted upward to account for non-reporting facilities. It has been estimated that GHGRP onshore production facilities represent approximately 85% of energy production. If the reported devices were scaled up by only 15% for non-reporters, the adjusted activity factor would be over 7X lower than the value estimated by the first approach, which suggests that this approach underestimates the number of devices. It may be more appropriate to scale up activity factors by the percentage of wells that report – this value could be estimated by comparing company- and county-level data from DI Desktop to the GHGRP data. If GHGRP data are used to estimate a national activity factor, it is critical that EPA verifies that the underlying device counts are accurate. GHGRP-based activity factors could be separated into natural gas and petroleum systems proportional to the GHG Inventory well counts by type.

Activity factors by controller type could be estimated by applying the GHGRP fractions of controllers by type to the national activity factors. There is higher confidence in 2013 GHGRP pneumatic controller data compared to 2011 and 2012 since these previous years were based on partial surveys. The 2013 data indicates that there are 28%, 5%, and 67% of low-bleed, high-bleed, and intermittent bleed devices, respectively. Natural Gas STAR data on pneumatic controller replacement since 1990 may be useful for estimating the fraction of controllers by type in previous years.

Comment: The inventory should use emission factors specific to pneumatic controller types such as low-bleed/high-bleed/intermittent-bleed. This would allow emission reductions from device replacement to be applied by updating activity factors instead of subtracting voluntary reductions. Recent data sources such as Allen et al. 2015, OIPA 2014, and Prasino 2013 may be useful for developing emission factors. These studies indicate a positively skewed distribution with a small fraction of devices contributing the majority of emissions. Allen et al. 2015 reports that many of these high emission devices are malfunctioning. This is readily observable for low-bleed devices measured in the study, which have a median emission rate of 0 scfh and an average emission rate of 10.4 scfh. This average emission rate, which is higher than the low-bleed regulatory definition of 6 scfh, is greatly affected by the 19% of devices exceeding 6 scfh.

One option to account for the skewed distribution of pneumatic device emissions is to use separate activity factors and emission factors for normally functioning and malfunctioning devices. Allen et al. 2015 provides useful data on the current emission rates and frequency of malfunctioning devices. Future changes in the frequency of malfunctioning devices may be estimated from leak detection and repair (LDAR) data from programs such as Natural Gas STAR. Alternatively, emissions could be reported separately for normally functioning pneumatic controllers and equipment leaks from pneumatic controllers. Emissions from normally functioning devices could be estimated using the complete activity factors and emission factors developed from data excluding malfunctioning devices. Potential equipment leak emissions from pneumatic controllers could be estimated using the frequency and emission rates of malfunctioning devices from Allen et al. 2015. These potential emissions could be scaled to other years proportional to the number of devices. To account for future emission reductions resulting from the repair of malfunctioning devices, voluntary reductions could be applied to pneumatic controller equipment leaks using data from Natural Gas STAR reports of pneumatic controller LDAR programs.

Commenter: Anna Moritz
Center for Biological Diversity (CBD)

Comment: One of the IPCC Fifth Assessment Report's ("AR5") breakthrough insights is the discovery of a fundamental flaw in previous calculations of GWP: the climate effect of CO_2 intrinsically includes carbon cycle feedbacks, but the GWPs of other greenhouse gases do not. Thus, to compare "apples to apples," it is necessary to include these feedbacks in the estimates of all greenhouse gas emissions. The Inventory, however, perpetuates the error by reporting only the lower, non-feedback 100-year GWP values for non-CO_2 gases. This omission causes serious inaccuracies in how the report presents and compares the respective greenhouse gases' climate change impacts.

We appreciate that EPA has included the AR5 100-year GWP values for all greenhouse gases in Annex 6.3 It is entirely unrealistic, however, to expect the wide range of Inventory readers to understand the significance of the Annex 6 information, much less to substitute their own calculations in lieu of those provided by EPA. The greenhouse gas inventory is relied upon by citizens, businesses, governmental agencies, and policy makers across the country, and they consult its prominently displayed information, especially its executive summary and tables. These do not display or explain the significance of the GWPs. As the examples discussed below and the attached exhibit vividly demonstrate, only actually running the numbers and displaying them in tables show their impact and avoid comparing apples to oranges. Thus, we strongly urge EPA to include climate-carbon feedbacks from all greenhouse gases and use the GWPs stated in AR5. To do otherwise is inaccurate and misleading.

Comment: Another glaring omission is the failure to compare, and in this case even to mention, greenhouse gas emissions based on their 20-year global warming potentials. The selection of a particular time horizon for GWPs influences the policy focus because the analysis and comparison occurs only at the selected time frame. Many policy analysts and decision makers, however, believe that a 100-year focus is important for long-term climate stabilization, while a near-term (20 years or less) focus is equally crucial because the next few decades will determine whether catastrophic and irreversible damage can be avoided before tipping points are crossed. Decision makers and the public should be presented with the 20-year effects of greenhouse gases to focus attention on short-term solutions that may abate immediate harm sufficiently to allow us to reach climate stability on a 100-year and beyond time scale.
The time-based distinction between GWPs is of key importance for a greenhouse gas such as methane. Methane is a short-lived greenhouse gas that remains in the atmosphere a little over a decade; by contrast, CO_2 has an atmospheric lifetime of a century and beyond. Methane has exerted the second largest warming influence since the Industrial Revolution, behind only CO_2. And crucially, the AR5 value for its 20-year GWP (86) is approximately 2.5 times higher than its 100-year GWP (34). The implications of this difference for responsive action are enormous, and reporting both GWPs for methane is therefore of key importance.

To illustrate these points, we reproduced Table ES-2 from the Inventory and presented both AR5 100-year and 20-year GWPs (with climate-carbon feedbacks) for all greenhouse gases. The results are striking. On a 20-year GWP basis, total U.S. methane emissions are approximately equivalent to the heating influence of CO_2 generated by the entire electricity generating sector. This is key information: EPA has embarked on a ground-breaking effort to create standards for power plants; since methane is an equivalent contributor to near-term climate change, EPA should place an equally high priority on methane mitigation strategies. Overall, on a 20-year basis, methane emissions constitute some 27% of total U.S. greenhouse gas emissions – instead of only about 10% as reported in Table ES-2. Put another way, reporting only an (incorrect) 100-year methane GWP results in a ratio between warming from methane

and warming from CO_2 of about 1 to 10 (10%), while reporting the most accurate 20-year methane GWP shifts that ratio to 4 in 10 (40%). Presenting an accurate short-term comparison is thus critically important, and omission of these facts is highly misleading.

Gas/Source	2013 (Inventory GWP) MMT CO2eq	2013 (AR5 100-yr GWP) MMT CO2eq	2013 (AR5 20-yr GWP) MMT CO2eq	Percent total GHG emissions (GHG Inventory)	Percent total GHG emissions (AR5 100-yr)	Percent total GHG emissions (AR5 20-yr)
CO2	**5,556.0**	**5,556.0**	**5,556.0**	**82.4**	**79.4**	**66.8**
Fossil Fuel Combustion	5,195.5	5,195.5	5,195.5	77.1	74.2	62.5
Electricity Generation	2,040.5	2,040.5	2,040.5	30.3	29.2	24.6
Transportation	1,754.0	1,754.0	1,754.0	26.0	25.1	21.1
Industrial	817.3	817.3	817.3	12.1	11.7	9.8
Residential	329.9	329.9	329.9	4.9	4.7	4.0
CH4	**654.1**	**911.9**	**2,259.1**	**9.7**	**13.0**	**27.2**
Enteric Fermentation	164.5	223.7	565.9	2.4	3.2	6.8
Natural Gas Systems	159.9	230.3	556.5	2.4	3.3	6.7
Landfills	114.6	155.9	394.2	1.7	2.2	4.7
Total	**6,742.2**	**7,000.0**	**8,311.5**			

Excerpt from Appendix A. Entries for source categories are directly from Table ES-2 ("Recent Trends in U.S. Greenhouse Gas Emissions and Sinks") in the Draft GHG Inventory for 1990-2013 at ES-5. Data column 1 is a replicate of the last column in Table ES-2, which contains 2013 data. Data columns 2 and 3 in this table were compiled using IPCC AR5 100-year and 20-year GWPs. These GWPs include climate-carbon feedbacks, as recommended by the AR5. Methane GWPs: column 1 = 25; column 2 = 34 (biogenic) or 36 (fossil); column 3 = 86 (biogenic) or 87 (fossil). Data columns 4 through 6 reflect the percentage of total emissions (prior to removal of sinks) for each gas/source.

A compounding factor is that the methane emissions from certain sources are likely under-represented by EPA's analysis method. For instance, a number of peer-reviewed scientific studies suggest that methane leakage from natural gas systems could be as much as double what EPA assumes. Likewise, methane leakage from landfills is notoriously difficult to monitor and may also be much larger than EPA's calculations assume. In sum, not only does the Inventory fail to include critical information about methane's influence over the next 20 years, but even the corrected values we calculate here likely are a considerable under-estimate of methane emissions.

Comment: We commend EPA for using IPCC Fourth Assessment Report ("AR4") GWP values for the first time in this Inventory, a vast improvement over the use of Second Assessment Report values. While this is an important step, we and other organizations previously asked EPA to utilize the most up-to-date science and adopt the most recent methane GWPs from AR5, and to report both 100-year and 20-year methane GWPs. EPA declined to do so because current international reporting requirements under the United Nations Framework Convention on Climate Change employ only 100-year GWPs, and will begin using AR4 GWPs in 2015.

While we understand EPA's need to comply with international reporting requirements, we renew our call on EPA to update the emissions reported in the U.S. GHG Inventory to also reflect the AR5 GWPs, as well as report normalized emissions using both 20-year and 100-year GWPs for methane. The U.S. GHG Inventory is seminal, foundational document domestically for both government and private-sector decision-making and analysis. Providing reliable data for domestic use is one of its key purposes, separate and apart from international commitments, and requires the most accurate quantification of climate impacts possible. While the inclusion of Appendix 6 in the Inventory is helpful to the most careful readers – those who then also take the next step and perform their own calculations as we have done here – we request that EPA include these calculations to make the information both prominent and easily accessible.

Commenter: Cynthia Finley

National Association of Clean Water Agencies (NACWA)

Comment: The emissions from POTWs in the 2013 Inventory are essentially the same as those in the 2012 Inventory. NACWA appreciates the clarifications that have been made over the past few years to clarify the emissions calculations and the factors that are used. NACWA's primary concern with the Inventory is the extensive use of potentially outdated data and extrapolated data in the emissions calculations. For example, the 1992, 1996, 2000, and 2004 Clean Watershed Needs Surveys (CWNS) are used as the basis for the percent of wastewater flow to aerobic and anaerobic systems, the percent of utilities that do and do not employ primary treatment, and the wastewater flow to POTWs that have anaerobic digesters. EPA states that since the 2008 CWNS does not contain information that is detailed enough for use in the Inventory, information for the years 2004 through 2013 was forecast from the rest of the time series. The 2004 CWNS is likely outdated now, and forecasts made from it and the previous surveys may not accurately reflect recent trends and practices for wastewater utilities. A similar forecast was made for sludge generation and protein consumption.

Comment: NACWA's other concern with the Inventory calculations is the lack of specific emissions factors and calculation methods for the U.S. As NACWA has explained in comments on the Inventory in previous years, the Association believes that the nitrogen loading rates for N2OEFFLUENT are sourced incorrectly and that using information from the existing National Pollution Discharge Elimination System (NPDES) database will yield more accurate and justifiable loading rates. The NPDES permitting program represents long-term, nationwide facility performance that would allow emissions estimate projections over the time series represented in the Inventory. If EPA decides not to investigate its own databases, the average nitrogen loading rate of 15.1 g N/capita-day from Metcalf and Eddy (2003) represents the industry standard and is supported by a wealth of data widely confirmed in U.S. practice. This value represents all domestic sources of nitrogen, the use of other nitrogen-containing compounds, and both residential and commercial sources. EPA uses other values from Metcalf and Eddy (2003), such as the BOD5 production rate and BOD5 removed by primary treatment. Since this reference is valid for other factors, it should also be valid for the nitrogen loading rate.

Comment: NACWA agrees with EPA's planned improvements and encourages EPA to investigate additional data sources as soon as possible to ensure the accuracy of future Inventories.

Commenter: Brad Upton
National Council for Air and Stream Improvement, Inc. (NCASI)

Comment: Production statistics for the pulp and paper sector are too high. Table 7-12 lists 2013 production of the pulp and paper sector at 131.5 million metric tons, based on data from the Food and Agriculture Organization of the United Nations (FAO), and includes a note that this figure represents the sum of woodpulp production plus paper and paperboard production. Summing woodpulp, paper, and paperboard production results in double counting, because the majority of woodpulp production is used to produce paper and paperboard at integrated mills (an integrated mill includes both pulping and papermaking at the same facility, with a single wastewater treatment system).

A more appropriate method for characterizing total pulp and paper sector production would be to sum paper production, paperboard production, and market pulp1 production. For 2013, the American Forest and Paper Association (AF&PA) reported total production of paper and paperboard to be approximately 73 million metric tons and total production of market woodpulp to be approximately 8 million metric tons2. Based on these statistics, total pulp and paper sector production in 2013 was approximately 81 million metric tons. AF&PA provides its Statistical Summary reports to the Library of Congress annually, and has indicated a willingness to provide a gratis copy of the report directly to EPA. The August 2014 issue of the Statistical Summary is attached for your convenience (information on production of paper and paperboard can be found in Table 1 and information on production of market wood pulp can be found in Table 15).

Comment: EPA characterizes wastewater generation per ton of production based on water discharge statistics from AF&PA Sustainability Reports. These are the most current and relevant data for this characterization, and NCASI submits no comments on this use other than to emphasize that the agency should ensure it is using the most current version of the AF&PA Sustainability Report, which is published biennially, and attached for your convenience.

Comment: EPA characterizes the organic load in untreated wastewater using a legacy value of 0.4 gram BOD per liter of untreated effluent and a multiplier of 2 to convert from BOD to COD. NCASI has very limited data on untreated effluent organic load. Therefore, until additional data are available, we cannot suggest an alternative value.

Commenter: Erica Bowman
America's Natural Gas Alliance (ANGA)

Comment: For the past several years, ANGA has submitted comments on EPA's Draft GHG Inventories. In recent GHG Inventories, EPA has addressed some of these concerns, including adjusting the methodologies for estimating the frequency of well re-fracturing, emissions from hydraulically fractured well completions and workovers, and emissions from liquids unloading. ANGA supported these changes, which more accurately accounted for actual field practices. We encourage EPA to continue upgrading the GHG Inventory with net emission factors in place of potential emission factors as more data become available. We believe more accurate data will show lower methane emissions from the natural gas sector.

Comment: In the 2014 GHG Inventory, EPA adjusted the methodology for completions and workovers with hydraulic fracturing. These adjustments established four technology specific emissions factors for wells with hydraulically fractured completions and workovers using data from the 2011 and 2012 Greenhouse Gas Reporting Program (GHGRP) Subpart W.

In the 2015 Draft GHG Inventory, these emissions factors are updated using additional data from the 2013 GHGRP. These updates result in reductions for the emissions factors for three of the four well categories. Additionally, the updated data show more wells using RECs and fewer wells that directly vent all flowback emissions in 2012 compared to the 2014 GHG Inventory. These activity data better reflect actual industry practices, including the voluntary use of RECs by many producers. ANGA supports these changes, which address inaccuracies found in previous GHG Inventories that we have commented on in the past. We would also support further sub-categorization to recognize the differences between hydraulically fractured completions and hydraulically fractured workovers.

Comment: While ANGA supports the new emission factors for uncontrolled well completions as more accurately representing actual industry practices, they remain higher than measured results from the recent study by researchers at the University of Texas-Austin and supported by Environmental Defense Fund (UT Austin/EDF study). At 36.8 metric tons (MT) methane per vented well completion, for example, the estimate in the Draft 2015 GHG Inventory is one order of magnitude higher than similarly configured completions in the UT Austin/EDF Study, which found a range of 0.5-4 MT methane per completion event for those wells vented directly to atmosphere. Much of this difference can be attributed to the choke flow calculation methodology option in the GHGRP. The choke flow calculation methodology was not designed for use in multi-phase flow applications, and as such can often deliver erroneous results when compared to direct measurement. While ANGA supports continued use of the GHGRP data to update emission factors, ANGA encourages EPA to remove outlier data from the emission factor calculation and use only measured data in the GHGRP for the calculation of emission factors, not data derived from the choke flow equation methodology.

Comment: As noted above, ANGA supports the use of GHGRP data to establish emission factors and encourages EPA to continue using this data source to refine the emission factors for hydraulically fractured well completions and workovers. As industry technology and practices improve to further reduce methane reductions and the GHGRP continues to update its calculation and reporting methodologies, the emission factors for hydraulically fractured wells and completions should be adjusted accordingly. In addition to improving the accuracy of the GHG Inventory, creating emissions factors that more closely match the GHGRP data will provide public confidence in and increase uniformity across EPA's data programs.

Comment: While ANGA continues to believe that EPA's estimate of the number of uncontrolled well completions and workovers is too high, we understand that this number will decrease significantly in future GHG Inventories because they will factor in requirements included in the 2012 Oil and Gas NSPS. This rule requires the use of RECs for almost all completions and workovers after January 1, 2015 and required flowback emissions to be routed to a completion combustion device starting in October 2012. The impact of this rule can clearly be seen in the Draft 2015 GHG Inventory, which reports methane emissions from these activities decreasing by nearly 52 tons from 2012 to 2013.

Comment: In response to EPA's request for feedback on possible changes to the methodologies for estimating emissions from pneumatic controllers and liquids unloading, ANGA supports the use of direct measurements to develop technology- and/or process/function-specific emissions factors. Additionally,

ANGA supports the development of emissions factors and activity data on a regional as opposed to national basis. We believe that aggregation of regional data to calculate national emissions provides a more accurate estimate that accounts for regional variation in gas composition, production practices, and regulation.

Comment: Given the magnitude of the changes that the Agency has made over the past five years both increasing and decreasing estimated emissions from natural gas production, the underlying data and assumptions must be rigorous and well supported. ANGA appreciates the changes EPA has made to its methodology for estimating emissions from liquids unloading, its estimate of the frequency of workovers, and its methodology for hydraulically fractured well completions and workovers. We encourage EPA to continue updating its methodology and emissions factors with technology specific and region specific emissions factors based on valid data, assumptions and calculations. However, given the underlying uncertainties of the current data, ANGA does not support the use of the emissions estimates presented in the GHG Inventory as the basis for any analysis or regulatory action.

Commenter: Karin Ritter
American Petroleum Institute (API)

Comment: Regarding EPA's approach for designating "associated gas wells" within the category of "oil wells", EPA may be over estimating the number of associated gas wells and is not consistent with EIA and state approaches. API urges EPA to make note of this in the final inventory and commit to re-evaluate this as part of the methodology improvements for the next GHGI cycle.

Comment: API advises EPA to carefully analyze and screen GHGRP reported data in order to improve the validity of data used in the 2013 national GHGI. Obvious data outliers should be excluded or otherwise corrected to prevent disproportionately impacting the derivation of emission factors (EFs) or extrapolation of information for the national 2013 GHGI, as may be evident from the changes made to 2012 GHGRP data due to corrections of industry data. As discussed previously with EPA, the GHGRP data may potentially include incomplete or incorrect data due to ambiguity in implementation of approved EPA procedures, errors in applying the GHGRP calculations, and faults in data aggregation and reporting.

Comment: API supports the use of information reported through the GHGRP for developing the GHG emissions estimates for the refining sector in the 2013 national GHGI. Although the GHG emission profile for refineries has changed over the years due to additional controls, the use of throughput to scale emissions for 1990-2009 is an acceptable surrogate.

Comment: As API commented previously during the Expert Review Version of the 2013 GHGI, some reporters voluntarily reported emissions data for oil well completions and workovers with hydraulic fracturing in their 2011 through 2013 GHGRP data. API sorted the GHGRP data to examine those data sets reporting emissions data for oil formations where either Equation 10-B or 10-A with measured emissions were used. This excludes data sets which relied on the choke flow equation to estimate emissions. As a result of this analysis, API identified 149 reported data sets providing emissions data for 1,675 completions and 226 workovers for the years 2011 through 2013 combined. This is a substantial amount of information. Even with some ambiguities in the reported data, there is sufficient information to develop updated emission factors rather than using decade's old data from the 1996 GRI/EPA study.

API recommends the use of two data categories, which maximizes the use of data available from the GHGRP. Table 1 summarizes the resulting emission factors for these two data categories: vented oil well completions and workovers without REC, and all other oil well completions and workovers (Flared w/o REC, Vented w/REC, or Flared w/REC). Although there appear to be some data outliers, in general the emission data currently available shows that vented workovers and completions without REC have a distinctly higher emission rate than completions and workovers flared without REC, flared with REC, and vented with REC.

Table 1. Emission Factors Derived from GHGRP Data for Oil Well Completions and Workovers with Hydraulic Fracturing

Emission Factor Category	Vented w/out REC		Flared + REC	
	Tonnes CH_4/event	# Events	Tonnes CH_4/event	# Events
All Years	22.2	349	2.97	689
2013	0.01	11	0.6	153
2012	15.7	214	4.5	298
2011	35.5	124	2.6	238

* API's analysis results in fewer "ambiguous" data sets, thus 689 events are used for deriving the emission factor for the 'Flared + REC' category as compared with the total of 396 events that could be categorized as either 'Flared w/o REC', 'Vented w/REC', or 'Flared w/REC'. For 2013, the CH_4 emission factors are converted from tonnes CO2e using the CH_4 GWP value of 25 from the AR4. For 2012 and 2011, the CH_4 emission factors are converted from tonnes CO2e using the CH_4 GWP value of 21 from the SAR.

Until regular reporting of oil well completions and workovers is established, API recommends developing the emission factors based on all three years of available GHGRP data combined. The factors should be re-evaluated when more information is available.

Comment: API agrees with excluding 2000 GOADS data.

Comment: API agrees with the proposed approach for applying GOADS data to previous years. API recognizes that using the 2005 GOADs data for inventory years 1990 through 2006 is a bit of a stretch for the early inventory years, but believes this is the best option of those considered.

Comment: The proposed method of obtaining platform counts will absolutely result in overestimated emissions, as the platform census is not able to differentiate between active and nonactive platforms. There is an industry-wide tool called "Lexco/OWL" that should have better information. BOEM/BSEE is certainly aware of this tool because they maintain the data in the tool. It would be informative to understand whether EPA plans to count each structure as a "platform", or each complex. BOEM designates bridge connected structures as a "complex" with a unique complex ID. While the method of determining an average emission factor and applying it to facilities according to the 4 facility "buckets" seems like it would result in an overestimation of emissions, applying the factor to each structure, rather than each complex will certainly result in flawed, overestimated emissions.

Comment: Is this volume of gas received from MMS/BOEMRE a single volume that a percentage is then called flared? If so, the method looks to be a very inaccurate method to split out the combusted from the uncombusted emissions. A method to potentially get closer to combusted vs uncombusted emissions

would be to start with the gas release volumes that PRA gas volume accounting has provided to BOME on the OGOR reports over the years. Even if BOME has retained this data, determining what portion of each of these reported volumes is combusted, or not, would be a labor-intensive exercise. It may be easier to ID the platforms that have a true flare system that combusts the gas and apply these volumes.
The above effort would be needed because prior to 2010, PRA volume accounting provided volumes of gas released from fields to BOME as "flare." Re-write of Subpart K in 2010 moved the offshore producers to update their OGOR reports to reflect separate reporting into a flare or a vent release.

Comment: API provided an analysis of the GHGRP data to EPA in October 2014 and in our comments on the Expert Review version in the GHGI. Table 2 compares emissions factors that API developed from the 2013 GHGRP data, those proposed by EPA for the 2013 national GHGI (which are based on a combination of 2011-2013 data) as well as combined 2012-2013 data that are proposed by API for the 2013 national GHGI.

Table 2. Comparison of EPA and API Analysis of GHGRP Data for Gas Well Completions and Workovers with Hydraulic Fracturing

	Emission Factor Category	2013 GHGRP Data	2011-2012 GHGRP Data (Used in 2012 GHGI)	2011, 2012, 2013 GHGRP Data (Proposed by EPA for 2013 GHGI)	2012 and 2013 GHGRP Data (Proposed by API for the 2013 GHGI)
		Tonnes CH_4/event			
EPA Emission Factor Approach	Vented w/out REC	28.8	38.0	36.8	
	Flared w/out REC	3.7	5.2	4.9	
	Vented with REC	3.3	3.2	3.2	
	Flared with REC	4.0	5.4	4.9	
API Emission Factor Approach*	Vented w/out REC	38.3	48.9	47.6	35.4
	Flared + REC	2.9	4.3	3.8	3.5

*Note, the API derived emission factors are not a simple combination of EPA's 3 categories above. API's analysis results in fewer "ambiguous" data sets. For 2013, the CH_4 emission factors are converted from tonnes CO2e using the CH_4 GWP value of 25 from the AR4. For 2012 and 2011, the CH_4 emission factors are converted from tonnes CO2e using the CH_4 GWP value of 21 from the SAR.

As Table 2 shows, the emission factors for workovers and completions flared without REC, flared with REC, and vented with REC are essentially the same within the expected uncertainty bounds.

Over time, the majority of completions and workovers will utilize REC due to regulatory requirements and increased use of control technologies such as gas separation and capture with, or without, flaring. API continues to contend that these three categories can be combined resulting in only two categories for grouping the completion and workover emissions data for deriving representative emission factors. These two categories will be more straightforward to back cast for previous reporting years in the national GHGI and are consistent with current practices and the phased-in implementation of emission control regulations.

EPA's memo on the proposed revisions to hydraulically fractured gas well completions and workovers does not indicate any assumptions EPA used in evaluating the GHGRP data for the 2013 national GHGI.

Differences between API's analysis and EPA's are apparent in the comparison of emission factors for vented completions and workovers without REC, indicating different assumptions in the analysis. EPA should document any assumptions used in the approach.

Finally, due to potential data issues associated with the first year of reporting, API suggests excluding 2011 data in the development of emission factors. The GHGRP provides sufficient data to support annual updates to the emission factors for years going forward, as indicated by the API proposed emission factors that are based on the GHGRP data from 2012-2013 only.

Comment: API's analysis of the GHGRP data shown in Table 2 is based on information from 4,843 of the total 27,207 completion and workover events reported for 2013. Additional information will be reported through the GHGRP in 2015 as companies report previously deferred data. The deferred data should provide additional clarity and improve the ability to classify the completions and workovers emissions. API also believes that the quality of emission data reported to the GHGRP has improved over time. Therefore, API suggests that EPA examine data that would be reported through the GHGRP by the end of March 2015 and consider its applicability for potential development of regional emission factors and activity data that could be used starting with the 2014 national GHGI.

Comment: API appreciates EPA's effort to improve transparency and reproducibility in the way it generates the natural gas and petroleum system well counts. As EPA has proposed in the 2013 national GHGI, API believes the approach to classifying all active production wells as either "Non-associated Gas Wells" or "Oil Wells," then defining an oil well sub-population as "Associated Gas Wells," all based solely on GOR would simplify the well count process and improve reproducibility. API also believes this approach would be the best option to implement since this option clarifies the well count process while still allowing for a distinction between associated and non-associated gas wells. In the expert review version of the inventory, API had commented that if this approach is adopted, EPA should use a GOR ratio of >100 Mcf/bbl to define a "gas well" versus an "oil well" and then use the GOR > 6 Mcf/bbl threshold to define an "associated gas well" as a subset of "oil wells" to best reflect the wide range of definitions used by the states.

EPA had stated that they would "apply a GOR threshold to identify a sub-population of 'Oil Wells' that produce substantial amounts of gas and should be classified as 'Associated Gas'." However, in the Public Comment version of the 2013 GHGI, EPA essentially chose a GOR of zero for the threshold by deciding that "any well within the oil wells population . . . that also produces any gas is classified as an associated gas well in the Inventory" (emphasis added). This means that any well with a GOR of 100 MCF/Bbl or less (the threshold for an oil well) that also has any gas production, will be categorized as an associated gas well.

API believes that this choice is incorrect. It is very common for wells that produce mainly oil to also produce a small amount of gas (as demonstrated in the query into the Drilling Info database as shown in Table 3 below). The difference between the previously proposed Options (as described in the Expert Review version of the 2013 GHGI) is that the preferred approach meant "to treat oil wells with significant gas production differently than primarily gas-producing or oil-producing wells (as they are expected to have emissions somewhere between the two populations)—and therefore included a population of 'associated gas' wells." By not including a meaningful threshold to distinguish the sub-population of associated gas wells from oil wells, the way EPA has elected to implement this approach fails to treat these wells differently.

As EPA notes, "The GOR selected to define the "Associated Gas Wells" population will need to be thoughtfully chosen and well-documented." API recommends using a threshold of 6 MCF/Bbl to separate out the subpopulation of "associated gas wells" from the selection of oil wells. This is the threshold that the EIA uses to classify associated gas wells versus oil wells. Table 3 below exhibits the difference in well counts when using a threshold of 6 MCF/Bbl versus a threshold of any gas production. The example is based on a sample of 2014 wells in the Eagle Ford and Williston basins using the Drilling Info database. In each case, "Gas Wells" and "Oil Wells" are distinguished by the 100 MCF/Bbl threshold described by EPA. The example emphasizes that using the EPA's definition for "associated gas wells" would classify virtually all "oil wells" as "associated gas wells" in the Williston and Eagle Ford Basins.

Table 3. Comparison of Well Counts for Williston ad Eagle Ford Basins

Threshold for Associated Gas Wells	*Gas Wells*	*Oil Wells*	Associated Gas Wells (Sub-population)	Strictly Oil Wells (Sub-population)
Williston Basin				
Any Gas Production (EPA)	*2,844*	*13,499*	13,498	1
6 MCF/Bbl	*2,844*	*13,499*	280	13,219
Eagle Ford Basin				
Any Gas Production (EPA)	*606*	*11,893*	11,734	159
6 MCF/Bbl	*606*	*11,893*	3,175	8,718

Despite the obvious bias introduced by EPA's implementation of the selected approach, API recognizes that EPA might not be in a position to make major changes to the GHGI prior to submitting it to the UNFCCC by mid-April 2015. Nonetheless, API is urging EPA to note in the final report for the 1990-2013 GHGI that their assignment of "associated gas wells" within the "oil wells" category may be challenging and may lead to over counting "associated gas well", and is not compatible with EIA's and States' approaches as well as industry's recommendations. EPA should go further and commit itself to address this issue more fully as part of methodology improvements for the next GHGI cycle.

Comment: It should also be noted that in EPA's supplemental note on pneumatic controllers the discussion on controller counts per well refers to only some 400,000 wells nationwide, which is less than half the wells in the U.S. API expects that with the updated pneumatic device inventories that would become available with 2014 data, it will be possible to improve both the counts of pneumatic devices per well.

Comment: Emissions from condensate tanks in natural gas production operations have increased 13% from 2012 due to large increases in the activity data. The memo on Proposed Revisions to Well Counts Data indicates that condensate production data are taken from EIA. Such a large increase in the activity data warrants an explanation in the 2013 national Inventory.

Comment: There is a discrepancy in the emissions data reported for gas well completions and workovers with hydraulic fracturing in the Rocky Mountain region. Table A-133 (page A-189) reports 604,275 workovers per year for this one region. This appears to be a typo.

Commenter: Lesley Fleischman and David McCabe
Clean Air Task Force (CATF)

Comment: We are pleased to see that EPA is working to improve the GHG Inventory on multiple fronts and is using new data sets as they become available. We also endorse efforts to make the methodology of Petroleum and Natural Gas Systems sections of the inventory more transparent.

Comment: Based on our review of the Pneumatics Memo and Appendix 3 of the Public Draft, CATF agrees that the Inventory should apportion emissions reductions reported to Natural Gas STAR for pneumatic controllers between the Natural Gas and Petroleum Systems sections of the Inventory.

However, the overall approach EPA takes to pneumatic controllers produces inventory documents which are very opaque. EPA should use a similar approach as used for well completions to tabulate emissions from pneumatic controllers. Instead of listing potential emissions and regulatory and voluntary reductions for pneumatic controllers, EPA should list net emissions for multiple classes of pneumatic controllers, such as high-continuous bleed, low-continuous bleed, intermittent bleed, and zero-bleed. The final category has no emissions, but should be tracked in the inventory to provide fuller information about activity levels. This approach would closely parallel the approach used for gas well completion emissions.

Voluntary and regulatory emissions reductions from pneumatic controllers are quite substantial and EPA may wish to tabulate the magnitude of those reductions in the inventory. This is easily handled with a separate table.

This would be far better than handling the various classes of controller by calculating the average emissions per controller, as the inventory currently does. This would make the inventory easier to understand, make it easier to compare inventory emissions factors to measurements in the field, and make the implications of potential future policies clearer. Finally, it would allow much more straightforward comparison with the GHGRP and would make it more straightforward to tabulate the effects of NSPS Subpart OOOO on emissions.

Comment: The Pneumatics Memo also highlights several studies that indicate that the number of pneumatic controllers per well is higher than previous estimates. The Allen et al. 2014 study suggests that there are at least 1.5 controllers per well, and the Oklahoma Independent Petroleum Association study suggests that there is an average of at least 3.6 controllers per well (and an even more for newer wells). The current inventory estimates approximately 1 pneumatic controller per well, which is clearly too low in light of these studies. Thus, we suggest that EPA increase its assumption about the number of pneumatics per well based on these recent studies.

Comment: In Table 6 of the Pneumatics Memo, EPA notes that the OIPA study reports emissions factors of: "Average 1.05 scf whole, gas/hour; 0.40 scf/h intermittent vent, 21.54 scf/h continuous bleed." However, the emissions factors quoted in the OIPA study represent manufacturer reported emissions rates, and thus they do not measured emissions rates. Studies like Allen et al. 2014 have found that measured emissions are much higher than manufacturer reported emissions. Thus, we caution the EPA against using emissions estimates from the OIPA study and recommend that EPA uses, or at least considers, direct measurements in revising the emissions factors.

Table 6 also presents results from the Prasino Study. It notes that the report lists emissions factors of 9.2 scfh and 9.0 scfh for "high-bleed controllers." It is critical to note that the Prasino study considered any

controller actually emitting over 6 scfh to be a "high-bleed" controller, even though many of the controllers that they classified as such were designed to emit less than 6 scfh. Excess emissions from these controllers, which are generally classified as low-bleed controllers (because that's what they are designed to be, and in general well operators are not checking actual bleed rates from installed controllers), are a significant concern. However, emissions from controllers designed to emit more than 6 scfh are probably considerably larger than emission from malfunctioning low-bleeds. Averaging in a large number of malfunctioning low-bleeds into this data set leads to an average emissions factor which is far lower than the expected emissions from controllers designed to be high-bleed. As a result, this emissions factor is not comparable with other emissions factors for high-bleed pneumatic controllers.

Comment: We were pleased to see that the EPA is starting to think about including emissions from abandoned wells in the GHG Inventory. This is an area with a great deal of uncertainty, both in terms of the number of abandoned wells and the emissions from those wells. However, this could be a significant emissions source and it could help fill the gap between bottom up and top down studies of methane emissions. We encourage the EPA to review the Kang et al. study, published in December 2014 ("Direct measurements of methane emissions from abandoned oil and gas wells in Pennsylvania").

Comment: EPA stated that it is seeking comments on the casinghead gas emissions source. The GHG Reporting Program has data on casinghead gas emissions in the source category: Associated Gas Venting Flaring. In 2013, companies reported methane emissions in this category of 84,103 metric tons. In contrast, in the draft GHG Inventory, emissions from Stripper wells were 14,215 metric tons in 2013. Thus, it is clear that the GHG Inventory underestimates casinghead gas emissions. One reason for this discrepancy is the fact that casinghead gas emissions occur at a wider set of associated gas oil wells, not only at stripper wells. Thus, it may be appropriate for the EPA to peg casinghead gas emissions to the new category of Associated Gas Oil Wells, rather than the Stripper Well category.

Commenter: Theresa Pugh
Interstate Natural Gas Association of America (INGAA)

Comment: The T&S methane emissions inventory in the Draft GHG Report "increases" from 51.8 million metric tons CO_2 equivalent (CO_2e) in 2012 to 54.4 million metric tons CO_2 equivalent (CO_2e) in 2013. Some portion of this increase can be attributed to the EPA's decision to increase the global warming potential of methane from 21 to 25. EPA should clarify the extent and impact of the changes to the methane global warming potential on the National Inventory, including T&S methane emissions.

Comment: It also appears that the methodology used by EPA to calculate GHG emissions from the T&S sector is a significant contributor to the year-over-year increase in emissions attributed to this sector. EPA has not changed the emission factors (EFs) used for the T&S sector other than when EFs were updated to reflect centrifugal compressors with wet seals. Nearly all other EFs from T&S are from the 1996 EPA-GRI Report and have not changed since the National Inventory reporting started in the late 1990s.

Changes in Activity Data (e.g., compressor counts, facility counts) from year-to-year often are driven by methodology rather than real changes in physical assets. Thus, nominal year-to-year changes in "emissions" for T&S operations in the Draft GHG Report often are driven by methodology rather than actual emissions.

As a result of this and other marginal year-to-year changes for other natural gas sectors, some have reported that methane emissions from natural gas operations increased by 1.5 percent from 2012 to 2013. This increase is likely a calculation methodology change rather than an actual change in emissions.

The Draft Annex Report indicates that the T&S methane emission increases from 2012 to 2013 are driven by changes to the estimated number of storage station facilities and the related change in compressor counts at storage facilities (i.e., compressor counts are based on the storage facility counts because an average number of compressors per facility is assumed). According to footnote 2 in Table A-137 of the Draft Annex Report, EPA adjusts the storage facility count from year-to-year based on "ratios for relating other factors for which activity data are available." However, the related process or operational parameter used for this scaling is not apparent. Therefore, INGAA recommends that EPA provide greater transparency to explain the methodologies and assumptions embedded into its National Inventory. This methodology has resulted in the following changes in storage station facility counts for the 2011 report through the 2015 Draft GHG Report.

Table 1. Annual Variants of Storage Facility Data Based Upon Prior Inventories

2011	2012	2013	2014	2015
392	408	389	344	407

Similar relative year-to-year changes occur for reciprocating and centrifugal compressors at storage facilities. Clearly, this is not indicative of actual year-to-year changes in the number of facilities and compressors that are in operation. While there may be some year-to-year changes in the number of facilities in actual operation, the discrepancies appear to go far beyond this. It should be incumbent upon EPA to differentiate between changes in emissions attributable to actual changes in facilities versus changes attributable to the methodology.

Regardless of the basis of the scaling adjustment, it is not apparent that this scaling provides a comparable real-world change in methane emissions, especially since EFs are based on older studies and have not been updated to consider Subpart W data. There also are assumptions in the National Inventory about reductions in emissions based on Gas STAR Gold information that introduce some fluctuations (and uncertainty). INGAA urges EPA to highlight and explain how these factors affect calculation of the National Inventory each year.

The Draft GHG Report should be revised to describe clearly the calculation methodology and to clarify the uncertainty in estimates and limitations in the data reflecting a year-to-year increase (or decrease). Failure to clarify these calculation methodology changes can result in faulty and inaccurate conclusions regarding total national GHG emissions and emissions from industry sectors. An accurate National Inventory is essential for stakeholder understanding of emissions from the industrial sectors and for future policy decisions.

Comment: U.S. domestic natural gas is a key component of the U.S. energy portfolio. Because of the fuel's importance and the sharp increase in domestic supply over the past decade, interest in GHG emissions—especially methane emissions from natural gas systems including T&S operations—is keen. For many natural gas system emissions sources, including most T&S sector sources, the national estimates are based on EFs from the EPA-GRI project that resulted in the 1996 EPA-GRI Report. Most of

the EFs used for the T&S sector have not changed since the 1996 EPA-GRI report. Although EPA updated EFs associated with centrifugal compressors with wet seals, nearly all other EFs from the T&S sector are from the 1996 EPA-GRI Report and have not changed since National Inventory reporting started in the late 1990s. Further, the fact that EPA has not differentiated changes in components (such as through new technology or new measurements) may further compound the inaccuracies in the National Inventory calculations.

With significant new emissions data becoming available from the mandatory Greenhouse Gas Reporting Program (GHGRP) and other stakeholder projects, and new technological advances, it is imperative that EPA undertake efforts to analyze the new studies, reassess and update historical emissions data, and integrate improved emission estimates into the National Inventory.

INGAA recognizes that EPA has revised production-related methane emission estimates in recent annual reports. The agency has made an effort in the past three years to review, compare and incorporate GHGRP Subpart W data for the production sector. INGAA supports EPA initiating a similar process to review methane emission estimates in the T&S sector.

Comment: Significant differences between the GHGRP Subpart W estimate and Draft GHG Report estimate of methane emissions for the T&S sector suggest that the Draft GHG Report data may be over-stated. The Subpart W methane emissions estimates are about an order of magnitude lower than the Draft GHG Report estimate. This is due in part to the GHGRP reporting threshold that results in less than a third of compressor stations reporting. However, if GHGRP Subpart W estimates are normalized and scaled using the activity data for T&S estimates in the Draft GHG Report (i.e., based on activity data of facility count and compressor count), estimates based on Subpart W data are still significantly lower than the estimate in the current Draft GHG Report.

As the EPA is aware, the T&S sector (along with the gas processing sector) are unique within the GHGRP, in that direct measurement is required for several key sources, such as emissions from reciprocating compressor rod packing and leakage associated with compressor unit isolation valves and compressor blowdown valves. Thus, thousands of measurements have been completed at T&S facilities since Subpart W reporting began in 2011. The GHGRP data is intended to be used as a basis for the National Inventory and related policy decisions regarding GHG and methane emissions, but the EPA's Subpart W data for T&S operations are currently not being used for that purpose. INGAA urges the EPA to integrate Subpart W data into the National Inventory.

Comment: The Draft GHG Report includes a "Planned Improvements" section that mentions the availability of additional data from the GHGRP and other sources. It is imperative that the EPA implement a plan to incorporate the GHGRP data for T&S sources into the existing 1990-2014 National Inventory estimate as well as future estimates. INGAA offers its support for an effort to compile and analyze this data to improve EFs from key sources such as compressors, and use updated EFs to improve the National Inventory.

Comment: T&S facilities are required to measure many sources (e.g., compressor related vent lines) and measurement data are available from GHGRP Subpart W reports submitted for the 2011-2013 annual reporting years. The measurements for 2014, along with additional data from 2011-2013 related to EPA's confidentiality determinations that must be reported this year, will be reported by March 31, 2015. This data also should be integrated into the National Inventory.

Comment: Moreover, as the EPA is aware, natural gas systems operators, including INGAA members, are also conducting a collaborative methane emissions project with the Environmental Defense Fund. A Colorado State University paper on T&S measurements was recently published.5 In addition, a Pipeline Research Council International project is compiling and analyzing Subpart W measurement data for development of new emission factors for the T&S sector. It is imperative that this wealth of new information be incorporated into the EPA's annual National Inventory.

Comment: INGAA believes EPA clearly and transparently should explain all changes to the methodology it relies upon to arrive at its National Inventory. All stakeholders should have the ability to understand the reason for any increases or decreases to the level of the National Inventory and changes attributable to the various sectors.

INGAA recommends that EPA revise the Planned Improvements section of the Draft GHG Report to define how EPA plans to integrate additional data, including Subpart W data, into its National Inventory, with a goal to use updated emission factors in the 2016 annual National Inventory report. EPA should work with all stakeholders, including INGAA, on this effort. A more accurate and timely National Inventory will help regulators, the industry and the public understand the GHG Inventory and sources of emissions.

Commenter: Wayne Evans
NorthWest Research Associates (NWRA)

Comment: GWPs should be 33 for 100 year and 82 for 20 year time scales from the IPCC 2013 report

Comment: A 20 year time scale is much more consistent with recent time trends in methane

Comment: Recent satellite data indicate that global methane in the NH is increasing again (since 2000). This may be due to unaccounted for methane leakage of gas fields during natural gas production.

Comment: There is a large discrepancy between Bottom up and Top down measurements of gas field leakage of methane. The bottom up measurements around gas wells indicate leakage rates of about 2% of production. The top down measurements from aircraft indicate that basin leakages are around 9 %. The discrepancy is about 7% of production. The satellite measurements are consistent with the aircraft measurements. The most likely explanation of this discrepancy is that the gas basins are leaking in a bulk sense. It has been shown that most gas deposits are overlain by layered coal beds. The boring of gas wells punctures the coal beds and results in large scale gas leaks on a scale larger than the individual gas wells. Fracking likely enhances this leakage process. The conclusion is that EPA is under reporting the gas field leaks to the UNFCCC: 2% instead of 9%! Similarly, other countries are under- reporting their gas production leakage rates.

Comment: If the gas field leakage rates were reported with 10% of production and a GWP of 82, then, the US total greenhouse budget would be about 30% higher. Similarly the GHG budget of most gas producing countries would be increased considerably more.

Comment: Until the combined gas field coal bed leakage effect can be resolved, one has to question as to whether natural gas is really a climate change friendly fuel.

Supplemental Material Received

Appendix A

Appendix A from the Center Biological Diversity comment on the U.S. Greenhouse Gas Emissions and Sinks: 1990-2013

Appendix B

American Forest & Paper Association 2013 Statistical Summary of Pulp, Paper and Paperboard

Appendix C

American Forest & Paper Association 2014 Sustainability Report

Appendix A

APPENDIX A

Table 1. The entries for source categories are directly from Table ES-2 ("Recent Trends in U.S. Greenhouse Gas Emissions and Sinks") in the Draft GHG Inventory for 1990-2013 at ES-5. Data column 1 is a replicate of the last column in Table ES-2, which contains 2013 data. Data columns 2 and 3 in this table were compiled using IPCC AR5 100-year and 20-year GWPs, respectively for methane and nitrous oxide. These GWPs include climate-carbon feedbacks, as recommended by the AR5. GWPs for HFCs, PFCs, SF6 and NF3 were not altered. Methane GWPs: column 1 = 25; column 2 = 34 (biogenic) or 36 (fossil); column 3 = 86 (biogenic) or 87 (fossil). Data columns 4 through 6 reflect the percentage of total emissions (prior to removal of sinks) for each gas/source.

Gas/Source	2013 (Inventory GWP) MMT CO2eq	2013 (AR5 100-yr GWP) MMT CO2eq	2013 (AR5 20-yr GWP) MMT CO2eq	Percent total GHG emissions (Inventory)	Percent total GHG emissions (AR5 100-yr)	Percent total GHG emissions (AR5 20-yr)
CO2	**5,556.0**	**5,556.0**	**5,556.0**	**82.4**	**79.4**	**66.8**
Fossil Fuel Combustion	5,195.5	5,195.5	5,195.5	77.1	74.2	62.5
Electricity Generation	2,040.5	2,040.5	2,040.5	30.3	29.2	24.6
Transportation	1,754.0	1,754.0	1,754.0	26.0	25.1	21.1
Industrial	817.3	817.3	817.3	12.1	11.7	9.8
Residential	329.9	329.9	329.9	4.9	4.7	4.0
Commercial	221.5	221.5	221.5	3.3	3.2	2.7
U.S. Territories	32.3	32.3	32.3	0.5	0.5	0.4
Non-Energy Use of Fuels	133.0	133.0	133.0	2.0	1.9	1.6
Iron and Steel Production & Metallurgical Coke Production	52.3	52.3	52.3	0.8	0.7	0.6
Natural Gas Systems	37.8	37.8	37.8	0.6	0.5	0.5
Cement Production	36.1	36.1	36.1	0.5	0.5	0.4
Petrochemical Production	26.3	26.3	26.3	0.4	0.4	0.3
Lime Production	14.1	14.1	14.1	0.2	0.2	0.2
Ammonia Production	10.2	10.2	10.2	0.2	0.1	0.1
Incineration of Waste	10.1	10.1	10.1	0.1	0.1	0.1
Cropland Remaining Cropland	9.9	9.9	9.9	0.1	0.1	0.1
Petroleum Systems	6.0	6.0	6.0	0.1	0.1	0.1

Gas/Source	2013 (Inventory GWP) MMT CO2eq	2013 (AR5 100-yr GWP) MMT CO2eq	2013 (AR5 20-yr GWP) MMT CO2eq	Percent total GHG emissions (Inventory)	Percent total GHG emissions (AR5 100-yr)	Percent total GHG emissions (AR5 20-yr)
Urea Consumption for Non-Agricultural Purposes	4.7	4.7	4.7	0.1	0.1	0.1
Other Process Uses of Carbonates	4.4	4.4	4.4	0.1	0.1	0.1
Aluminum Production	3.3	3.3	3.3	0.0	0.0	0.0
Soda Ash Production and Consumption	2.7	2.7	2.7	0.0	0.0	0.0
Ferroalloy Production	1.8	1.8	1.8	0.0	0.0	0.0
Titanium Dioxide Production	1.6	1.6	1.6	0.0	0.0	0.0
Zinc Production	1.4	1.4	1.4	0.0	0.0	0.0
Phosphoric Acid Production	1.2	1.2	1.2	0.0	0.0	0.0
Glass Production	1.2	1.2	1.2	0.0	0.0	0.0
Carbon Dioxide Consumption	0.9	0.9	0.9	0.0	0.0	0.0
Wetlands Remaining Wetlands	0.8	0.8	0.8	0.0	0.0	0.0
Lead Production	0.5	0.5	0.5	0.0	0.0	0.0
Silicon Carbide Production and Consumption	0.2	0.2	0.2	0.0	0.0	0.0
Magnesium Production and Processing	+	+	+			
Land Use, Land-Use Change, and Forestry (Sink)	*-882.0*	*-882.0*	*-882.0*	*-13.1*	*-12.6*	*-10.6*
Wood Biomass and Ethanol Consumption	*283.3*	*283.3*	*283.3*	*4.2*	*4.0*	*3.4*
International Bunker Fuels	*99.8*	*99.8*	*99.8*	*1.5*	*1.4*	*1.2*
CH4	**654.1**	**911.9**	**2,259.1**	**9.7**	**13.0**	**27.2**
Enteric Fermentation	164.5	223.7	565.9	2.4	3.2	6.8
Natural Gas Systems	159.9	230.3	556.5	2.4	3.3	6.7

Gas/Source	2013 (Inventory GWP) MMT CO2eq	2013 (AR5 100-yr GWP) MMT CO2eq	2013 (AR5 20-yr GWP) MMT CO2eq	Percent total GHG emissions (Inventory)	Percent total GHG emissions (AR5 100-yr)	Percent total GHG emissions (AR5 20-yr)
Landfills	114.6	155.9	394.2	1.7	2.2	4.7
Coal Mining	64.6	93.0	224.8	1.0	1.3	2.7
Manure Management	61.4	83.5	211.2	0.9	1.2	2.5
Petroleum Systems	40.4	58.2	139.0	0.6	0.8	1.7
Wastewater Treatment	15.0	20.4	51.6	0.2	0.3	0.6
Rice Cultivation	8.3	11.3	28.6	0.1	0.2	0.3
Stationary Combustion	8.0	11.5	27.8	0.1	0.2	0.3
Abandoned Underground Coal Mines	6.2	8.9	21.6	0.1	0.1	0.3
Forest Land Remaining Forest Land	5.8	7.9	20.0	0.1	0.1	0.2
Mobile Combustion	2.1	3.0	7.3	0.0	0.0	0.1
Composting	2.0	2.7	6.9	0.0	0.0	0.1
Iron and Steel Production & Metallurgical Coke Production	0.7	1.0	2.4	0.0	0.0	0.0
Field Burning of Agricultural Residues	0.3	0.4	1.0	0.0	0.0	0.0
Petrochemical Production	0.1	0.1	0.3	0.0	0.0	0.0
Ferroalloy Production	+	+	+			
Silicon Carbide Production and Consumption	+	+	+			
Wetlands Remaining Wetlands	+	+	+			
Incineration of Waste	+	+	+			
International Bunker Fuelsc	0.1	0.1	0.3	0.0	0.0	0.0
N2O	**354.5**	**354.5**	**318.8**	**5.3**	**5.1**	**3.8**
Agricultural Soil Management	263.7	263.7	237.2	3.9	3.8	2.9

Gas/Source	2013 (Inventory GWP) MMT CO2eq	2013 (AR5 100-yr GWP) MMT CO2eq	2013 (AR5 20-yr GWP) MMT CO2eq	Percent total GHG emissions (Inventory)	Percent total GHG emissions (AR5 100-yr)	Percent total GHG emissions (AR5 20-yr)
Stationary Combustion	22.9	22.9	20.6	0.3	0.3	0.2
Mobile Combustion	18.4	18.4	16.5	0.3	0.3	0.2
Manure Management	17.3	17.3	15.6	0.3	0.2	0.2
Nitric Acid Production	10.7	10.7	9.6	0.2	0.2	0.1
Wastewater Treatment	4.9	4.9	4.4	0.1	0.1	0.1
N2O from Product Uses	4.2	4.2	3.8	0.1	0.1	0.0
Forest Land Remaining Forest Land	4.2	4.2	3.8	0.1	0.1	0.0
Adipic Acid Production	4.0	4.0	3.6	0.1	0.1	0.0
Settlements Remaining Settlements	1.8	1.8	1.6	0.0	0.0	0.0
Composting	1.8	1.8	1.6	0.0	0.0	0.0
Incineration of Waste	0.3	0.3	0.3	0.0	0.0	0.0
Semiconductor Manufacture	0.2	0.2	0.2	0.0	0.0	0.0
Field Burning of Agricultural Residues	0.1	0.1	0.1	0.0	0.0	0.0
Wetlands Remaining Wetlands	+	+	+			
International Bunker Fuelsc	0.9	0.9	0.8	0.0	0.0	0.0
HFCs, PFCs, SF6 and NF3	**177.6**	**177.6**	**177.6**	**2.6**	**2.5**	**2.1**
HFCs	**164.3**	**164.3**	**164.3**	**2.4**	**2.3**	**2.0**
Substitution of Ozone Depleting Substancesd	158.6	158.6	158.6	2.4	2.3	1.9
HCFC-22 Production	5.5	5.5	5.5	0.1	0.1	0.1
Semiconductor Manufacture	0.2	0.2	0.2	0.0	0.0	0.0
Magnesium Production and	0.1	0.1	0.1	0.0	0.0	0.0

Gas/Source	2013 (Inventory GWP) MMT CO2eq	2013 (AR5 100-yr GWP) MMT CO2eq	2013 (AR5 20-yr GWP) MMT CO2eq	Percent total GHG emissions (Inventory)	Percent total GHG emissions (AR5 100-yr)	Percent total GHG emissions (AR5 20-yr)
Processing						
PFCs	**5.8**	**5.8**	**5.8**	**0.1**	**0.1**	**0.1**
Aluminum Production	3.0	3.0	3.0	0.0	0.0	0.0
Semiconductor Manufacture	2.9	2.9	2.9	0.0	0.0	0.0
SF6	**6.9**	**6.9**	**6.9**	**0.1**	**0.1**	**0.1**
Electrical Transmission and Distribution	5.1	5.1	5.1	0.1	0.1	0.1
Magnesium Production and Processing	1.4	1.4	1.4	0.0	0.0	0.0
Semiconductor Manufacture	0.4	0.4	0.4	0.0	0.0	0.0
NF3	**0.6**	**0.6**	**0.6**	**0.0**	**0.0**	**0.0**
Semiconductor Manufacture	0.6	0.6	0.6	0.0	0.0	0.0
Total	**6,742.2**	**7,000.0**	**8,311.5**			
Net Emissions (Sources and Sinks)	**5,860.2**	**6,118.0**	**7,429.5**			

Appendix B

2013 Statistical Summary

American Forest & Paper Association

1101 K Street, NW, Suite 700
Washington, DC 20005
(202) 463-2700
http://www.afandpa.org

August 2014

PAPER

PAPERBOARD

PULP

America's Forest & Paper People® — Improving Tomorrow's Environment Today®

Table of Contents

Table of Contents

This is the fifty-second edition of AF&PA's Statistics of Paper, Paperboard, and Wood Pulp. This annual report covers the U.S. Paper Industry and includes a broad range of industry statistics. The source of data in this report is AF&PA, unless otherwise noted. Totals have not been adjusted to account for differences in rounding. Comments or suggestions as to how this report can be improved are welcome and should be directed to Karen Hibdon at 202-463-2724 or by email at Karen_Hibdon@afandpa.org.

Production, Imports, Exports and New Supply

TABLE 1 Paper and Paperboard Production, Imports, Exports and New Supply[1]

Year	Includes Wet Machine Board and Construction Grades					Excludes Wet Machine Board and Construction Grades				
	Production	Imports (Incl. Products)	Exports (Incl. Products)	New Supply [1]	Per Capita New Supply	Production	Imports (Incl. Products)	Exports (Incl. Products)	New Supply [1]	Per Capita New Supply
	thousands of short tons				*pounds*	*thousands of short tons*				*pounds*
1965	43,455	6,585	1,770	48,270	496.9	40,489	6,545	1,737	45,297	466.3
1970	51,670	7,115	2,817	55,968	545.9	48,719	7,057	2,779	52,997	516.9
1975	50,976	6,253	3,116	54,113	501.1	47,997	6,164	3,050	51,111	473.3
1980	63,600	8,780	5,214	67,166	589.9	61,042	8,304	5,148	64,198	563.8
1985	68,683	11,522	4,071	76,133	638.5	66,983	11,105	4,003	74,085	621.3
1990	80,551	13,148	6,796	86,902	694.9	78,785	13,006	6,787	85,004	679.7
1995	91,212	15,654	10,944	95,921	719.7	89,416	15,499	10,918	93,996	705.3
1997	96,807	15,856	13,162	99,501	729.2	95,044	15,657	13,137	97,565	715.0
1998	96,315	17,055	12,244	101,126	732.5	94,554	16,615	12,189	98,980	716.9
1999	98,648	18,488	11,820	105,316	754.2	97,020	18,063	11,765	103,318	739.8
2000	96,048	19,269	12,507	102,810	728.7	94,491	18,876	12,436	100,932	715.3
2001	90,384	18,513	11,503	97,395	683.2	88,913	18,136	11,456	95,592	670.6
2002	91,112	19,433	11,596	98,949	687.3	89,687	19,149	11,506	97,331	676.0
2003	89,813	20,064	11,867	98,010	674.1	88,388	19,826	11,797	96,417	663.1
2004	93,408	21,144	12,670	101,883	693.9	91,901	20,894	12,574	100,220	682.6
2005	92,610	20,438	13,434	99,613	665.4	91,108	20,204	13,311	98,001	654.6
2006	93,720	20,293	13,349	100,664	664.6	92,224	20,078	13,254	99,048	654.0
2007	92,956	18,634	14,582	97,008	636.5	91,667	18,480	14,501	95,647	627.6
2008	88,445	16,870	15,477	89,838	590.9	87,401	16,789	15,382	88,808	584.1
2009	79,062	13,446	13,797	78,710	512.8	78,298	13,359	13,739	77,918	507.6
2010	83,702	13,740	15,657	81,784	529.8	82,968	13,639	15,581	81,025	524.9
2011	82,725	13,171	16,452	79,444	509.9	82,003	13,057	16,380	78,680	505.0
2012	81,832	12,555	15,768	78,619	500.9	81,051	12,507	15,690	77,868	496.1
2013	81,326	13,129	15,694	77,761	492.0	80,477	13,089	15,644	76,922	486.6

[1] *New Supply is Production plus Imports less Exports (including Imports and Exports of Products).*

Sources: Production: AF&PA, Imports and Exports: U.S. Bureau of the Census, U.S. Population Estimate: U.S. Bureau of the Census.

Paper and Board Production 2012

TABLE 2 A Paper and Board Production for 2012

thousands of short tons

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Newsprint [1]	260	253	280	268	274	268	270	275	239	256	232	263	3,136
Printing & Writing	1,581	1,535	1,597	1,469	1,574	1,551	1,533	1,611	1,523	1,618	1,479	1,399	18,471
Uncoated Mechanical (s)	151	147	147	139	150	151	139	138	120	139	124	111	1,655
Total Coated Papers (s)	598	575	592	545	593	618	594	632	635	659	596	547	7,184
Coated Free Sheet (s)	316	301	319	298	316	316	322	358	353	380	332	299	3,911
Coated Mechanical (s)	282	273	274	247	276	301	272	274	282	279	265	248	3,273
Uncoated Free Sheet (s)	773	750	791	731	768	718	735	769	707	753	696	687	8,877
Other Printing & Writing Papers (s)	60	63	68	54	63	65	65	72	61	66	62	55	754
Tissue Paper	619	591	621	595	598	580	626	630	582	617	598	626	7,283
Total Packaging & Other Paper	365	348	373	352	362	352	362	357	347	353	339	341	4,252
Unbleached Kraft Papers (s)	113	117	124	116	121	113	118	115	115	113	103	102	1,372
Bleached Kraft Papers (s)	17	14	18	19	17	20	20	17	16	15	18	16	207
Specialty Packaging & Other [2]	235	217	231	217	224	218	224	224	216	225	218	223	2,673
TOTAL PAPER PRODUCTION	**2,826**	**2,727**	**2,871**	**2,683**	**2,808**	**2,751**	**2,790**	**2,872**	**2,691**	**2,844**	**2,648**	**2,629**	**33,142**
TOTAL PAPER OPERATING RATE	**88%**	**91%**	**90%**	**87%**	**88%**	**90%**	**89%**	**91%**	**88%**	**91%**	**87%**	**84%**	**89%**
Containerboard	2,888	2,735	2,931	2,697	2,887	2,843	2,915	2,975	2,830	2,908	2,867	2,927	34,403
Total Linerboard	2,051	1,934	2,058	1,885	2,036	2,043	2,078	2,109	2,005	2,072	2,018	2,059	24,349
Corrugating Medium	837	801	872	813	851	799	837	866	826	836	849	868	10,054
Boxboard	1,125	1,098	1,138	1,127	1,159	1,141	1,136	1,158	1,083	1,111	1,118	1,114	13,506
Total Folding Boxboard	581	570	590	577	604	589	587	584	550	565	588	584	6,969
Unbleached Kraft	211	209	204	215	215	208	220	205	182	186	199	212	2,465
Solid Bleached	177	183	193	178	205	200	178	186	176	184	198	191	2,251
Recycled	193	178	192	184	184	182	189	193	193	194	191	181	2,254
Liquid Pkg. & Food Service	255	253	250	255	250	258	251	276	247	251	247	257	3,052
Other Boxboard	289	275	298	294	305	294	298	298	285	295	282	273	3,484
TOTAL BOARD PRODUCTION	**4,013**	**3,833**	**4,069**	**3,825**	**4,046**	**3,983**	**4,051**	**4,133**	**3,913**	**4,019**	**3,985**	**4,041**	**47,909**
TOTAL BOARD OPERATING RATE	**93%**	**95%**	**94%**	**91%**	**94%**	**95%**	**94%**	**96%**	**94%**	**93%**	**95%**	**94%**	**94%**
TOTAL PAPER & BOARD PRODUCTION	**6,839**	**6,560**	**6,940**	**6,508**	**6,854**	**6,734**	**6,841**	**7,005**	**6,604**	**6,862**	**6,633**	**6,670**	**81,051**
TOTAL PAPER & BOARD OPERATING RATE	**91%**	**93%**	**92%**	**90%**	**92%**	**93%**	**92%**	**94%**	**91%**	**92%**	**92%**	**90%**	**92%**

[1] *Newsprint data are compiled by Pulp and Paper Products Council.*

[2] *Estimated by AF&PA*

(s) - *Shipments. Shipment data used where production data are not available.*

Paper and Board Production 2013

TABLE 2 B Paper and Board Production for 2013

thousands of short tons

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Newsprint [1]	257	228	235	212	228	216	220	230	227	228	213	229	2,723
Printing & Writing	1,547	1,377	1,508	1,469	1,474	1,451	1,537	1,550	1,532	1,613	1,407	1,447	17,912
Uncoated Mechanical (s)	132	115	130	131	132	125	136	133	131	139	141	135	1,579
Total Coated Papers (s)	591	504	562	539	548	561	582	595	619	626	529	528	6,783
Coated Free Sheet (s)	337	285	314	312	310	309	327	339	349	365	294	287	3,829
Coated Mechanical (s)	254	219	248	226	238	251	256	256	270	261	235	241	2,954
Uncoated Free Sheet (s)	764	700	755	739	733	704	757	754	721	784	677	723	8,811
Other Printing & Writing Papers (s)	61	57	61	61	61	61	62	67	61	66	60	61	739
Tissue Paper	635	586	636	625	631	625	643	648	613	627	601	619	7,490
Total Packaging & Other Paper	378	332	366	354	350	344	357	357	340	350	328	345	4,202
Unbleached Kraft Papers (s)	123	105	117	112	106	109	113	113	107	111	104	113	1,333
Bleached Kraft Papers (s)	21	16	17	20	21	21	21	22	19	19	10	12	220
Specialty Packaging & Other [2]	235	212	232	222	222	214	223	222	214	220	215	221	2,650
TOTAL PAPER PRODUCTION	**2,817**	**2,523**	**2,744**	**2,661**	**2,684**	**2,636**	**2,757**	**2,784**	**2,712**	**2,819**	**2,550**	**2,640**	**32,328**
TOTAL PAPER OPERATING RATE	**90%**	**90%**	**88%**	**90%**	**87%**	**88%**	**89%**	**90%**	**91%**	**91%**	**85%**	**86%**	**89%**
Containerboard	2,973	2,662	2,854	2,806	3,010	2,953	3,065	3,090	2,817	2,933	2,720	2,838	34,721
Total Linerboard	2,127	1,898	2,044	1,989	2,158	2,120	2,189	2,202	2,007	2,095	1,951	2,035	24,815
Corrugating Medium	846	765	810	818	852	833	876	888	810	838	769	802	9,906
Boxboard	1,106	1,048	1,106	1,132	1,140	1,142	1,152	1,180	1,106	1,101	1,105	1,109	13,429
Total Folding Boxboard	571	554	560	571	586	579	591	609	564	544	568	563	6,860
Unbleached Kraft	214	199	197	213	222	212	208	215	189	181	211	206	2,467
Solid Bleached	164	177	169	174	174	192	186	197	185	170	171	183	2,143
Recycled	193	178	194	184	190	175	197	197	189	192	187	174	2,250
Liquid Pkg. & Food Service	249	238	247	257	249	266	262	261	250	243	259	274	3,054
Other Boxboard	287	256	300	304	305	297	299	310	292	315	278	273	3,515
TOTAL BOARD PRODUCTION	**4,080**	**3,711**	**3,960**	**3,938**	**4,150**	**4,095**	**4,216**	**4,270**	**3,923**	**4,035**	**3,826**	**3,947**	**48,150**
TOTAL BOARD OPERATING RATE	**94%**	**96%**	**93%**	**95%**	**96%**	**97%**	**96%**	**97%**	**95%**	**94%**	**91%**	**90%**	**95%**
TOTAL PAPER & BOARD PRODUCTION	**6,897**	**6,234**	**6,704**	**6,599**	**6,834**	**6,731**	**6,974**	**7,054**	**6,634**	**6,853**	**6,376**	**6,587**	**80,477**
TOTAL PAPER & BOARD OPERATING RATE	**93%**	**93%**	**91%**	**93%**	**92%**	**93%**	**93%**	**94%**	**93%**	**93%**	**88%**	**89%**	**92%**

[1] *Newsprint data are compiled by Pulp and Paper Products Council.*

[2] *Estimated by AF&PA*

(s) - *Shipments. Shipment data used where production data are not available.*

Total Paper Shipments

TABLE 3 A Total Paper Shipments by Grade

thousands of short tons

						Coated Free Sheet							Coated Mechanical			
								Coated Two Sides								
Year	Paper	Newsprint	Total Printing-Writing and Related [1]	Total Printing-Writing [2]	Total Coated	Total Coated Free Sheet	Coated One Side	#1	#2 [3]	#3 [3]	#4 [3]	Job Lot	Total Mechanical	#3 + #4 [3]	#5 + Job Lot [3]
1995	42,899	7,002	25,405	23,922	8,795	4,371	470	427	1,094	1,894	293	194	4,424	772	3,652
1996	42,482	6,949	24,869	23,375	8,184	4,363	434	428	1,052	1,884	335	230	3,821	676	3,145
1997	44,697	7,215	26,628	25,066	9,317	4,811	430	452	1,167	2,391	166	206	4,506	825	3,681
1998	44,761	7,250	26,501	24,969	9,302	4,932	410	481	1,095	2,612	136	198	4,370	1,119	3,252
1999	45,979	7,179	27,156	25,569	9,580	5,105	391	458	1,092	2,877	67	220	4,475	1,270	3,206
2000	45,519	7,241	26,935	25,344	9,615	4,993	428	441	1,102	2,744	74	204	4,622	1,479	3,143
2001	42,103	6,360	24,433	23,050	8,876	4,486	399	311	1,057	2,408	105	206	4,390	1,556	2,834
2002 [5]	41,560	5,784	24,491	23,058	8,962	4,481	383	271	1,149	2,318	123	238	4,481	1,613	2,868
2003	40,370	5,676	23,713	22,382	8,708	4,191	347	214	1,131	2,298 [4]		200	4,517	1,583	2,934
2004	41,816	5,618	25,021	23,602	9,389	4,652	341	215	1,541	2,320		234	4,737	1,662	3,076
2005	41,397	5,392	24,494	23,205	9,330	4,626	329	188	1,481	2,409		219	4,704	1,721	2,983
2006	41,810	5,225	24,971	23,705	9,485	4,968	306	194	1,428	2,849		191	4,517	1,706	2,811
2007	41,267	4,921	24,887	23,688	9,660	4,997	295	221	1,461	2,837		182	4,663	1,879	2,784
2008	38,955	4,623	22,952	21,817	8,590	4,439	315	173	1,299	2,442		210	4,151	1,791	2,360
2009	33,808	3,298	19,370	18,470	7,009	3,638	307	115	843	2,135		238	3,370	1,361	2,009
2010	35,508	3,429	20,467	19,596	7,911	4,146	349	108	881	2,546		263	3,765	1,537	2,227
2011	34,344	3,267	19,470	18,698	7,442	3,988	355	118	859	2,446		210	3,454	1,490	1,963
2012	33,142	3,136	18,471	17,717	7,184	3,911	373		916 [6]	2,419		202	3,273	1,425	1,849
2013	32,328	2,723	17,912	17,174	6,783	3,829	338		903	2,404		183	2,954	1,263	1,691

[1] Total of Uncoated Mechanical, Coated Paper, Uncoated Free Sheet, Cotton Fiber, and Bristols.

[2] Total of Uncoated Mechanical, Coated Printing and Uncoated Free Sheet.

[3] Data from 1997 forward affected by grade reclassifications.

[4] Coated Two Sides Nos. 3 & 4 Free Sheet have been combined to prevent disclosure.

[5] Effective 2002 coated paper brightness levels have changed, which may limit comparability with prior periods.

[6] Coated Two Sides Nos. 1 & 2 Free Sheet have been combined to prevent disclosure.

Total Paper Shipments

TABLE 3 B Total Paper Shipments by Grade

thousands of short tons

	Uncoated Mechanical			Uncoated Free Sheet															
													Offset & Opaque			Cover & Text			
Year	Total Uncoated Mechanical	Super-calendered	Other	Total Uncoated Free Sheet	Bond & Writing [8]	Ledger [9]	Form Bond	Carbon-less [10]	Tablet	M.F., E.F. & Super-calendered	Papeterie & Wedding [11]	Envelope	Total	Rolls	Sheets	Total	Cover	Text	Other Uncoated Free Sheet [7]
1995	2,130	620	1,510	12,997	4,076	34	1,710	891	352	57	55	1,295	3,431	2,455	976	513	219	294	584
1996	2,028	568	1,461	13,163	4,289	28	1,747	829	370	54	57	1,351	3,479	2,571	908	501	222	278	460
1997	2,068	612	1,456	13,681	4,621	32	1,688	812	356	53	45	1,438	3,626	2,617	1,010	509	240	269	501
1998	2,062	564	1,454	13,605	4,780	31	1,594	704	309	65	39	1,418	3,749	2,750	999	437	200	237	479
1999	1,952	557	1,395	14,037	4,984	27	1,567	704	383	110	35	1,464	3,785	2,785	1,000	438	196	242	541
2000	1,832	578	1,253	13,898	4,985	21	1,378	817	335	116	23	1,513	3,862	2,833	1,029	429	150	279	419
2001	1,525	534	991	12,649	4,907	18	1,248	707	231	87	21	1,392	3,290	2,396	893	383	153	229	367
2002	1,668	687	981	12,428	5,003	17	1,204	648	208	50	20	1,422	3,111	2,310	801	344	158	186	400
2003	1,412	641	771	12,262	5,007	22	1,127	611	252	52	22	1,366	3,102	2,362	741	304	144	161	397
2004	1,658	675	983	12,555	5,171	16	1,103	585	274	116	21	1,452	3,049	2,323	727	299	148	151	469
2005	1,859	759	1,100	12,016	5,144	17	1,041	591	211	111		1,384	2,875	2,191	684	286	142	143	355
2006	1,916	735	1,181	12,304	5,268	16	1,002	536	228	82		1,389	2,933	2,150	783	318	175	143	532
2007	2,092	753	1,339	11,935	5,076		1,003	523	213			1,346	2,866	2,081	785	304	149	155	605
2008	2,282	708	1,574	10,946	4,877		963	481	187			1,228	2,546	1,815	730	234	132	102	429
2009	1,757	610	1,147	9,704	4,394		717	409	183			1,102	1,957	1,388	569	159	85	74	783
2010	2,130	678	1,452	9,556	4,191		714	393	202			1,059	2,097	1,460	638	172	94	78	727
2011	1,949	661	1,287	9,308	4,040		721	364	231			1,032	1,974	1,388	587	171	85	86	775
2012	1,655	531	1,125	8,877	3,852		676	322	210			971	1,818	1,281	538	123	61	62	905
2013	1,579	533	1,046	8,811	3,813		630	303	254			947	1,776	1,259	517	179	91	89	909

[7] Includes All Other Uncoated Free Sheet, Other Technical, Direct Line, Air Dried, Manifold and Thin Paper. Includes Papeterie beginning 2005. Includes M.F., E.F. & Supercalendered and technical starting in 2007.

[8] Mimeo and Duplicating combined with Bond & Writing.

[9] Combined with Bond & Writing in 2007.

[10] Includes both carbonless paper and base stock for carbonless coating.

[11] Combined with Other Uncoated Free Sheet in 2005.

Total Paper Shipments

TABLE 3 C Total Paper Shipments by Grade

thousands of short tons

			Packaging and Industrial Converting					
Year	Total Cotton Fiber	Total Bleached Bristols	Total	Total Kraft Paper	Unbleached Kraft Papers	Bleached Packaging Papers	Specialty Packaging & Industrial	Tissue
1995	123	1,361	4,282	2,412	2,025	387	1,870	6,210
1996	133	1,360	4,399	2,348	1,971	377	2,051	6,264
1997	114	1,447	4,425	2,301	1,901	400	2,124	6,429
1998	122	1,409	4,425	2,174	1,860	314	2,251	6,585
1999	117	1,470	4,796	2,231	1,916	315	2,565	6,847
2000	104	1,487	4,432	2,035	1,707	329	2,396	6,911
2001	86	1,297	4,287	1,891	1,601	290	2,396	7,024
2002	83	1,350	4,159	1,835	1,545	291	2,323	7,127
2003	76	1,255	3,887	1,636	1,385	250	2,252	7,094
2004	71	1,348	4,066	1,654	1,400	254	2,412	7,111
2005	69	1,221	4,101	1,597	1,362	235	2,504	7,409
2006	63	1,202	4,111	1,579	1,370	209	2,532	7,503
2007	61	1,138	4,111	1,651	1,458	194	2,460	7,348
2008	49	1,086	4,147	1,687	1,492	195	2,460	7,233
2009	43	857	3,863	1,403	1,236	167	2,460	7,276
2010	23	848	4,303	1,620	1,435	185	2,683	7,309
2011	20	752	4,318	1,677	1,462	215	2,641	7,290
2012	12	742	4,252	1,579	1,372	207	2,673	7,283
2013	14	725	4,202	1,553	1,333	220	2,650	7,490

Paperboard Production

TABLE 4 Total Paperboard Production by Grade

thousands of short tons

	All Grades	Containerboard - Domestic			Boxboard - Domestic				All Other - Domestic				Exports
Year	Total	Total	Linerboard	Corrugating Material [1]	Total	Folding	Set-Up	Liquid Packaging & Food Service	Total	Gypsum Wallboard Facing	Tube, Can and Drum	Balance of All Other [2]	Total
1995	46,548	28,600	19,773	8,827	8,502	6,384	282	1,835	4,867	1,479	1,549	1,839	4,580
1996	47,935	28,975	19,770	9,205	8,469	6,476	250	1,742	4,911	1,552	1,572	1,788	5,580
1997	50,347	30,049	20,477	9,572	8,518	6,495	254	1,770	5,066	1,570	1,634	1,862	6,714
1998	49,793	30,279	20,911	9,369	8,603	6,666	245	1,692	5,123	1,579	1,574	1,970	5,788
1999	51,041	31,732	21,963	9,769	8,790	6,744	285	1,761	5,100	1,602	1,641	1,857	5,419
2000	48,972	30,571	20,920	9,651	8,801	6,705	235	1,861	4,666	1,416	1,628	1,622	4,934
2001	46,809	29,271	19,954	9,317	8,485	6,437	218	1,830	4,384	1,448	1,446	1,491	4,669
2002	48,126	30,486	20,823	9,663	8,379	6,349	206	1,823	4,361	1,429	1,509	1,423	4,901
2003	48,018	30,191	20,471	9,720	8,331	6,380	216	1,736	4,541	1,556	1,492	1,493	4,955
2004	50,085	31,912	21,614	10,298	8,441	6,340	198	1,903	4,751	1,625	1,583	1,543	4,981
2005	49,711	31,430	21,218	10,212	8,498	6,326	184	1,988	4,614	1,710	1,491	1,414	5,169
2006	50,415	31,986	21,882	10,104	8,550	6,340	187	2,024	4,494	1,616	1,485	1,394	5,385
2007	50,400	31,885	22,048	9,837	8,586	6,399	169	2,017	4,225	1,437	1,442	1,346	5,705
2008	48,446	30,288	20,776	9,512	8,356	6,218	141	1,997	3,819	1,203	1,368	1,248	5,983
2009	44,491	27,593	18,861	8,732	7,766	5,793	102	1,871	3,257	908	1,206	1,143	5,875
2010	47,460	29,794	20,523	9,271	8,047	5,950	96	2,001	3,360	865	1,323	1,172	6,259
2011	47,652	30,005	20,566	9,439	8,107	6,021	84	2,002	3,313	893	1,290	1,130	6,227
2012 R	47,909	30,080	20,485	9,595	8,076	5,961	75	2,040	3,385	1,023	1,305	1,057	6,368
2013	48,150	30,288	20,807	9,481	7,908	5,828	75	2,005	3,420	1,007	1,339	1,074	6,535

[1] Includes Container Chip & Filler Board.

[2] Beginning 2005, Balance of All Other includes Unbleached Kraft Tube Can and Drum. Beginning 2009, Balance of All Other includes Solid Bleached Linerboard. This is required to meet Antitrust Safe Harbor guidelines.

R - Revised

Unbleached Kraft Paperboard Production

TABLE 5 A Unbleached Kraft Paperboard Production *thousands of short tons*

Year	Total All Grades	For Domestic Use: Total Domestic	Linerboard	Folding	All Other	For Export
1995	22,730	19,433	17,686	1,452	296	3,297
1996	22,174	17,928	16,108	1,473	347	4,246
1997	23,222	18,111	16,338	1,432	341	5,111
1998	23,198	18,929	16,903	1,662	364	4,269
1999	23,113	19,376	17,459	1,637	281	3,737
2000	21,796	18,430	16,486	1,716	228	3,366
2001	20,437	17,480	15,581	1,738	161	2,958
2002	21,086	17,954	16,024	1,740	189	3,132
2003	21,730	18,258	16,298	1,784	176	3,472
2004	22,665	19,275	17,270	1,789	217	3,390
2005	22,578	19,029	16,962	1,854	212	3,549
2006	23,415	19,663	17,623	1,884	156	3,752
2007	23,544	19,676	17,482	2,063	132	3,868
2008	22,169	18,251	16,186	1,975	90	3,918
2009	20,549	16,598	14,694	1,833	71	3,951
2010	21,355	17,343	15,486	1,857	-	4,012
2011	21,615	17,464	15,519	1,945	-	4,151
2012	21,844	17,632	15,668	1,964	-	4,212
2013	21,998	17,666	15,697	1,969	-	4,332

Source: AF&PA's Containerboard Annual Summary & Basis Weight Survey

Solid Bleached Paperboard Production

TABLE 5 B Solid Bleached Paperboard Production *thousands of short tons*

Year		Total All Grades	For Domestic Use: Total Domestic	Folding	Liquid Packaging & Food Service	Other Packaging & Non-Packaging[1]	For Export
1995		5,157	4,135	2,068	1,835	231	1,022
1996		5,082	4,090	2,088	1,742	259	992
1997		5,377	4,200	2,112	1,770	318	1,177
1998		5,338	4,216	2,145	1,692	379	1,122
1999		5,572	4,448	2,259	1,761	429	1,124
2000		5,297	4,213	2,223	1,861	129	1,084
2001		5,187	4,069	2,083	1,830	156	1,118
2002		5,180	4,027	2,057	1,823	146	1,153
2003		5,237	4,023	2,127	1,736	160	1,214
2004		5,506	4,178	2,105	1,903	169	1,328
2005		5,584	4,250	2,129	1,988	132	1,335
2006		5,620	4,287	2,105	2,024	159	1,333
2007		5,720	4,265	2,069	2,017	178	1,456
2008		5,689	4,194	2,031	1,997	167	1,495
2009		5,288	3,886	1,792	1,871	223	1,402
2010		5,616	4,068	1,829	2,001	238	1,548
2011		5,522	4,038	1,806	2,002	230	1,484
2012	R	5,482	3,978	1,765	2,040	173	1,504
2013		5,401	3,834	1,630	2,005	199	1,567

Source: AF&PA's Paperboard Annual Statistical Summary and Time Series. R - Revised

[1] Beginning 2009, Other Packaging and Non-Packaging includes Solid Bleached Linerboard.

TABLE 5 C Semichemical Paperboard Production *thousands of short tons*

Year	Total All Grades	For Domestic Use: Total Domestic	For Domestic Use: Corrugating	For Domestic Use: All Other	For Export
1995	5,673	5,536	5,532	3.3	138
1996	5,619	5,414	5,410	3.5	206
1997	6,047	5,779	5,778	1.0	267
1998	5,894	5,665	5,665	-	229
1999	6,010	5,711	5,711	-	299
2000	5,948	5,686	5,686	-	263
2001	5,579	5,267	5,266	0.5	313
2002	5,838	5,522	5,522	0.4	316
2003	6,096	5,962	5,962	0.1	134
2004	6,529	6,373	6,373	-	156
2005	6,414	6,239	6,239	-	175
2006	6,224	6,022	6,022	-	202
2007	6,160	5,863	5,863	-	298
2008	5,819	5,439	5,439	-	380
2009	5,213	4,858	4,858	-	355
2010	5,443	4,955	4,955	-	488
2011	5,431	5,025	5,025	-	406
2012	5,414	5,016	5,016	-	398
2013	5,313	4,926	4,926	-	387

Source: AF&PA's Containerboard Annual Summary & Basis Weight Survey

Semichemical Paperboard Production

TABLE 5 D Recycled Paperboard Production *thousands of short tons*

Year	Total All Grades	For Domestic Use: Total Domestic	Linerboard	Corrugating Material [1]	Folding	Set-Up	Tube, Can & Drum	Gypsum Wallboard Facing	Panelboard and Other Uses	For Export
1995	12,837	12,714	1,936	3,294	2,864	282	1,491	1,479	1,367	123
1996	14,906	14,770	3,508	3,795	2,916	250	1,499	1,552	1,250	136
1997	15,530	15,370	3,967	3,793	2,950	254	1,569	1,570	1,267	159
1998	15,214	15,047	3,858	3,704	2,858	245	1,495	1,579	1,307	168
1999	16,206	15,946	4,364	4,058	2,849	285	1,582	1,602	1,206	260
2000	15,791	15,569	4,294	3,965	2,767	235	1,615	1,416	1,277	221
2001	15,495	15,215	4,263	4,051	2,616	218	1,430	1,448	1,189	281
2002	15,906	15,607	4,683	4,141	2,552	206	1,487	1,429	1,110	300
2003	14,832	14,697	4,050	3,759	2,468	216	1,474	1,556	1,176	135
2004	15,237	15,129	4,195	3,925	2,446	198	1,544	1,625	1,196	108
2005	15,055	14,945	4,176	3,973	2,343	184	1,491	1,710	1,070	110
2006	15,071	14,973	4,174	4,082	2,351	187	1,485	1,616	1,079	98
2007	14,891	14,808	4,482	3,974	2,268	169	1,442	1,437	1,036	83
2008	14,690	14,501	4,513	4,073	2,212	141	1,368	1,203	991	189
2009	13,439	13,272	4,166	3,874	2,168	102	1,206	908	848	167
2010	15,045	14,835	5,037	4,316	2,264	96	1,323	865	934	210
2011	15,090	14,904	5,048	4,414	2,269	84	1,290	893	906	186
2012	15,167	14,913	4,817	4,578	2,232	75	1,305	1,023	883	254
2013	15,439	15,191	5,110	4,555	2,229	75	1,339	1,007	876	248

Source: AF&PA's Paperboard Annual Statistical Summary and Time Series
[1] Includes Container Chip & Filler Board

Recycled Paperboard Production

Paper New Supply

TABLE 6 A Paper New Supply [1]

thousands of short tons

			Printing-Writing and Related					Packaging and Industrial Converting			
Year	Total Paper	Newsprint	Printing-Writing Papers	Uncoated Mechanical	Total Coated	Uncoated Free Sheet	Other Printing-Writing Related [2]	Total Packaging and Industrial Converting Papers	Unbleached Kraft	Other	Tissue
1995	52,769	12,762	29,550	4,967	9,720	13,355	1,508	4,241	2,034	2,207	6,215
1996	50,687	11,768	28,300	4,456	8,853	13,476	1,515	4,325	1,928	2,397	6,294
1997	54,149	12,612	30,751	4,818	10,263	14,080	1,591	4,265	1,801	2,465	6,521
1998	55,132	12,801	31,384	4,983	10,584	14,213	1,604	4,285	1,731	2,553	6,662
1999	57,304	13,087	32,528	5,182	10,870	14,739	1,737	4,711	1,820	2,890	6,978
2000	57,125	12,921	32,986	5,480	11,196	14,510	1,799	4,273	1,637	2,636	6,945
2001	53,464	11,469	30,617	5,227	10,226	13,430	1,733	4,307	1,601	2,706	7,071
2002	53,663	11,176	31,088	5,470	10,663	13,452	1,502	4,202	1,548	2,655	7,197
2003	53,198	11,050	31,007	5,538	10,829	13,265	1,375	3,957	1,320	2,637	7,184
2004	54,876	10,841	32,679	5,881	11,868	13,482	1,448	4,137	1,349	2,788	7,219
2005	53,693	10,123	31,988	6,205	11,701	12,765	1,318	4,048	1,178	2,870	7,535
2006	52,970	9,489	31,784	5,598	12,193	12,805	1,188	4,098	1,221	2,877	7,600
2007	50,881	8,348	31,045	6,206	11,564	12,155	1,121	4,072	1,298	2,774	7,416
2008	46,711	7,249	28,060	6,024	9,846	11,150	1,040	4,046	1,301	2,745	7,356
2009	39,374	5,258	23,028	4,820	7,610	9,761	837	3,663	1,002	2,661	7,425
2010	40,342	4,996	23,732	4,818	8,420	9,653	841	4,184	1,148	3,036	7,430
2011	38,504	4,570	22,457	4,432	7,983	9,333	708	3,999	994	3,005	7,478
2012	37,026	4,405	21,084	3,737	7,857	8,845	646	4,072	1,108	2,964	7,465
2013	36,539	3,921	20,823	3,840	7,501	8,876	607	4,134	1,123	3,011	7,660

[1] New Supply is Production plus Imports less Exports. If Production is not available then annual shipment figures are used. New Supply is calculated using Import/Export figures from the U.S. Bureau of the Census, unless preferred alternative Import/Export data is available (see page 26).

[2] Imports/Exports of Other Printing-Writing Related may include a small amount of tonnage used for wallpaper base and other miscellaneous uses.

[3] U.S. Bureau of the Census is the sole source for Import/Export data used to calculate New Supply of Paper, Paperboard and Products, and Total New Supply Including Converted Products.

R - Revised

Paperboard New Supply

TABLE 6 B Paperboard New Supply [1] *thousands of short tons*

Year	Paperboard					Construction and Other
	Total Paperboard	Unbleached Kraft	Semichemical	Bleached Board	Recycled	
1995	43,387	19,774	5,841	4,286	13,485	1,925
1996	43,383	17,934	5,689	4,244	15,516	2,108
1997	45,130	18,477	6,089	4,372	16,192	1,936
1998	45,672	19,313	5,974	4,366	16,020	2,147
1999	47,592	19,872	6,118	4,588	17,014	1,999
2000	46,021	18,958	6,020	4,353	16,690	1,877
2001	44,088	18,008	5,598	4,179	16,303	1,801
2002	45,291	18,491	5,829	4,142	16,828	1,617
2003	44,947	18,709	6,235	4,146	15,856	1,592
2004	47,201	19,825	6,678	4,326	16,372	1,663
2005	46,505	19,508	6,488	4,329	16,180	1,612
2006	47,107	20,083	6,324	4,372	16,327	1,616
2007	46,608	20,054	6,151	4,349	16,055	1,361
2008	44,246	18,721	5,716	4,374	15,435	1,030
2009	40,194	16,940	4,968	4,017	14,269	792
2010	43,061	17,717	5,081	4,193	16,071	759
2011	43,215	17,891	5,148	4,145	16,031	764
2012 R	43,244	18,042	5,122	4,094	15,986	751
2013	43,541	18,184	5,055	3,965	16,336	839

See footnotes on page 12.

Total New Supply

TABLE 6 C Total New Supply [1] *thousands of short tons*

Year	Total All Grades Including Construction Grades, Excluding Converted Products	Paper, Paperboard and Converted Products [3]	Total All Grades Including Construction Grades and Converted Products [3]
1995	98,081	93,996	95,921
1996	96,178	92,535	94,643
1997	101,215	97,565	99,501
1998	102,951	98,980	101,126
1999	106,895	103,318	105,316
2000	105,023	100,932	102,808
2001	99,353	95,592	97,393
2002	100,570	97,331	98,948
2003	99,737	96,417	98,010
2004	103,740	100,220	101,883
2005	101,811	98,001	99,613
2006	101,693	99,048	100,664
2007	98,851	95,647	97,008
2008	91,986	88,808	89,838
2009	80,360	77,918	78,710
2010	84,162	81,025	81,784
2011	82,483	78,680	79,444
2012 R	81,022	77,868	78,619
2013	80,919	77,922	78,761

See footnotes on page 12.

TABLE 7 State Data 2013 *thousands of short tons*

Geographic Areas	Recovered Paper Consumption [1]	Total Paper & Paperboard Capacity [2]
UNITED STATES, TOTAL	**30,143**	**87,349**
Alabama	1,843	7,973
Arkansas	(D)	3,096
California	1,162	1,309
Connecticut	579	701
Florida	(D)	3,126
Georgia	2,352	7,526
Illinois	244	282
Indiana	735	716
Kentucky	(D)	1,818
Louisiana	1,853	7,538
Maine	(D)	3,484
Massachusetts	263	369
Michigan	1,467	3,314
Minnesota	790	2,216
Mississippi	208	1,890
Missouri	101	(D)
New Hampshire	62	(D)
New York	2,228	2,953
North Carolina	316	1,757
Ohio	1,063	1,650
Oklahoma	1,282	2,459
Oregon	1,046	2,680
Pennsylvania	836	2,455
South Carolina	936	4,733
Tennessee	931	3,010
Texas	631	2,536
Vermont	154	211
Virginia	1,583	3,901
Washington	1,211	4,697
Wisconsin	2,255	5,505
Mountain Region [3]	364	1,051
States Not Listed[4]	1,572	1,884

Note: (D) - *Withheld to avoid disclosure.*

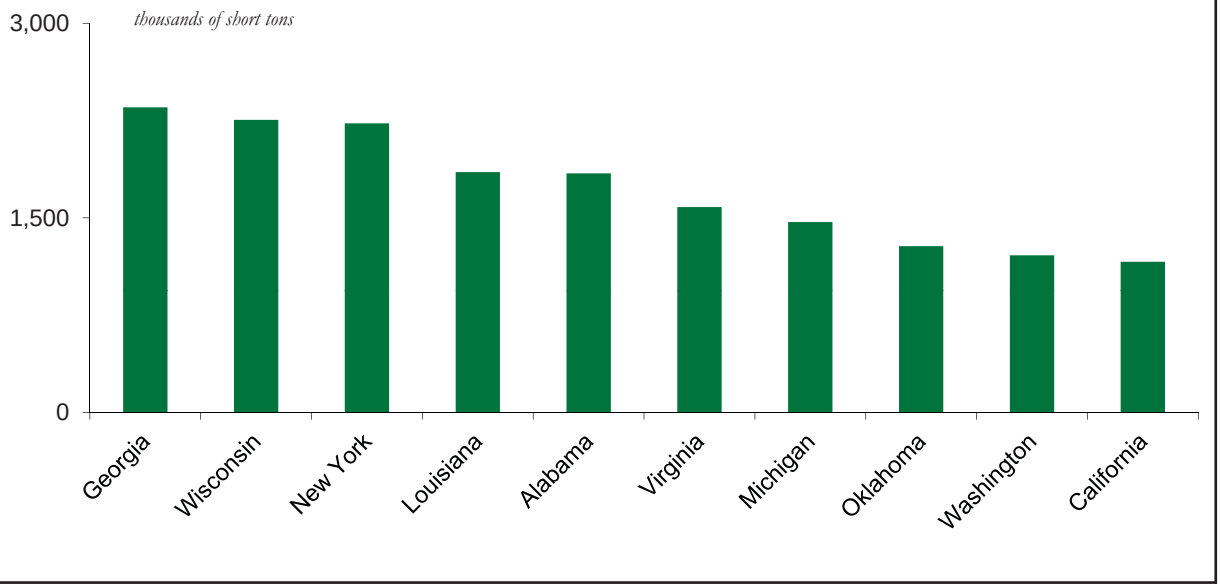
[1] Includes construction grades and molded pulp grades. Total does not include estimated consumption of newspaper grades for insulation, mailing bags and other end uses.

[2] Data excludes wet machine board, construction paper and insulating board.

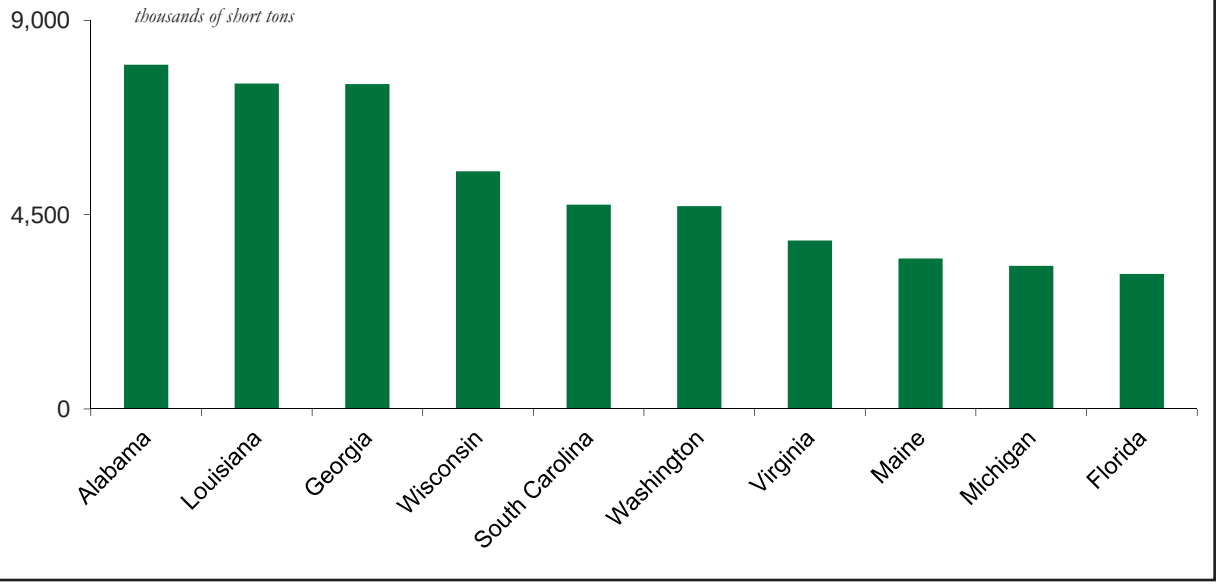
[3] Mountain Region includes Arizona, Idaho, Nevada, New Mexico and Utah.

[4] The following states have production and/or consumption data which have been withheld to avoid disclosure: Iowa, Kansas, Maryland, New Jersey, West Virginia. No data available for the following states: Alaska, Colorado, Delaware, Hawaii, Montana , Nebraska, North Dakota, Rhode Island, South Dakota, Wyoming.

Top 10 States by Recovered Paper Consumption--2013



Top 10 States by Paper & Paperboard Capacity--2013



Consumption

Capacity

TABLE 8 A United States Annual Capacity to Produce Paper *thousands of short tons*

	Paper & Paperboard	Paper	Newsprint	Printing & Writing						
Year	Total	Total	Total	Total	Uncoated Mechanical	Coated Mechanical	Coated Free Sheet	Uncoated Free Sheet	Cotton Fiber	Solid Bleached Bristols
1995	95,749	46,700	7,253	27,495	2,198	4,493	4,876	14,206	189	1,533
1996	98,494	47,167	7,303	27,852	2,306	4,319	5,123	14,488	193	1,423
1997	101,263	48,016	7,442	28,468	2,182	4,513	5,359	14,701	209	1,504
1998	101,833	48,174	7,387	28,794	2,101	4,647	5,391	14,915	211	1,529
1999	102,432	49,020	7,433	29,135	2,028	4,639	5,609	15,222	207	1,430
2000	103,875	49,578	7,464	29,389	1,956	4,849	5,617	15,226	187	1,554
2001	101,886	48,000	7,125	28,016	1,822	4,942	5,411	14,230	172	1,439
2002	100,520	47,079	7,031	27,271	2,010	5,039	5,030	13,620	160	1,412
2003	100,074	47,106	6,940	27,099	1,867	4,975	4,820	13,875	156	1,406
2004	100,038	46,959	6,625	27,274	2,073	4,979	5,017	13,682	120	1,403
2005	99,279	46,194	5,758	27,458	2,242	4,991	5,132	13,558	120	1,415
2006	97,663	45,459	5,526	27,129	2,261	4,674	5,306	13,366	115	1,407
2007	97,052	44,711	5,323	26,651	2,271	4,780	5,295	12,952	108	1,245
2008	96,285	43,329	4,863	25,563	2,373	4,665	5,185	12,095	95	1,150
2009	93,923	41,537	4,819	23,895	2,521	4,182	4,575	11,436	90	1,091
2010	91,045	40,578	4,480	22,675	2,700	3,896	4,433	10,670	91	885
2011	89,778	38,856	3,718	21,653	2,297	3,636	4,346	10,398	83	893
2012	88,315	37,324	3,508	20,566	1,975	3,404	4,333	9,962	80	812
2013	87,349	36,450	3,271	19,689	1,693	3,320	4,189	9,620	39	828

	Packaging & Industrial Converting					Tissue
Year	Total	Unbleached Kraft	Bleached Packaging & Ind. Conv.	Specialty Packaging	Special Industrial	Total
1995	5,400	2,563	511	680	1,646	6,552
1996	5,358	2,409	507	687	1,755	6,654
1997	5,224	2,276	413	839	1,696	6,882
1998	5,114	2,134	398	809	1,773	6,879
1999	5,331	2,135	449	1,049	1,698	7,121
2000	5,277	2,029	375	1,183	1,690	7,448
2001	5,065	1,896	372	1,151	1,646	7,794
2002	4,816	1,786	374	1,091	1,565	7,961
2003	4,976	1,765	380	1,096	1,735	8,091
2004	4,894	1,690	335	1,188	1,681	8,166
2005	4,703	1,653	332	1,154	1,564	8,275
2006	4,565	1,566	204	1,146	1,649	8,239
2007	4,623	1,602	213	1,098	1,710	8,114
2008	4,680	1,676	194	1,141	1,669	8,223
2009	4,488	1,628	204	1,156	1,500	8,335
2010	4,941	1,811	214	1,151	1,765	8,482
2011	4,914	1,805	262	1,142	1,705	8,571
2012	4,843	1,704	253	1,123	1,763	8,407
2013	4,867	1,718	248	1,237	1,664	8,622

Source: AF&PA's Paper, Paperboard and Wood Pulp Capacity Survey.

TABLE 8 B United States Annual Capacity to Produce Paperboard *thousands of short tons*

	Paperboard	Boxboard & Other Paperboard							
Year	Total	Total	Unbleached Kraft Folding	Unbleached Other	Solid Bleached Folding	Liquid Packaging & Food Service	Bleached Other[1]	Recycled Ctd & Unctd Board	Gypsum Wall Board Facing
1995	49,049	15,357	1,845	481	2,557	2,354	285	6,371	1,464
1996	51,327	15,674	2,017	476	2,763	2,406	143	6,363	1,506
1997	53,247	16,024	2,073	444	3,032	2,359	149	6,404	1,563
1998	53,659	16,127	2,284	408	3,001	2,393	151	6,305	1,585
1999	53,412	16,790	2,425	510	3,092	2,441	245	6,469	1,608
2000	54,297	16,881	2,413	492	3,061	2,443	227	6,525	1,720
2001	53,886	16,689	2,435	399	3,003	2,488	213	6,380	1,771
2002	53,441	16,619	2,477	346	3,108	2,434	210	6,216	1,828
2003	52,968	22,511	2,446	331	3,219	2,485	143	6,009	1,869
2004	53,079	22,365	2,408	377	3,190	2,580	187	5,860	1,903
2005	53,085	21,916	2,448	319	3,236	2,736	134	5,586	1,871
2006	52,204	21,318	2,522	355	2,977	2,703	130	5,415	1,801
2007	52,341	21,085	2,575	351	3,111	2,729	156	5,225	1,713
2008	52,956	15,949	2,575	377	3,148	2,735	149	5,233	1,732
2009	52,386	20,330	2,500	294	2,976	2,746	141	4,941	1,791
2010	50,467	20,157	2,500	-	2,611	3,009	245	5,061	1,670
2011	50,922	14,919	2,522	-	2,475	3,121	235	5,040	1,526
2012	50,991	19,644	2,549	-	2,399	3,202	188	4,890	1,526
2013	50,900	14,590	2,499	-	2,202	3,250	204	4,866	1,569

Paperboard Capacity

	Containerboard					
Year	Total	Unbleached Kraft Liner	Bleached Kraft Liner [1]	Semi-chemical Medium	Recycled Liner	Recycled Medium [2]
1995	33,692	21,363	178	5,994	2,481	3,676
1996	35,653	21,624	209	5,778	3,775	4,267
1997	37,223	22,215	215	5,982	4,489	4,322
1998	37,532	22,254	179	5,955	4,637	4,507
1999	36,622	20,734	180	6,132	5,059	4,517
2000	37,416	20,964	158	6,331	5,291	4,672
2001	37,197	20,533	128	6,409	5,230	4,897
2002	36,822	20,336	126	6,452	5,199	4,709
2003	36,466	20,773	148	6,472	4,615	4,458
2004	36,574	20,927	167	6,710	4,385	4,385
2005	36,755	20,951	84	6,884	4,403	4,433
2006	36,301	21,078	89	6,331	4,332	4,471
2007	36,481	21,288	90	6,200	4,602	4,301
2008	37,007	21,393	87	6,080	5,037	4,410
2009	36,997	21,219	92	6,108	5,132	4,446
2010	35,371	19,808		5,578	5,462	4,523
2011	36,003	20,225		5,588	5,539	4,651
2012	36,237	20,445		5,485	5,364	4,943
2013	36,309	20,400		5,377	5,689	4,843

[1] *Starting 2010, Bleached Kraft Liner numbers included in Bleached Other Paperboard*

TABLE 8 C *thousands of short tons*

	Construction Paper & Board & Wet Machine Board			
Year	Total	Construction Paper [3]	Wet Machine Board [3]	Insulating Board [3]
1995	2,188	905	117	1,166
1996	2,227	907	117	1,203
1997	2,147	911	108	1,128
1998	2,165	904	117	1,144
1999	2,035	785	84	1,166
2000	1,990	790	77	1,123
2001	1,882	703	66	1,113
2002	1,882	703	66	1,113
2003	1,891	724	66	1,101
2004	1,884	720	62	1,102
2005	1,877	710	63	1,104
2006	1,870	700	64	1,106
2007	1,768	677	60	1,031
2008	1,747	651	65	1,031
2009	1,488	528	64	896
2010	1,317			
2011	1,145			
2012	1,140			
2013	1,082			

Construction Paper & Board Capacity

[3] *Starting 2010, Total Capacity for Construction Paper & Board is not broken out by category.*

Wood Pulp Capacity

TABLE 9 A United States Annual Capacity to Produce Wood Pulp *thousands of short tons*

Year	Wood Pulp for Paper & Board	Dissolving	Chemical Paper Grades					Semi-chemical	Mechanical	Wood Pulp for Construction Paper & Board
	Total	Total	Total	SULFITE Total	SULFATE Bleached Hardwood	SULFATE Bleached Softwood	SULFATE Unbleached	Total	Total	Total
1995	68,799	1,435	56,275	1,330	16,940	15,107	22,898	4,269	6,820	622
1996	68,793	1,483	56,198	1,288	16,538	15,439	22,933	4,255	6,857	722
1997	70,319	1,154	57,802	1,291	17,202	15,377	23,932	4,267	7,096	735
1998	69,887	1,100	56,499	1,283	16,931	14,535	23,750	5,281	7,007	726
1999	68,946	1,101	56,179	1,220	17,097	14,956	22,906	4,410	7,256	704
2000	69,931	1,183	57,222	1,230	17,399	14,859	23,734	4,447	7,079	597
2001	68,414	1,155	56,216	943	16,966	14,968	23,339	4,459	6,584	551
2002	68,052	1,175	56,087	855	16,779	14,994	23,459	4,436	6,354	550
2003	67,637	998	55,854	832	16,914	15,069	23,039	4,577	6,208	542
2004	67,547	875	55,956	722	16,811	15,265	23,158	4,496	6,220	543
2005	67,401	876	56,138	654	16,939	15,410	23,135	4,261	6,126	542
2006	66,370	843	55,403	553	16,397	15,194	23,259	4,028	6,096	542
2007	66,442	745	55,502	557	16,230	15,312	23,403	3,949	6,246	542
2008	65,965	752	55,245	519	16,131	15,333	23,262	3,974	5,994	542
2009	65,245	737	54,588	481	15,529	14,985	23,593	3,933	5,987	524
2010	63,503	767	53,057	475	14,978	14,794	22,810	3,657	6,022	442
2011	63,340	894	53,170	474	14,736	14,857	23,103	3,651	5,625	405
2012	63,353	938	53,402	289	14,659	15,086	23,368	3,619	5,394	405
2013	61,864	1,196	51,927	283	13,745	14,902	22,997	3,531	5,210	319

Source: AF&PA's Paper, Paperboard and Wood Pulp Capacity Survey.

Market Pulp Capacity

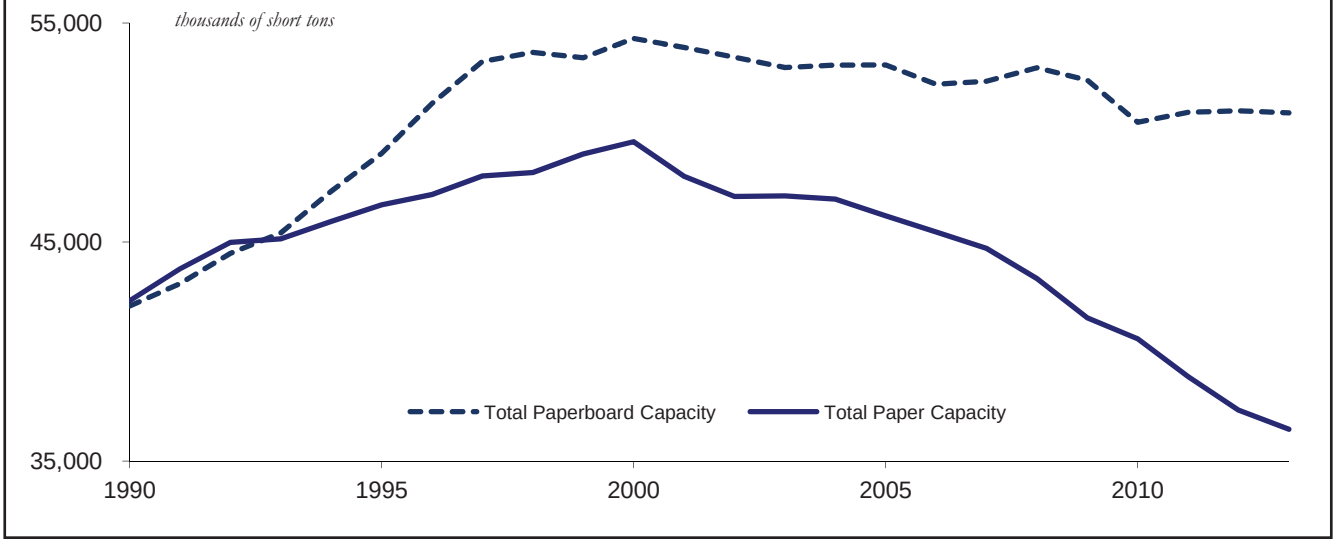
TABLE 9 B United States Annual Capacity to Produce Market Pulp *thousands of short tons*

Year	Market Pulp	Dissolving	Chemical Paper Grades				
	Total	Total	Total	SULFITE Total [1]	SULFATE Bleached Hardwood	SULFATE Bleached Softwood	SULFATE Unbleached [1]
1995	11,125	1,435	9,690	187	3,811	5,434	258
1996	10,721	1,483	9,238	175	3,323	5,443	297
1997	10,505	1,154	9,351	177	3,415	5,295	464
1998	10,083	1,100	8,983	75	3,132	5,332	444
1999	9,741	1,101	8,640	113	2,706	5,416	405
2000	10,338	1,183	9,155	113	3,106	5,552	384
2001	10,514	1,155	9,359		3,152	5,776	
2002	10,538	1,175	9,363		3,155	5,757	
2003	10,624	998	9,626		3,291	5,887	
2004	10,455	875	9,580		2,800	6,326	
2005	10,680	876	9,804		2,806	6,441	
2006	10,185	843	9,342		2,369	6,498	
2007	10,442	745	9,697		2,454	6,758	
2008	10,726	752	9,974		2,631	7,118	
2009	10,785	737	10,048		2,572	7,060	
2010	10,617	767	9,850		2,395	7,115	
2011	11,023	894	10,129		2,256	7,520	
2012	11,232	938	10,294		2,310	7,648	
2013	11,028	1,192	9,836		1,878	7,649	

[1] *Starting 2001, Sulfite and Unbleached Sulfate numbers included in Total Chemical Paper Grades*

Paper and Paperboard Capacity

U.S. Annual Capacity to Produce Paper and Paperboard



Wood Pulp Capacity

U.S. Annual Capacity to Produce Wood Pulp for Paper & Board

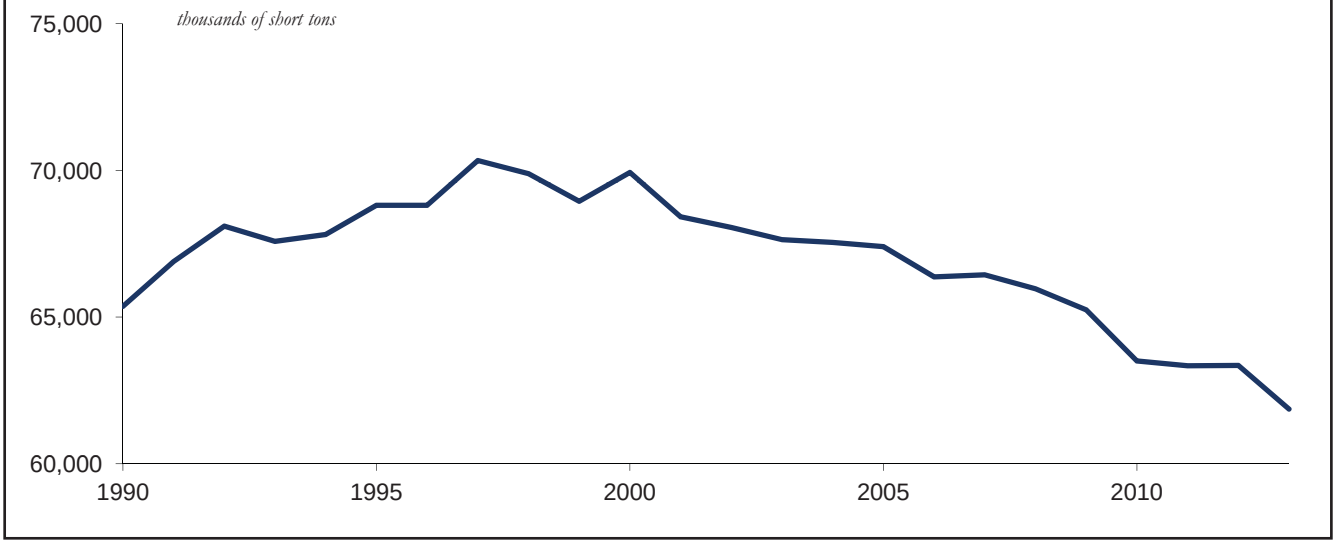


TABLE 10 Imports by Year

value in thousands of dollars

	2011		2012		2013	
	Short Tons	Value	Short Tons	Value	Short Tons	Value
Total Pulp (Wood, Cotton & Other)	**6,170,822**	**3,863,905**	**5,632,328**	**3,201,245**	**6,135,013**	**3,495,198**
Wood Pulp	**6,117,086**	**3,830,369**	**5,599,197**	**3,185,347**	**6,112,163**	**3,485,337**
Dissolving & Special Alpha	273,981	366,413	363,124	369,916	223,990	306,860
Sulfite, Paper Grades, Total	240,164	129,230	237,137	128,680	238,246	119,230
Bl. Sulfite	240,106	129,216	236,612	128,401	237,316	118,759
Unbl. Sulfite	58	14	525	278	930	471
Sulfate, Paper Grades, Total	5,190,068	3,139,769	4,664,181	2,537,460	5,343,868	2,932,971
Bl. Sulfate	5,040,351	3,035,217	4,509,697	2,439,112	5,169,220	2,831,279
Semi Bl. Sulfate	59,233	43,455	49,415	42,134	45,276	41,332
Unbl. Sulfate	90,484	61,098	105,069	56,214	129,372	60,360
Mechanical, Semi-Chemical & Other	412,873	194,956	334,755	149,291	306,059	126,275
Cotton & Other Pulp	**53,736**	**33,536**	**33,131**	**15,898**	**22,850**	**9,861**
Recovered Paper	**1,004,809**	**170,734**	**1,094,024**	**152,882**	**893,931**	**123,247**
Paper, Board & Converted Products	**13,171,363**	**15,343,984**	**12,555,655**	**15,086,882**	**13,128,656**	**15,410,194**
Paper & Paperboard [1]	**11,116,086**	**9,485,317**	**10,489,713**	**9,117,255**	**11,006,645**	**9,318,570**
Paper	9,219,093	7,990,410	8,737,981	7,688,335	9,041,359	7,672,028
Newsprint	2,511,754	1,463,910	2,289,266	1,344,160	2,332,198	1,290,467
Printing Writing & Related	5,482,516	4,507,129	5,190,731	4,298,497	5,415,035	4,344,533
Clay Coated Free Sheet	836,122	763,600	746,781	677,923	747,264	658,435
Clay Coated Mechanical	835,516	709,634	1,032,239	838,942	967,859	775,747
Other Printing Writing & Related	36,129	53,308	32,514	49,573	35,057	53,776
Uncoated Free Sheet [2]	1,009,662	974,395	1,042,531	1,031,020	1,127,682	1,053,832
Uncoated Mechanical	2,765,087	2,006,193	2,336,666	1,701,038	2,537,173	1,802,744
Packaging & Industrial Converting	405,844	492,854	421,148	497,337	434,557	503,443
Bleached Kraft	176,447	231,850	194,214	232,773	184,835	219,862
Other	72,146	115,507	65,588	117,452	74,274	129,441
Unbleached Kraft	157,251	145,496	161,346	147,112	175,448	154,140
Tissue & Sanitary	322,541	379,232	323,829	371,881	328,950	378,249
Special Industrial & Absorbent	496,438	1,147,284	513,007	1,176,459	530,619	1,155,336
Paperboard	1,782,870	1,433,960	1,703,382	1,396,526	1,925,665	1,619,741
Kraft Linerboard (Unbl. & Other)	217,921	174,203	195,783	146,281	258,566	200,766
Other Unbleached Kraft Paperboard	209,401	164,322	214,238	171,308	260,090	224,233
Semi Chemical Paperboard	122,822	56,906	105,435	48,756	129,468	70,189
Bleached Kraft Paperboard	106,638	132,786	115,394	153,205	132,461	180,995
Folding Boxboard	6,462	7,698	8,319	8,435	3,467	4,897
Liquid Pkg. Stock	4,870	15,884	11,164	38,522	16,689	52,013
Other Kraft	30,156	36,121	26,088	30,017	25,815	28,957
Plate, Dish, Cup & Tray	65,150	73,082	69,823	76,231	86,490	95,128
Other Paperboard	1,126,088	905,744	1,072,532	876,977	1,145,080	943,558
Construction Paper & Board	113,845	60,495	48,071	31,958	39,396	26,415
Wet Machine Board	278	451	279	437	225	388
Converted Paper & Board Products	**2,055,277**	**5,858,667**	**2,065,942**	**5,969,626**	**2,122,011**	**6,091,624**
Wallpaper	4,406	44,190	4,596	48,188	4,975	51,172
Printing Writing & Related	168,461	702,344	167,642	715,182	161,722	688,387
Cigarette Paper	35,951	193,193	39,635	208,307	32,593	180,888
Packaging & Industrial Converting	267,189	938,852	271,700	959,698	285,711	958,344
Tissue & Sanitary	686,504	1,798,455	681,069	1,757,860	689,361	1,823,223
Special Industrial, Molded Pulp, Etc.	284,517	687,160	287,796	736,311	292,837	746,990
Boxes, Cartons and Drums	423,798	1,082,686	412,024	1,073,361	422,420	1,127,486
Sanitary Food Ctns and Other Bleached	152,305	358,348	178,366	433,755	194,226	468,976
Corrugated Paper & Board	32,146	53,441	23,114	36,965	38,166	46,159
No Tonnage Figures Available [3]	**--**	**784,486**	**--**	**798,072**	**--**	**788,854**

Source: U.S. Bureau of the Census

[1] Includes Paper, Paperboard, Wet Machine Board, and Construction Paper and Board.

[2] Includes Uncut and Cut-to-Size Uncoated Free Sheet Paper.

[3] Value included only in the "Total Imports" Category.

[4] Value represents Total Value, not CIF Value.

TABLE 11 Exports by Year

value in thousands of dollars

	2011		2012		2013	
	Short Tons	Value	Short Tons	Value	Short Tons	Value
Total Pulp (Wood, Cotton & Other)	**9,330,148**	**5,977,677**	**8,395,524**	**5,595,654**	**8,386,428**	**5,589,184**
Wood Pulp	**9,068,200**	**5,719,495**	**8,126,025**	**5,335,973**	**8,146,838**	**5,369,148**
Dissolving & Special Alpha	695,688	816,746	728,677	951,369	816,125	1,016,074
Sulfite, Paper Grades, Total	129,272	73,817	84,836	44,421	64,879	30,257
Bl. Sulfite	115,174	68,686	64,320	36,997	45,802	24,866
Unbl. Sulfite	14,098	5,131	20,516	7,423	19,077	5,391
Sulfate, Paper Grades, Total	7,963,927	4,708,375	7,050,330	4,212,509	7,135,805	4,258,430
Bl. Sulfate	7,059,290	4,356,538	6,349,222	3,878,206	6,519,099	3,945,393
Semi Bl. Sulfate	567,313	200,075	445,608	218,413	374,621	198,056
Unbl. Sulfate	337,324	151,762	255,500	115,889	242,085	114,981
Mechanical, Semi-Chemical & Other	279,313	120,557	262,182	127,674	130,029	64,387
Cotton & Other Pulp	**261,948**	**258,182**	**269,499**	**259,681**	**239,590**	**220,035**
Recovered Paper	**23,179,198**	**3,757,181**	**22,187,777**	**3,382,063**	**20,794,113**	**3,140,183**
Paper, Board & Converted Products	**16,453,471**	**16,242,283**	**15,768,729**	**16,171,773**	**15,693,754**	**16,470,881**
Paper & Paperboard [1]	**13,902,472**	**10,571,571**	**13,125,845**	**10,205,664**	**12,890,893**	**10,172,413**
Paper	4,782,227	4,772,157	4,637,994	4,798,381	4,544,767	4,603,506
Newsprint	930,233	534,631	805,423	453,668	847,672	445,237
Printing Writing & Related	2,495,949	2,487,712	2,576,318	2,558,908	2,504,029	2,396,381
Clay Coated Free Sheet	656,496	661,517	645,238	641,806	620,420	592,147
Clay Coated Mechanical	473,479	344,254	460,442	388,897	376,409	323,156
Other Printing Writing & Related	99,887	98,473	140,765	136,667	167,424	158,237
Uncoated Free Sheet [2]	984,464	1,137,521	1,075,070	1,174,381	1,063,108	1,110,119
Uncoated Mechanical	281,623	245,947	254,803	217,156	276,668	212,722
Packaging & Industrial Converting	780,322	495,912	588,565	469,484	520,516	439,720
Bleached Kraft	97,788	107,084	107,918	108,247	91,526	95,531
Other	57,096	99,704	55,520	87,663	43,125	83,411
Unbleached Kraft	625,438	289,125	425,127	273,573	385,865	260,778
Tissue & Sanitary	134,545	169,195	142,307	176,470	158,623	198,911
Special Industrial & Absorbent	441,178	1,084,707	525,381	1,139,852	513,927	1,123,256
Paperboard	9,048,038	5,744,464	8,409,977	5,355,361	8,296,658	5,531,339
Kraft Linerboard (Unbl. & Other)	4,893,079	2,375,595	4,361,490	2,124,792	4,077,085	2,209,647
Other Unbleached Kraft Paperboard	1,077,406	721,375	1,077,807	680,442	1,185,901	784,767
Semi Chemical Paperboard	400,381	195,078	388,658	180,696	360,575	183,577
Bleached Kraft Paperboard	1,914,623	1,948,232	1,813,638	1,836,170	1,797,109	1,771,129
Folding Boxboard	593,388	590,511	494,375	508,420	545,268	541,248
Liquid Pkg. Stock	561,697	616,543	533,221	591,033	521,221	574,188
Other Kraft	542,483	505,749	555,689	500,635	475,644	415,750
Plate, Dish, Cup & Tray	217,055	235,429	230,353	236,082	254,976	239,944
Other Paperboard	762,549	504,184	768,384	533,261	875,988	582,220
Construction Paper & Board	71,491	54,306	77,419	51,168	48,985	37,187
Wet Machine Board	716	644	455	754	483	382
Converted Paper & Board Products	**2,550,999**	**5,670,712**	**2,642,884**	**5,966,109**	**2,802,861**	**6,298,468**
Wallpaper	8,149	83,038	8,041	84,572	8,174	89,407
Printing Writing & Related	154,361	700,484	146,734	724,152	156,123	765,178
Cigarette Paper	11,249	39,915	8,551	40,871	6,251	34,352
Packaging & Industrial Converting	389,320	951,967	433,362	977,497	466,625	1,023,064
Tissue & Sanitary	547,526	1,632,035	586,901	1,767,512	609,065	1,833,663
Special Industrial, Molded Pulp, Etc.	55,022	150,430	58,124	160,545	56,177	159,309
Boxes, Cartons and Drums	868,978	1,400,216	807,717	1,414,281	822,779	1,493,456
Sanitary Food Ctns and Other Bleached	190,330	412,583	204,341	443,944	211,997	454,123
Corrugated Paper & Board	326,064	300,044	389,113	352,734	465,670	445,917
No Tonnage Figures Available [3]	**--**	**229,186**	**--**	**192,391**	**--**	**200,117**

Source: U.S. Bureau of the Census

[1] *Includes Paper, Paperboard, Wet Machine Board, and Construction Paper and Board.*

[2] *Includes Uncut and Cut-to-Size Uncoated Free Sheet Paper.*

[3] *Value included only in the "Total Exports" Category.*

[4] *Value represents Total Value, not CIF Value.*

TABLE 12 Imports by Region for 2013

	World		Canada	
	Short Tons	Value	Short Tons	Value
Total Pulp (Wood, Cotton & Other)	**6,135,013**	**3,495,198**	**3,707,322**	**2,220,908**
Wood Pulp	**6,112,163**	**3,485,337**	**3,697,108**	**2,219,559**
Dissolving & Special Alpha	223,990	306,860	126,373	150,442
Sulfite, Paper Grades, Total	238,246	119,230	234,127	116,884
Bl. Sulfite	237,316	118,759	233,207	116,415
Unbl. Sulfite	930	471	920	469
Sulfate, Paper Grades, Total	5,343,868	2,932,971	3,061,500	1,834,340
Bl. Sulfate	5,169,220	2,831,279	2,957,423	1,766,807
Semi Bl. Sulfate	45,276	41,332	37,125	29,517
Unbl. Sulfate	129,372	60,360	66,952	38,016
Mechanical, Semi-Chemical & Other	306,059	126,275	275,108	117,893
Cotton & Other Pulp	**22,850**	**9,861**	**10,214**	**1,349**
Recovered Paper	**893,931**	**123,247**	**799,590**	**107,633**
Paper, Board & Converted Products	**13,128,656**	**15,410,194**	**7,768,636**	**7,225,184**
Paper & Paperboard [1]	**11,006,645**	**9,318,570**	**6,887,363**	**5,009,035**
Paper	9,041,359	7,672,028	5,612,780	4,018,755
Newsprint	2,332,198	1,290,467	2,323,584	1,286,091
Printing Writing & Related	5,415,035	4,344,533	2,824,160	2,168,618
Clay Coated Free Sheet	747,264	658,435	3,074	4,204
Clay Coated Mechanical	967,859	775,747	376,787	306,654
Other Printing Writing & Related	35,057	53,776	22,382	23,451
Uncoated Free Sheet [2]	1,127,682	1,053,832	347,246	337,322
Uncoated Mechanical	2,537,173	1,802,744	2,074,671	1,496,986
Packaging & Industrial Converting	434,557	503,443	225,098	232,573
Bleached Kraft	184,835	219,862	110,688	125,691
Other	74,274	129,441	2,925	5,044
Unbleached Kraft	175,448	154,140	111,485	101,838
Tissue & Sanitary	328,950	378,249	123,068	158,450
Special Industrial & Absorbent	530,619	1,155,336	116,870	173,023
Paperboard	1,925,665	1,619,741	1,236,204	965,197
Kraft Linerboard (Unbl. & Other)	258,566	200,766	231,472	184,434
Other Unbleached Kraft Paperboard	260,090	224,233	29,532	15,282
Semi Chemical Paperboard	129,468	70,189	95,740	49,141
Bleached Kraft Paperboard	132,461	180,995	85,358	92,215
Folding Boxboard	3,467	4,897	1,644	1,367
Milk Carton Stock	16,689	52,013	64	76
Other Kraft	25,815	28,957	733	734
Plate, Dish, Cup & Tray	86,490	95,128	82,917	90,038
Other Paperboard	1,145,080	943,558	794,102	624,125
Construction Paper & Board	39,396	26,415	38,301	24,950
Wet Machine Board	225	388	78	133
Converted Paper & Board Products	**2,122,011**	**6,091,624**	**881,273**	**2,216,149**
Wallpaper	4,975	51,172	1,150	7,213
Printing Writing & Related	161,722	688,387	22,036	143,168
Cigarette Paper	32,593	180,888	3,536	28,476
Packaging & Industrial Converting	285,711	958,344	74,403	252,703
Tissue & Sanitary	689,361	1,823,223	337,783	981,444
Special Industrial, Molded Pulp, Etc.	292,837	746,990	143,862	181,368
Boxes, Cartons and Drums	422,420	1,127,486	190,796	401,979
Sanitary Food Ctns and Other Bleached	194,226	468,976	97,933	207,961
Corrugated Paper & Board	38,166	46,159	9,774	11,836
No Tonnage Figures Available [3]	**--**	**788,854**	**--**	**23,771**

Source: U.S. Bureau of the Census

[1] Includes Paper, Paperboard, Wet Machine Board, and Construction Paper and Board.

[2] Includes Uncut and Cut-to-Size Uncoated Free Sheet Paper.

[3] Value included only in the "Total Imports" Category.

[4] Value represents Total Value, not CIF Value.

value in thousands of dollars

Europe		Asia		Mexico & South America		Other	
Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
57,896	**42,598**	**17,637**	**16,528**	**2,352,158**	**1,186,941**	**0**	**28,223**
55,441	**39,929**	**7,456**	**10,685**	**2,352,158**	**1,186,941**	**0**	**28,223**
10,507	11,511	0	0	87,110	116,685	0	28,223
3,954	2,298	165	48	0	0	0	0
3,954	2,298	155	46	-	-	0	0
0	0	10	2	0	0	-	-
40,399	25,747	7,030	10,590	2,234,939	1,062,294	0	0
33,553	21,292	2,396	1,261	2,175,848	1,041,919	0	0
1,951	1,602	4,634	9,329	1,566	883	-	-
4,895	2,852	0	0	57,525	19,492	0	0
581	373	261	47	30,109	7,962	-	-
2,455	**2,669**	**10,181**	**5,843**	**0**	**0**	**0**	**0**
828	**328**	**4,580**	**2,285**	**88,933**	**13,002**	**0**	**0**
2,368,716	**2,998,399**	**2,065,394**	**3,805,487**	**751,408**	**1,262,771**	**174,502**	**118,352**
2,236,721	**2,302,840**	**1,272,494**	**1,443,421**	**443,841**	**455,254**	**166,226**	**108,021**
1,838,844	1,913,927	1,128,749	1,308,960	378,842	371,276	82,144	59,109
8,583	4,356	31	21	0	0	0	0
1,538,861	1,284,103	764,949	645,432	229,035	204,150	58,030	42,230
380,955	366,035	362,558	287,516	677	679	0	0
471,258	369,679	118,912	97,848	826	1,518	76	47
2,614	3,756	9,903	26,392	0	0	158	177
239,390	265,032	256,099	208,381	227,174	201,178	57,773	41,918
444,644	279,601	17,477	25,294	358	774	23	89
130,274	190,693	15,200	28,180	59,813	49,337	4,172	2,660
59,892	69,810	14,254	24,356	1	4	0	0
51,381	96,475	474	2,555	19,494	25,367	0	0
19,001	24,409	472	1,269	40,318	23,965	4,172	2,660
28,387	35,665	115,073	121,766	61,807	61,719	615	649
132,739	399,111	233,496	513,563	28,187	56,070	19,327	13,570
397,311	388,024	143,071	133,652	64,997	83,956	84,082	48,911
4,668	3,437	3,703	1,535	299	191	18,424	11,168
170,597	173,374	868	2,197	1,765	1,745	57,328	31,635
32,022	20,343	1,706	706	0	0	0	0
17,786	29,944	3,576	6,524	25,733	52,297	8	15
688	803	1,055	2,650	80	77	-	-
3,563	9,076	389	1,132	12,673	41,730	-	-
10,114	15,377	2,011	2,475	12,949	10,356	8	15
3,421	4,689	121	267	31	134	0	0
172,238	160,927	133,218	122,690	37,200	29,723	8,322	6,093
436	667	657	776	2	22	-	-
130	222	17	32	0	0	-	-
131,995	**695,559**	**792,900**	**2,362,067**	**307,567**	**807,518**	**8,276**	**10,332**
2,176	23,009	1,630	20,795	1	8	18	147
21,566	89,598	69,595	282,150	48,488	172,470	37	1,002
21,700	121,086	1,281	13,805	6,076	17,521	0	0
21,934	94,413	142,276	512,581	45,922	95,401	1,176	3,247
15,752	67,162	253,303	516,790	82,286	257,168	237	659
22,997	192,996	71,278	274,490	54,650	97,846	50	290
15,289	63,783	166,659	537,468	49,579	123,785	97	472
4,650	25,284	72,598	194,746	18,749	39,736	296	1,250
5,931	18,228	14,280	9,243	1,816	3,584	6,365	3,267
--	**44,686**	**--**	**555,129**	**--**	**144,162**	**--**	**21,105**

TABLE 13 Exports by Region for 2013

	World		Canada	
	Short Tons	Value	Short Tons	Value
Total Pulp (Wood, Cotton & Other)	**8,386,428**	**5,589,184**	**229,304**	**142,108**
Wood Pulp	**8,146,838**	**5,369,148**	**189,658**	**116,645**
Dissolving & Special Alpha	816,125	1,016,074	99	139
Sulfite, Paper Grades, Total	64,879	30,257	23,808	9,582
Bl. Sulfite	45,802	24,866	12,982	7,089
Unbl. Sulfite	19,077	5,391	10,826	2,493
Sulfate, Paper Grades, Total	7,135,805	4,258,430	161,876	105,295
Bl. Sulfate	6,519,099	3,945,393	159,028	103,702
Semi Bl. Sulfate	374,621	198,056	2,673	1,483
Unbl. Sulfate	242,085	114,981	175	110
Mechanical, Semi-Chemical & Other	130,029	64,387	3,875	1,629
Cotton & Other Pulp	**239,590**	**220,035**	**39,646**	**25,462**
Recovered Paper	**20,794,113**	**3,140,183**	**696,757**	**107,562**
Paper, Board & Converted Products	**15,693,754**	**16,470,881**	**4,049,659**	**5,426,417**
Paper & Paperboard [1]	**12,890,893**	**10,172,413**	**2,770,919**	**2,518,587**
Paper	4,544,767	4,603,506	1,418,473	1,599,551
Newsprint	847,672	445,237	102,105	60,595
Printing Writing & Related	2,504,029	2,396,381	751,158	870,780
Clay Coated Free Sheet	620,420	592,147	329,433	340,957
Clay Coated Mechanical	376,409	323,156	92,792	93,931
Other Printing Writing & Related	167,424	158,237	4,787	10,222
Uncoated Free Sheet [2]	1,063,108	1,110,119	297,753	398,979
Uncoated Mechanical	276,668	212,722	26,393	26,691
Packaging & Industrial Converting	520,516	439,720	194,987	155,416
Bleached Kraft	91,526	95,531	40,143	42,294
Other	43,125	83,411	6,435	13,023
Unbleached Kraft	385,865	260,778	148,409	100,098
Tissue & Sanitary	158,623	198,911	84,993	100,872
Special Industrial & Absorbent	513,927	1,123,256	285,230	411,889
Paperboard	8,296,658	5,531,339	1,327,960	904,222
Kraft Linerboard (Unbl. & Other)	4,077,085	2,209,647	279,085	162,362
Other Unbleached Kraft Paperboard	1,185,901	784,767	224,218	152,517
Semi Chemical Paperboard	360,575	183,577	36,573	17,912
Bleached Kraft Paperboard	1,797,109	1,771,129	191,663	165,759
Folding Boxboard	545,268	541,248	66,978	62,710
Liquid Pkg. Stock	521,221	574,188	2,320	2,736
Other Kraft	475,644	415,750	101,520	82,871
Plate, Dish, Cup & Tray	254,976	239,944	20,845	17,442
Other Paperboard	875,988	582,220	596,421	405,672
Construction Paper & Board	48,985	37,187	24,486	14,814
Wet Machine Board	483	382	-	-
Converted Paper & Board Products	**2,802,861**	**6,298,468**	**1,278,740**	**2,907,829**
Wallpaper	8,174	89,407	1,592	12,994
Printing Writing & Related	156,123	765,178	42,492	205,571
Cigarette Paper	6,251	34,352	3,733	14,016
Packaging & Industrial Converting	466,625	1,023,064	234,553	389,144
Tissue & Sanitary	609,065	1,833,663	428,255	1,320,130
Special Industrial, Molded Pulp, Etc.	56,177	159,309	22,220	50,988
Boxes, Cartons and Drums	822,779	1,493,456	297,094	510,454
Sanitary Food Ctns and Other Bleached	211,997	454,123	123,012	274,476
Corrugated Paper & Board	465,670	445,917	125,789	130,056
No Tonnage Figures Available [3]	**--**	**200,117**	**--**	**80,777**

Source: U.S. Bureau of the Census

[1] Includes Paper, Paperboard, Wet Machine Board, and Construction Paper and Board.

[2] Includes Uncut and Cut-to-Size Uncoated Free Sheet Paper.

[3] Value included only in the "Total Exports" Category.

[4] Value represents Total Value, not CIF Value.

value in thousands of dollars

Europe		Asia		Mexico & South America		Other	
Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
2,291,763	**1,490,440**	**4,253,767**	**2,905,396**	**1,232,084**	**817,633**	**379,510**	**233,607**
2,229,817	**1,414,120**	**4,163,222**	**2,822,270**	**1,200,665**	**795,155**	**363,476**	**220,958**
107,239	157,195	661,693	780,952	46,962	77,699	132	88
19,146	9,556	12,473	6,312	6,622	3,607	2,830	1,199
15,535	8,527	10,380	5,613	5,024	2,658	1,881	979
3,611	1,030	2,093	700	1,598	949	949	220
2,091,369	1,242,528	3,396,777	1,986,564	1,131,967	706,884	353,816	217,159
2,066,975	1,230,721	2,986,921	1,778,968	954,000	615,712	352,175	216,290
22,622	11,402	171,375	94,092	176,678	90,401	1,273	677
1,772	405	238,481	113,505	1,289	770	368	192
12,063	4,841	92,279	48,441	15,114	6,964	6,698	2,512
61,946	**76,320**	**90,545**	**83,126**	**31,419**	**22,478**	**16,034**	**12,649**
321,790	**81,543**	**18,224,691**	**2,641,021**	**1,535,981**	**305,991**	**14,894**	**4,066**
2,008,757	**1,862,039**	**3,186,348**	**2,943,036**	**5,908,455**	**5,760,488**	**540,535**	**478,902**
1,909,255	**1,438,701**	**3,040,192**	**2,442,109**	**4,668,512**	**3,399,339**	**502,015**	**373,677**
471,149	531,541	1,006,951	876,728	1,482,902	1,445,959	165,292	149,727
5,092	2,320	428,384	209,088	290,733	160,119	21,358	13,115
365,022	292,098	345,400	272,199	927,470	867,049	114,979	94,256
18,583	19,051	86,700	68,949	149,973	130,842	35,731	32,348
94,539	74,843	89,232	72,001	79,599	65,743	20,247	16,639
7,526	5,948	7,611	6,886	145,891	133,788	1,609	1,393
222,756	177,902	55,867	62,075	432,494	429,339	54,238	41,823
21,618	14,354	105,990	62,288	119,513	107,336	3,154	2,053
31,020	32,688	145,705	117,858	129,152	118,646	19,652	15,112
8,440	10,806	22,845	20,935	19,653	20,846	445	649
2,570	5,866	14,455	30,613	19,381	33,139	284	770
20,010	16,016	108,405	66,310	90,118	64,661	18,923	13,692
5,699	10,163	9,622	15,023	55,800	69,825	2,509	3,028
64,316	194,271	77,840	262,559	79,747	230,319	6,794	24,217
1,434,797	904,331	2,029,121	1,561,217	3,169,499	1,938,814	335,281	222,755
853,836	446,012	901,701	469,692	1,825,349	1,017,929	217,114	113,651
305,124	208,716	200,328	140,713	425,861	256,580	30,370	26,241
407	258	5,170	2,208	311,035	159,809	7,390	3,389
244,705	233,389	898,310	932,922	385,240	363,434	77,191	75,626
78,253	83,713	247,004	246,002	120,565	113,144	32,468	35,678
21,654	25,550	405,047	463,082	80,010	71,381	12,190	11,439
48,806	28,190	178,211	164,747	132,364	125,037	14,743	14,905
95,992	95,937	68,048	59,091	52,301	53,872	17,790	13,603
30,725	15,956	23,612	15,682	222,014	141,061	3,216	3,848
3,039	2,555	3,907	4,057	16,111	14,567	1,442	1,194
270	274	213	107	0	0	0	0
99,502	**423,337**	**146,156**	**500,927**	**1,239,943**	**2,361,148**	**38,520**	**105,226**
1,876	22,508	3,647	45,155	830	6,798	229	1,951
11,453	89,253	31,823	130,002	68,096	327,725	2,259	12,627
402	2,456	30	212	1,478	10,445	608	7,223
25,812	92,481	35,169	109,446	156,697	400,023	14,394	31,971
31,639	113,448	48,495	132,061	86,046	232,192	14,630	35,832
4,390	16,884	4,780	20,427	23,387	66,789	1,400	4,221
10,485	46,828	7,568	25,893	506,555	907,092	1,077	3,189
12,060	33,925	9,806	23,709	63,743	114,635	3,376	7,377
1,385	5,553	4,838	14,023	333,111	295,450	547	834
--	**29,166**	**--**	**25,404**	**--**	**58,910**	**--**	**5,860**

TABLE 14 Substitute Import/Export Figures for Specified Grades *thousands of short tons*

Year	Imports		Exports			
	Newsprint [1]	Uncoated Mechanical Paper [2]	Unbleached Kraft Paperboard [3]	Semichemical Paperboard [3]	Bleached Paperboard [3]	Recycled Paperboard [3]
1960	5,426	40	381	31	23	46
1965	6,349	98	905	55	47	32
1970	6,477	233	1,683	84	114	17
1975	5,522	264	1,058	115	256	24
1980	6,880	688	2,380	322	550	83
1985	7,635	1,476	1,830	189	466	26
1990	7,261	1,982	2,691	143	761	49
1995	6,493	3,041	3,297	138	1,022	123
1997	6,360	2,964	5,111	267	1,177	159
1998	6,432	3,083	4,269	229	1,122	168
1999	6,660	3,384	3,737	299	1,124	260
2000	6,537	3,873	3,366	263	1,084	221
2001	5,875	3,911	2,958	313	1,118	281
2002	6,121	4,021	3,132	316	1,153	300
2003	6,047	4,350	3,472	134	1,214	135
2004	5,839	4,457	3,390	156	1,328	107
2005	5,451	4,522	3,549	175	1,335	110
2006	4,910	3,884	3,752	202	1,333	98
2007	4,195	4,357	3,868	298	1,456	83
2008	3,621	4,019	3,919	380	1,495	189
2009	2,557	-	3,951	355	1,403	167
2010	2,417	-	4,012	488	1,548	210
2011	2,233	-	4,151	406	1,484	186
2012 R	2,073	-	4,212	398	1,504	254
2013	2,046	-	4,332	387	1,567	248

Note: The U.S. Import and Export shipment data in this table is obtained from sources other than the U.S. Bureau of the Census. For the grades shown here, Import/Export data from these alternative sources is often used in place of U.S. Census data.

Sources:

[1] Newsprint - Canadian Shipments to U.S., PPPC; Imports from other countries, U.S. Bureau of the Census;

[2] Uncoated Mechanical - Canadian Shipments to U.S. prior to 2009, PPPC; Imports from other countries, U.S. Bureau of the Census.; In 2009, AF&PA began using U.S. Census data for Printing & Writing imports from all countries;

[3] Paperboard Grades - 1960 - 1968, U.S. Bureau of the Census; 1968 - present, AF&PA.

R - Revised

TABLE 15 U.S. Production of Wood Pulp and Market Wood Pulp *thousands of short tons*

	2007	2008	2009	2010	2011	2012	2013
WOOD PULP, TOTAL[1]	58,932	56,745	52,122	54,343	55,125	55,475	54,466
Total Sulfite	431	373	296	326	327	244	237
Total Sulfate	50,194	48,360	45,155	46,808	47,568	47,919	47,206
Bl. & Semi-Bl.	28,791	27,990	25,622	26,470	26,592	26,797	26,038
Unbl. Sulfate	21,403	20,370	19,533	20,338	20,976	21,122	21,168
Total Groundwood	4,759	4,711	3,620	4,088	4,109	4,076	3,898
Stone and Refiner	1,366	1,324	1,020	1,185	1,124	1,163	1,145
Thermo-mechanical	3,393	3,388	2,600	2,904	2,984	2,912	2,753
Semichemical	3,547	3,301	3,051	3,121	3,122	3,237	3,126
MARKET WOOD PULP, TOTAL	9,074	8,642	8,736	8,769	8,998	9,251	9,004
Chemical Total	9,074	8,642	8,736	8,769	8,998	9,251	9,004
Bl. & Semi-Bl. Softwood Sulfate	6,374	6,442	6,439	6,441	6,627	6,881	7,082
Bl. & Semi-Bl. Hardwood Sulfate	2,297	2,031	1,977	2,067	2,091	2,067	1,653
Other [2]	403	169	320	261	280	304	269

Source: AF&PA's Monthly Summary of Pulp Production, Shipments and Inventory.
[1] Excludes Dissolving & Special Alpha Pulp and Wood Pulp for Construction Paper & Board.
[2] Includes Sulfite and Unbleached Sulfate.

Pulp Production

TABLE 16 Fiber Sources for Paper & Paperboard Manufacture *thousands of short tons*

	2007	2008	2009	2010	2011	2012	2013
TOTAL FIBER	92,979	89,400	80,038	84,558	83,852	83,079	83,421
Total Wood Pulp	58,605	56,565	50,598	52,832	53,175	53,001	53,099
Manufactured On-site	49,817	48,362	43,449	45,369	46,009	46,040	45,895
Purchased [1]	7,629	7,087	6,102	6,295	6,034	5,801	6,013
Transferred [1]	1,159	1,116	1,047	1,168	1,132	1,160	1,191
Total Recovered Paper [2]	34,174	32,655	29,268	31,552	30,508	29,913	30,143
Mixed Papers	4,481	4,564	4,150	4,371	3,950	4,204	3,998
Newspapers	5,272	4,850	3,826	3,886	3,441	2,877	2,468
Corrugated	20,159	19,161	17,415	19,327	19,339	19,057	19,805
Pulp Substitutes	1,487	1,359	1,218	1,260	1,204	1,171	1,166
High Grade Deinking	2,775	2,721	2,659	2,708	2,574	2,604	2,706
Other Fibers	200	180	172	174	169	165	179

[1] Comprises all Dried, Wet Lap or Slush Pulp not produced on-site including transfers from company or affiliated mills.
[2] Includes Fiber consumed for construction grades and molded pulp products. Totals not adjusted for differences in rounding.
Source: AF&PA's Annual Survey of Capacity and Fiber Consumption.

Fiber Sources

TABLE 17 Pulpwood Consumed in Wood Pulp Manufacture *thousands of cords*

	2007	2008	2009	2010	2011	2012	2013
TOTAL PULPWOOD	100,617	98,035	89,669	93,689	95,507	96,270	95,499
Total Softwood	70,730	69,424	64,476	67,573	69,172	70,047	69,617
Total Hardwood	29,887	28,611	25,193	26,116	26,335	26,223	25,882
Roundwood	53,058	53,630	51,144	53,326	54,216	55,629	54,416
Softwood	36,585	37,573	36,783	38,092	38,937	40,613	39,828
Hardwood	16,473	16,057	14,361	15,234	15,279	15,016	14,588
Roundwood Chips	33,864	33,587	29,118	31,291	32,339	31,221	33,349
Softwood	22,749	22,953	19,829	21,936	22,714	21,633	23,416
Hardwood	11,115	10,634	9,289	9,355	9,625	9,588	9,933
Forest Residues	1,121	789	866	635	634	576	526
Softwood	829	554	604	371	382	340	277
Hardwood	292	235	262	264	252	236	249
Manufacturing Residues	12,574	10,029	8,541	8,437	8,318	8,844	7,208
Softwood	10,567	8,344	7,260	7,174	7,139	7,461	6,096
Hardwood	2,007	1,685	1,281	1,263	1,179	1,383	1,112

Source: AF&PA's Annual Survey of Capacity and Fiber Consumption.
Totals not adjusted for differences in rounding.

Pulpwood Consumption

TABLE 18 Recovered Paper Utilization in the U.S. [1] *thousands of short tons*

Year	Newsprint	Tissue	Kraft Board	Semichemical Board	Recycled Board	All Other	Net Export	Total Recovered Paper	Recovery Rate [2]
1995	3,170	3,396	4,325	1,860	14,363	5,667	9,410	42,189	44.0%
1996	3,164	3,658	4,190	2,004	16,846	5,606	7,611	43,076	45.6%
1997	3,556	3,748	4,269	2,276	17,278	5,673	7,190	43,988	44.2%
1998	3,990	3,809	4,103	2,062	17,820	5,686	7,606	45,076	44.6%
1999	3,704	3,927	4,220	2,019	18,926	5,931	8,091	46,818	44.5%
2000	4,006	4,014	3,840	2,131	18,104	5,552	9,664	47,311	46.0%
2001	3,745	4,224	3,934	2,400	16,823	5,601	10,269	46,996	48.3%
2002	3,597	4,212	3,897	2,527	16,966	5,580	10,867	47,645	48.2%
2003	3,330	4,061	4,430	2,928	15,732	5,369	13,406	49,255	50.3%
2004	3,502	4,276	4,435	3,269	16,433	4,921	13,351	50,187	49.3%
2005	3,504	4,187	4,423	3,044	16,110	4,682	15,323	51,273	51.5%
2006	3,515	4,234	4,705	3,108	15,985	4,749	17,018	53,314	53.0%
2007	3,222	4,290	4,744	2,874	15,879	4,194	19,122	54,325	56.0%
2008	3,018	4,082	4,243	2,974	15,225	3,601	18,680	51,822	57.7%
2009	2,222	3,983	3,838	2,462	14,120	2,724	20,686	50,036	63.6%
2010	2,225	4,106	4,143	2,361	15,820	2,982	19,908	51,545	63.0%
2011	1,836	4,084	3,751	2,399	15,889	2,634	22,174	52,767	66.4%
2012	1,415	4,298	3,393	2,429	15,949	2,514	21,094	51,092	65.1%
2013	1,063	4,417	3,522	2,491	16,261	2,474	19,900	50,128	63.5%

[1] Data is sourced from www.paperrecycles.org and AF&PA's Annual Recovered Paper Utilization Report.
[2] Recovery Rate is the ratio of Recovered Paper collected to New Supply of Paper and Paperboard. Total Recovered Paper is the sum of Recovered Paper Consumption at Paper and Board Mills, Other Uses and Exports less Imports. AF&PA's Recovery Rate is calculated each Spring using preliminary data.

U.S. Recovered Paper Consumption and Recovery Rate

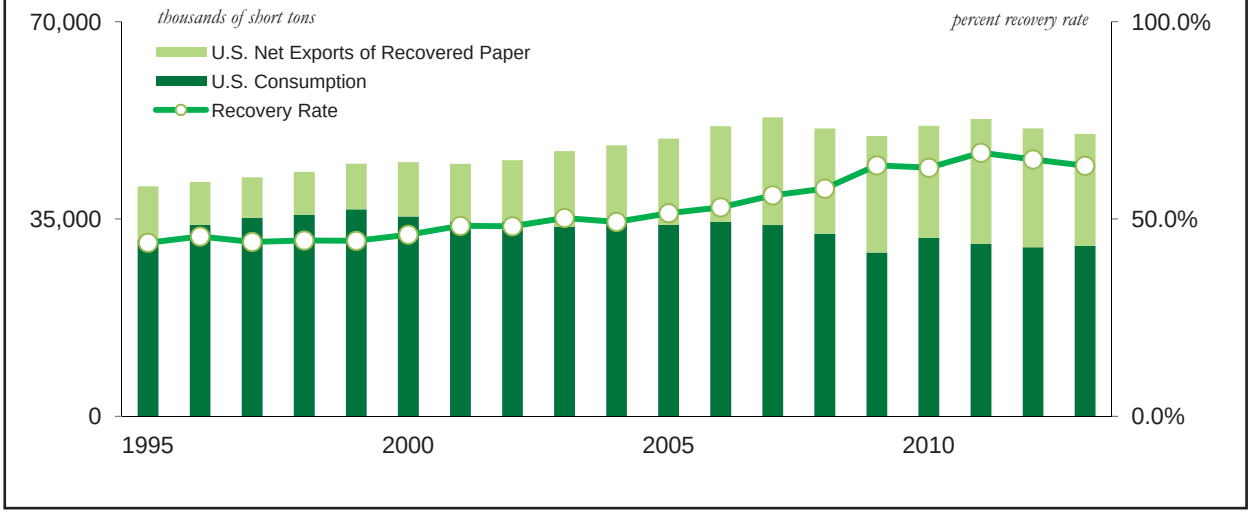


TABLE 19 State Employment Data for the Paper Manufacturing Industry [1] *thousands*

	2005	2006	2007	2008	2009	2010 R	2011
Northeast	**85.0**	**77.1**	**78.9**	**75.1**	**67.5**	**62.9**	**61.7**
New England	**30.0**	**26.1**	**26.2**	**23.6**	**21.5**	**18.3**	**17.7**
Maine	8.0	7.7	7.2	7.8	7.8	6.7	6.8
New Hampshire	2.0	1.4	1.5	-	-	-	-
Vermont	1.0	-	-	-	-	-	-
Massachusetts	13.0	11.2	11.6	10.5	9.1	8.2	7.6
Rhode Island	1.0	1.4	1.3	1.2	1.0	-	-
Connecticut	5.0	4.5	4.5	4.0	3.7	3.4	3.3
Middle Atlantic	**55.0**	**51.0**	**52.7**	**51.5**	**46.0**	**44.5**	**44.0**
New York	17.0	15.1	16.9	15.9	14.3	14.1	14.0
New Jersey	14.0	12.0	11.6	11.8	9.8	8.9	8.7
Pennsylvania	24.0	24.0	24.2	23.8	21.9	21.6	21.4
North Central	**131.0**	**127.5**	**128.8**	**124.8**	**113.5**	**111.9**	**110.3**
East North Central	**102.0**	**99.1**	**98.4**	**94.7**	**86.1**	**85.7**	84.7
Ohio	23.0	22.8	22.7	21.8	19.3	18.7	18.7
Indiana	11.0	11.0	11.6	11.0	10.6	10.3	9.9
Illinois	22.0	20.8	18.9	18.4	16.5	16.2	14.7
Michigan	13.0	12.5	12.9	12.5	11.4	10.9	10.8
Wisconsin	33.0	32.0	32.3	31.0	28.4	29.6	30.5
West North Central	**29.0**	**28.4**	**30.4**	**30.1**	**27.3**	**26.2**	**25.6**
Minnesota	12.0	11.3	12.4	12.4	11.6	11.3	11.3
Iowa	4.0	3.6	4.4	4.5	3.6	3.5	3.3
Missouri	9.0	9.4	9.6	9.2	8.8	8.2	8.0
Nebraska	2.0	1.6	1.4	1.5	1.4	1.5	1.5
Kansas	2.0	2.5	2.5	2.5	2.0	1.8	1.6
South	**161.0**	**153.2**	**151.8**	**147.0**	**133.1**	**129.4**	**127.8**
South Atlantic	**77.0**	**72.6**	**72.9**	**70.4**	**63.7**	**62.0**	**61.6**
Delaware	1.0	-	-	-	-	-	-
Maryland	6.0	5.1	4.5	4.2	3.6	3.4	3.0
Virginia	11.0	10.4	9.9	8.9	8.3	7.9	6.9
North Carolina	18.0	16.9	17.8	17.1	15.0	14.6	15.7
South Carolina	12.0	11.7	12.2	11.5	11.5	11.3	11.3
Georgia	20.0	19.3	19.4	19.8	17.5	17.2	17.2
Florida	9.0	9.2	8.9	8.9	7.7	7.6	7.4
East South Central	**43.0**	**40.8**	**40.9**	**40.6**	**36.4**	**35.2**	**34.7**
Kentucky	10.0	9.3	9.6	9.4	8.9	8.7	9.0
Tennessee	15.0	13.6	13.7	13.8	11.6	11.4	10.8
Alabama	13.0	12.5	12.7	12.5	11.7	11.2	11.3
Mississippi	5.0	5.4	4.8	4.9	4.3	3.8	3.6
West South Central	**41.0**	**39.9**	**38.0**	**36.0**	**33.0**	**32.2**	**31.6**
Arkansas	11.0	10.2	8.8	8.6	8.4	8.6	7.7
Louisiana	9.0	8.0	8.5	7.8	6.9	6.6	6.7
Oklahoma	4.0	3.7	4.4	3.9	3.4	3.3	3.3
Texas	17.0	17.9	16.3	15.7	14.3	13.6	14.0
West	**51.0**	**50.1**	**52.6**	**51.0**	**42.9**	**42.7**	**42.1**
Mountain	**10.0**	**9.2**	**10.0**	**9.5**	**6.8**	**8.0**	**8.1**
Idaho	2.0	1.9	1.9	1.8	1.7	1.7	1.7
Colorado	2.0	1.9	2.6	2.6	1.4	1.4	1.3
Arizona	3.0	2.7	2.8	2.7	2.3	2.0	2.0
Utah	3.0	2.7	2.6	2.5	1.4	1.8	2.0
Nevada	-	-	-	-	-	1.0	1.1
Pacific	**41.0**	**40.9**	**42.6**	**41.5**	**36.2**	**34.7**	**34.0**
Washington	11.0	11.9	11.4	10.7	9.4	9.2	9.0
Oregon	6.0	6.1	6.3	6.3	4.9	4.3	4.1
California	24.0	22.9	24.9	24.5	21.9	21.2	20.8
TOTAL REPORTED	**428.0**	**407.9**	**412.1**	**397.9**	**357.0**	**346.9**	**341.9**
TOTAL U.S.A.	**430.0**	**413.4**	**417.1**	**403.7**	**362.6**	**351.4**	**346.5**

Number of Employees [2]

Source: U.S. Bureau of the Census: Annual Survey of Manufactures, Geographic Area Statistics.
States not shown have no current or historic data. Data for 2012-13 not available at time of publication.
[1] NAICS Code 322. [2] Number of employees refers to all employees. R - *Revised.*

TABLE 20 Compensation of Employees in the Paper and Allied Products Industry, from the National Income and Product Accounts

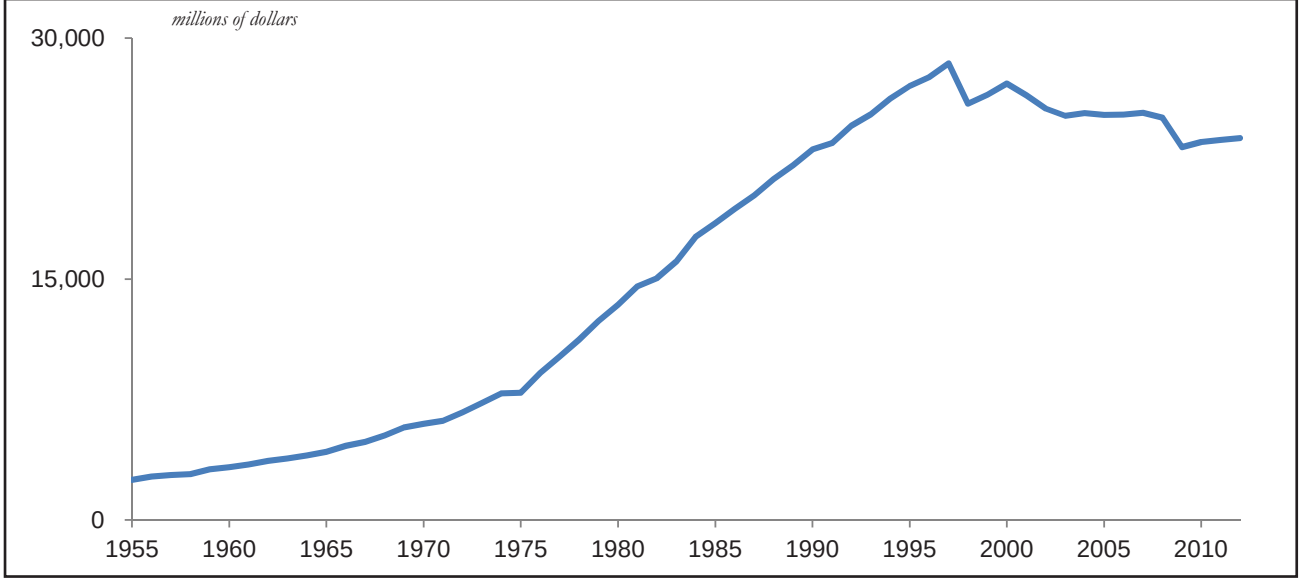
Year	Total	Wages & Salaries	Supplements to Wages & Salaries [1]	Number of Full Time Equivalent Employees	Number of Full Time & Part Time Employees	Wage & Salary Accruals per Full Time Equivalent Employee
	millions of dollars			*thousands*		*dollars*
1955	2,684	2,499	185	537	551	4,654
1960	3,596	3,288	308	576	592	5,708
1965	4,696	4,250	446	628	640	6,768
1970	6,788	5,994	794	694	702	8,637
1975	9,346	7,921	1,425	628	642	12,613
1980	16,164	13,401	2,763	681	691	19,678
1985	22,112	18,479	3,633	666	678	27,746
1990	27,848	23,063	4,785	687	697	33,514
1995	32,415	27,029	5,386	685	693	39,561
1997	33,383	28,437	4,946	675	686	42,137
1998 [2]	31,015	25,924	5,091	621	616	43,204
1999	31,697	26,486	5,211	611	607	44,878
2000	32,589	27,165	5,424	596	608	45,578
2001	32,023	26,445	5,578	564	579	46,911
2002	32,862	25,610	7,252	528	542	48,497
2003	35,854	25,172	10,682	502	516	50,192
2004	31,258	25,328	5,930	485	496	52,209
2005	31,297	25,213	6,084	469	483	53,815
2006	31,079	25,241	5,838	458	469	55,090
2007	31,378	25,345	6,033	447	457	56,640
2008	31,216	25,044	6,172	430	442	58,274
2009	28,472	23,218	5,254	393	406	59,012
2010	28,801	23,538	5,263	382	394	61,583
2011	29,343	23,667	5,676	378	388	62,679
2012	29,485	23,772	5,713	369	380	64,348

Source: U.S. Bureau of Economic Analysis, National Income and Product Accounts. Data for 2013 not available at time of publication.

[1] Total less Wages & Salaries.

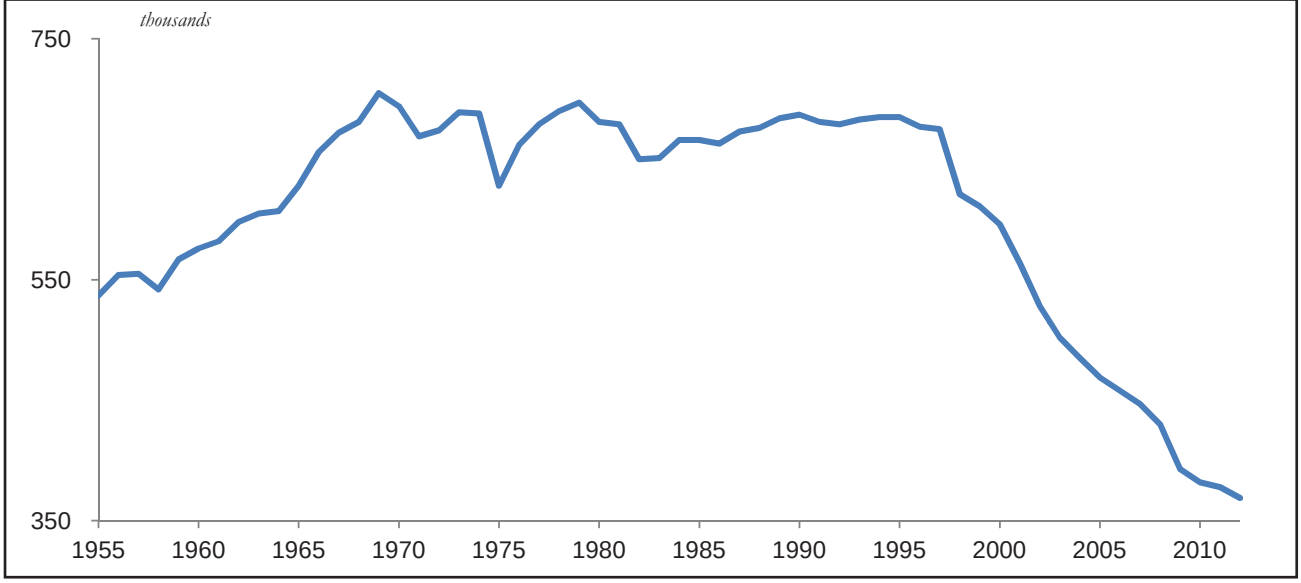
[2] Beginning in 1998, data based on NAICS.

Wages and Salaries



Wages and Salaries

Number of Full Time Equivalent Employees



Number of Employees

TABLE 21 A Wage Rates and Employment in the Paper and Allied Products Industry

Year	Average Hourly Earnings [1]	Average Weekly Earnings [1]	Average Weekly Hours [1]	Employees Total	Production Workers
	dollars			*thousands*	
PAPER AND PAPER PRODUCTS - NAICS 322					
2000	15.91	681.34	42.8	604.7	467.5
2001	16.38	690.06	42.1	577.6	446.3
2002	16.85	705.62	41.9	546.6	421.4
2003	17.33	719.55	41.5	516.2	392.7
2004	17.91	754.17	42.1	495.5	373.7
2005	17.99	764.15	42.5	484.2	365.2
2006	18.01	772.57	42.9	470.5	357.4
2007	18.44	795.58	43.1	458.2	350.5
2008	18.89	809.57	42.9	444.9	343.7
2009	19.29	806.19	41.8	407.0	313.0
2010	20.04	858.65	42.9	394.7	302.2
2011	20.28	870.53	42.9	387.4	295.3
2012 R	20.42	877.14	42.9	379.8	287.6
2013	20.31	874.44	43.1	378.7	279.9
PULP, PAPER AND PAPERBOARD MILLS - NAICS 3221					
2000	20.62	924.22	44.8	191.4	148.0
2001	21.16	930.62	44.0	179.2	139.1
2002	21.95	945.83	43.1	164.7	128.4
2003	22.62	971.07	42.9	151.0	118.1
2004	23.00	999.87	43.5	146.0	114.0
2005	22.99	1,008.33	43.9	141.6	110.7
2006	22.75	1,025.22	45.1	136.4	107.0
2007	24.03	1,071.52	44.6	132.1	104.0
2008	24.50	1,090.97	44.5	126.4	97.7
2009	24.64	1,077.13	43.7	116.9	90.8
2010	25.12	1,115.38	44.4	112.3	88.7
2011	25.75	1,174.80	45.6	109.3	85.8
2012 R	25.81	1,159.75	44.9	107.9	84.4
2013	25.00	1,122.12	44.9	107.1	81.7
PAPER AND PULP - NAICS 32212					
2000	20.68	938.58	45.4	145.6	112.8
2001	21.24	939.84	44.2	136.7	105.9
2002	21.97	954.33	43.4	124.2	96.8
2003	22.78	963.37	42.3	111.3	87.0
2004	22.96	992.63	43.2	106.8	83.4
2005	22.91	1,002.07	43.7	104.1	81.9
2006	22.95	1,032.28	45.0	99.9	78.5
2007	24.16	1,074.76	44.5	97.0	75.6
2008	24.81	1,101.73	44.4	92.1	70.2
2009 [2]	-	-	-	85.4	-
2010	-	-	-	82.5	-
2011	-	-	-	80.2	-
2012 R	-	-	-	78.8	-
2013	-	-	-	78.1	-

Source: U.S. Bureau of Labor Statistics, Employment and Earnings; data are not seasonally adjusted.

[1] Data on hours and earnings refer to production workers.

[2] Data for Paper and Pulp since 2009 unavailable except for Employees Total.

R - Revised

TABLE 21 B Wage Rates and Employment in the Paper and Allied Products Industry

Year	Average Hourly Earnings [1]	Average Weekly Earnings [1]	Average Weekly Hours [1]	Employees Total	Production Workers
	dollars			*thousands*	
PAPERBOARD - NAICS 32213					
2000	20.40	878.39	43.1	45.8	35.2
2001	20.90	901.41	43.1	42.5	33.2
2002	21.91	920.92	42.0	40.4	31.6
2003	22.20	992.91	44.7	39.7	31.1
2004	23.11	1020.02	44.1	39.2	30.6
2005	23.23	1025.71	44.2	37.5	28.9
2006	22.20	1005.97	45.3	36.5	28.5
2007	23.70	1061.53	44.8	35.1	28.3
2008 [2]	-	-	-	34.3	-
2009	-	-	-	31.5	-
2010	-	-	-	29.8	-
2011	-	-	-	29.1	-
2012 R	-	-	-	29.2	-
2013	-	-	-	29.0	-
CONVERTED PAPER PRODUCTS - NAICS 3222					
2000	13.58	569.03	41.9	413.2	319.5
2001	14.07	580.83	41.3	398.4	307.2
2002	14.52	600.03	41.3	382.0	293.0
2003	14.94	611.51	40.9	365.2	274.6
2004	15.57	646.31	41.5	349.6	259.8
2005	15.71	657.43	41.8	342.6	254.4
2006	15.83	664.44	42.0	334.1	250.4
2007	15.97	679.13	42.5	326.1	246.5
2008	16.54	697.65	42.2	318.5	246.0
2009	16.96	695.60	41.0	290.1	222.2
2010	17.81	751.78	42.2	282.4	213.5
2011	17.84	745.96	41.8	278.1	209.5
2012 R	18.04	759.90	42.1	271.9	203.1
2013	18.26	772.67	42.3	271.6	198.2
PAPERBOARD CONTAINERS - NAICS 32221					
2000	13.65	576.40	42.2	218.6	169.6
2001	14.11	582.82	41.3	211.3	162.5
2002	14.44	600.50	41.6	203.8	156.8
2003	14.89	617.21	41.5	195.4	147.4
2004	15.53	650.22	41.9	186.0	140.7
2005	15.49	658.33	42.5	182.3	138.5
2006	15.17	653.54	43.1	177.6	133.6
2007	15.24	658.46	43.2	172.2	130.8
2008	15.94	679.72	42.6	166.7	129.4
2009	16.43	668.63	40.7	150.7	114.6
2010	16.92	711.00	42.0	147.2	111.8
2011	16.80	705.29	42.0	145.2	110.1
2012 R	17.18	739.19	43.0	142.4	106.7
2013	17.71	776.60	43.9	143.6	104.6

Source: U.S. Bureau of Labor Statistics, Employment and Earnings; data are not seasonally adjusted.

[1] Data on hours and earnings refer to production workers.

[2] Data for Paperboard since 2008 unavailable except for Employees Total.

R - Revised

Selected Balance Sheet Data

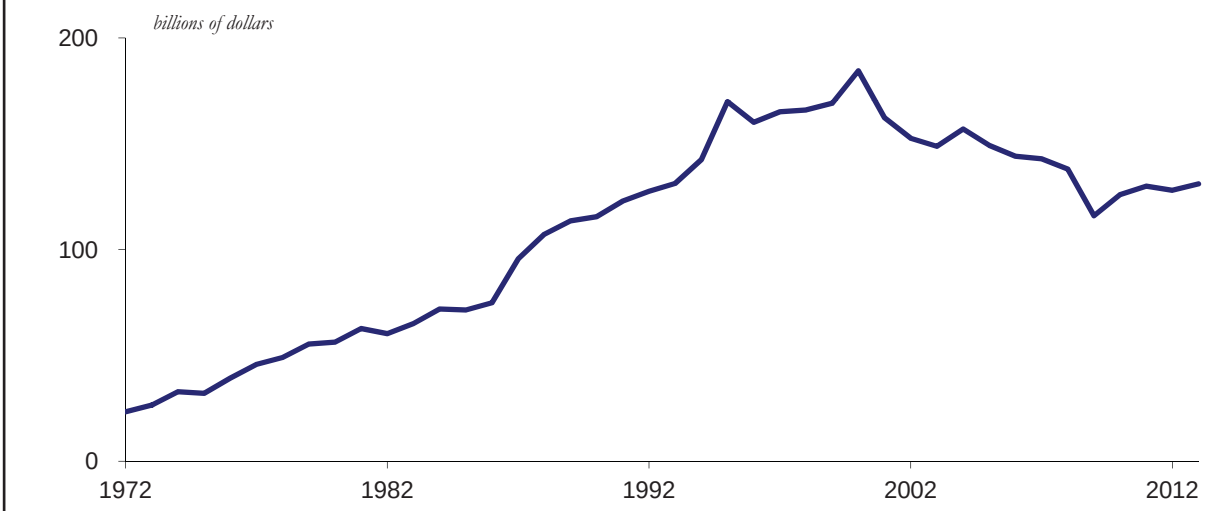
TABLE 22 Profit and Loss Data, Cash Inflow and Selected Balance Sheet Data for the Paper and Allied Products Industry

Year	Net Sales	Net Profit Before Taxes	Net Profit Before Taxes to Net Sales	Income Taxes	Net Profit After Taxes	Net Profit After Taxes to Net Sales	Depreciation	Cash Inflow	Gross Cash Flow
1970	21,069	1,211	5.7%	492	719	3.4%	869	1,588	2,080
1975	32,044	2,901	9.1%	1,099	1,801	5.6%	1,219	3,019	4,120
1980 E	56,250	4,045	7.2%	1,245	2,800	5.0%	2,026	4,826	6,071
1985	71,465	4,399	6.2%	1,519	2,880	4.0%	3,099	5,979	7,498
1990	115,523	7,236	6.3%	2,353	4,882	4.2%	5,578	10,460	12,814
1995	169,898	17,659	10.4%	5,680	11,979	7.1%	8,178	20,157	25,837
1997	165,149	4,926	3.0%	1,318	3,608	2.2%	9,150	12,758	14,076
1998	165,980	7,117	4.3%	2,389	4,728	2.8%	9,568	14,296	16,685
1999	169,151	10,587	6.3%	3,516	7,071	4.2%	9,438	16,509	20,025
2000	184,490	10,581	5.7%	3,149	7,431	4.0%	9,692	17,123	20,273
2001 [1]	162,234	2,388	1.5%	1,636	752	0.5%	8,825	9,577	11,213
2002	152,601	2,166	1.4%	(177)	2,343	1.5%	8,796	11,139	10,962
2003	148,804	2,249	1.5%	(160)	2,411	1.6%	8,483	10,894	10,732
2004	156,948	6,548	4.2%	1,645	4,904	3.1%	8,292	13,196	14,840
2005	149,218	6,054	4.1%	1,720	4,334	2.9%	7,360	11,694	13,414
2006	144,150	9,812	6.8%	3,681	6,134	4.3%	6,632	12,766	16,444
2007	142,889	6,304	4.4%	938	5,366	3.8%	6,710	12,076	13,014
2008	138,064	(2,136)	N.M	569	(2,706)	N.M.	6,372	3,666	4,236
2009	116,174	5,623	4.8%	1,660	3,964	3.4%	6,029	9,993	11,652
2010	125,786	8,183	6.5%	1,056	7,126	5.7%	5,781	12,907	13,964
2011	129,693	7,727	6.0%	1,597	6,130	4.7%	5,663	11,793	13,390
2012 R	127,898	7,199	5.6%	1,847	5,354	4.2%	5,599	10,953	12,798
2013	131,490	9,365	7.1%	1,030	8,335	6.3%	5,269	13,604	14,634

Notes: Cash Inflow = Net Profits After Taxes + Depreciation; Total Capital = Net Worth + Long Term Debt; Gross Cash Flow = Net Profit Before Taxes + Depreciation; Net Cash Flow = Change in Retained Earnings + Depreciation; E - Estimated by API with assistance from FTC; N.M. - Not Meaningful; R - Revised;

[1] U.S. Bureau of the Census converted data from the SIC system to the NAICS classification system in 2001.

Paper and Allied Products Industry Sales



Section V - Financial Data and Capital Expenditure Related Data

Selected Balance Sheet Data (Cont.)

millions of dollars

Cash Dividends	Change in Retained Earnings	Net Cash Flow	Total Assets	Property, Plant & Equipment Gross	Property, Plant & Equipment Net	Net Worth	Long-Term Debt	Total Capital	Net Profit After Taxes to Net Worth
430	289	1,158	19,679	18,160	9,969	10,305	4,822	15,127	7.0%
632	1,158	2,377	28,220	24,265	13,773	14,878	7,193	22,071	12.1%
1,057	1,743	3,769	45,894	40,361	24,800	24,396	10,585	34,981	11.5%
1,240	1,640	4,739	62,505	60,341	38,835	29,694	15,262	44,956	9.7%
2,351	2,530	8,108	117,335	105,489	68,726	45,951	40,720	86,671	10.6%
3,075	8,903	17,081	161,001	154,151	89,561	58,423	53,789	112,212	20.5%
3,728	(119)	9,031	178,303	158,737	96,367	60,970	61,899	122,869	5.9%
4,685	61	9,629	186,949	161,090	98,360	64,961	63,268	128,229	7.3%
3,414	3,657	13,095	203,261	161,857	97,939	68,777	68,553	137,330	10.3%
3,234	4,198	13,890	211,342	157,870	98,187	68,203	73,616	141,819	10.9%
2,465	(1,583)	7,242	194,229	161,685	89,328	65,051	67,757	132,808	1.2%
2,641	(3,722)	5,074	188,273	160,230	87,689	57,308	71,178	128,486	4.1%
3,050	(638)	7,845	188,103	157,170	82,127	60,096	71,202	131,298	4.0%
3,137	(1,115)	7,177	175,460	145,927	74,824	59,167	63,120	122,287	8.3%
3,211	(1,019)	6,341	152,472	136,148	67,628	54,266	52,221	106,487	8.0%
3,754	(3,020)	3,612	147,494	135,084	63,155	55,368	44,240	99,608	11.1%
5,246	1,355	8,065	153,493	132,845	60,452	54,821	44,617	99,438	9.8%
3,186	(14,371)	(7,999)	132,384	119,844	55,699	32,743	45,894	78,637	N.M.
2,285	739	6,768	132,937	115,854	50,199	37,622	42,474	80,096	10.5%
2,999	10,986	16,767	138,877	112,467	50,727	48,011	42,444	90,455	14.8%
3,508	(1,665)	3,998	139,030	115,056	50,744	47,095	46,402	93,497	13.0%
2,732	2,766	8,365	139,816	116,393	51,114	46,982	44,602	91,584	11.4%
3,012	4,990	10,259	143,334	115,167	49,543	52,294	44,550	96,844	15.9%

Source: Yearly data calculated by AF&PA from Quarterly Financial Report for Manufacturing, Mining and Trade Corporations, now reported by the U.S. Bureau of the Census.
2013 data is based on the First Quarter 2014 QFR Publication.

Paper and Allied Products Industry Net Profits after Taxes

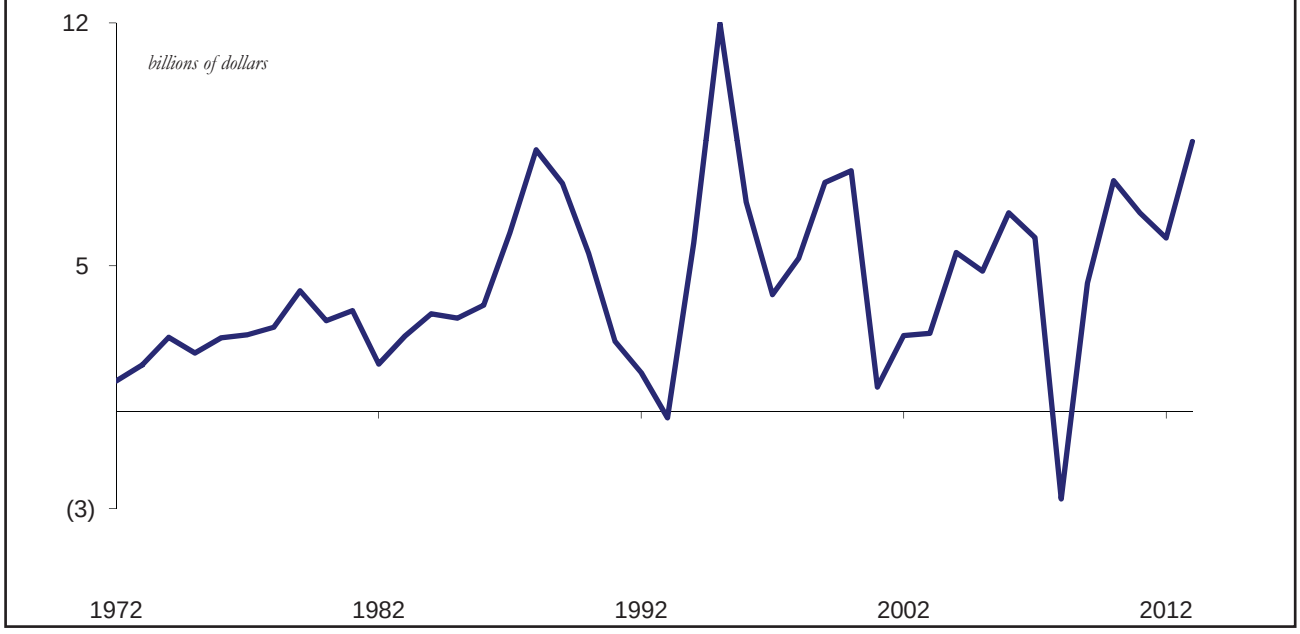


TABLE 23 General Statistics for the Paper Manufacturing Industry

General Financial Statistics 2010

	All Employees		Production Workers			Value Added by Manufacture	Cost of Materials	Value of Shipments	Capital Expenditures
	Number	Payroll	Number	Hours	Wages				
	(000)	$ millions	(000)			$ millions			
PAPER MANUFACTURING	351.4	19,215.3	274.4	563	13,136	79,017	91,377	170,043	5,755
Pulp, Paper & Paperboard Mills	109.6	7,526	87.4	184	5,636	40,758	38,650	79,342	3,483
Pulp Mills	6.8	517	5.3	11	375	2,127	2,408	4,504	394
Paper Mills	67.7	4,501	54.7	114	3,444	25,182	22,379	47,543	1,857
Newsprint Mills	Included in Paper Mills								
Paperboard Mills	35.1	2,508	27.5	59	1,816	13,448	13,862	27,296	1,232
Converted Paper Product Manufacturing	241.9	11,689	186.9	379	7,500	38,259	52,728	90,701	2,271
Paperboard Container Manufacturing	137.5	6,777	106.6	219	4,311	19,817	30,222	49,918	1,227
Paper Bag and Coated and Treated Paper Manufacturing	51.2	2,531	38.6	77	1,555	8,750	11,188	19,773	363
Coated & Laminated Paper and Packaging Mfg	32.9	1,734	24.1	49	1,034	6,702	7,960	14,527	271
Coated, Uncoated, & Multiwall Bag and Pkg Mfg	18.3	797	14.6	28	521	2,049	3,228	5,246	92
Stationery Product Manufacturing	20.7	869	16.2	32	595	2,198	4,030	6,272	77
Other Converted Paper Product Mfg	32.5	1,512	25.6	50	1,039	7,493	7,287	14,738	605
Sanitary Paper Product Mfg	17.0	879	13.6	28	640	5,417	5,168	10,560	492
All Other Converted Paper Product Mfg	15.5	633	12.0	23	399	2,077	2,119	4,178	113

General Financial Statistics 2011

PAPER MANUFACTURING	346.5	19,268	269.2	554	13,086	81,881	94,090	175,552	6,587
Pulp, Paper & Paperboard Mills	108.0	7,575	85.5	181	5,617	42,016	40,384	82,335	3,693
Pulp Mills	6.9	520	5.4	12	359	2,481	2,799	5,263	330
Paper Mills	65.9	4,469	52.6	110	3,385	25,545	23,132	48,614	1,679
Newsprint Mills	Included in Paper Mills								
Paperboard Mills	35.2	2,586	27.6	59	1,873	13,990	14,453	28,457	1,684
Converted Paper Product Manufacturing	238.6	11,693	183.8	373	7,469	39,865	53,706	93,217	2,894
Paperboard Container Manufacturing	135.8	6,831	105.4	218	4,341	21,200	30,906	51,927	1,315
Paper Bag and Coated and Treated Paper Manufacturing	48.8	2,440	36.3	72	1,494	8,549	11,225	19,617	452
Coated & Laminated Paper and Packaging Mfg	31.4	1,695	22.9	46	1,005	6,516	8,022	14,407	340
Coated, Uncoated, & Multiwall Bag and Pkg Mfg	17.3	745	13.5	26	489	2,032	3,202	5,209	112
Stationery Product Manufacturing	20.7	847	15.9	32	570	2,443	4,064	6,487	115
Other Converted Paper Product Mfg	33.3	1,576	26.1	51	1,064	7,673	7,512	15,186	1,013
Sanitary Paper Product Mfg	17.0	905	13.4	27	654	5,693	5,396	11,092	420
All Other Converted Paper Product Mfg	16.3	671	12.6	25	410	1,980	2,116	4,094	592

Source: U.S. Bureau of the Census: Annual Survey of Manufactures, Statistics for Industry Groups and Industries.
Data for 2012-13 not available at time of publication.

TABLE 24 Value of Paper Products Manufacturers' Shipments and Inventories *millions of dollars*

Year	Paper Products	Pulp, Paper and Paperboard Mills	Paperboard Container Manufacturing	Other Paper Manufacturing
Shipments				
2001	155,845	71,987	45,817	38,041
2002	153,755	69,967	43,531	40,257
2003	151,098	68,316	43,436	39,346
2004	155,380	71,625	44,507	39,248
2005	161,928	74,888	46,184	40,856
2006	169,033	78,926	48,441	41,666
2007	176,688	80,550	50,935	45,203
2008	179,249	83,357	51,764	44,128
2009	161,636	74,397	47,326	39,913
2010	170,043	79,342	49,918	40,783
2011	175,878	82,275	51,950	41,653
2012	174,410	81,375	51,464	41,571
2013	171,356	80,086	52,271	38,999
Inventories				
2001	14,027	5,934	3,998	4,095
2002	14,286	6,496	3,912	3,878
2003	13,444	6,177	3,658	3,609
2004	14,145	6,333	4,024	3,788
2005	14,351	6,583	3,878	3,890
2006	14,937	6,649	4,055	4,233
2007	15,134	6,628	4,146	4,360
2008	15,417	6,824	4,259	4,334
2009 R	13,329	6,046	3,596	3,687
2010 R	13,873	6,262	3,739	3,872
2011 R	14,539	6,476	3,973	4,090

Source: U.S. Bureau of the Census; data are not seasonally adjusted.
Data for 2012-13 not available at time of publication. R - Revised.

Paper Products Total Shipments and Inventories

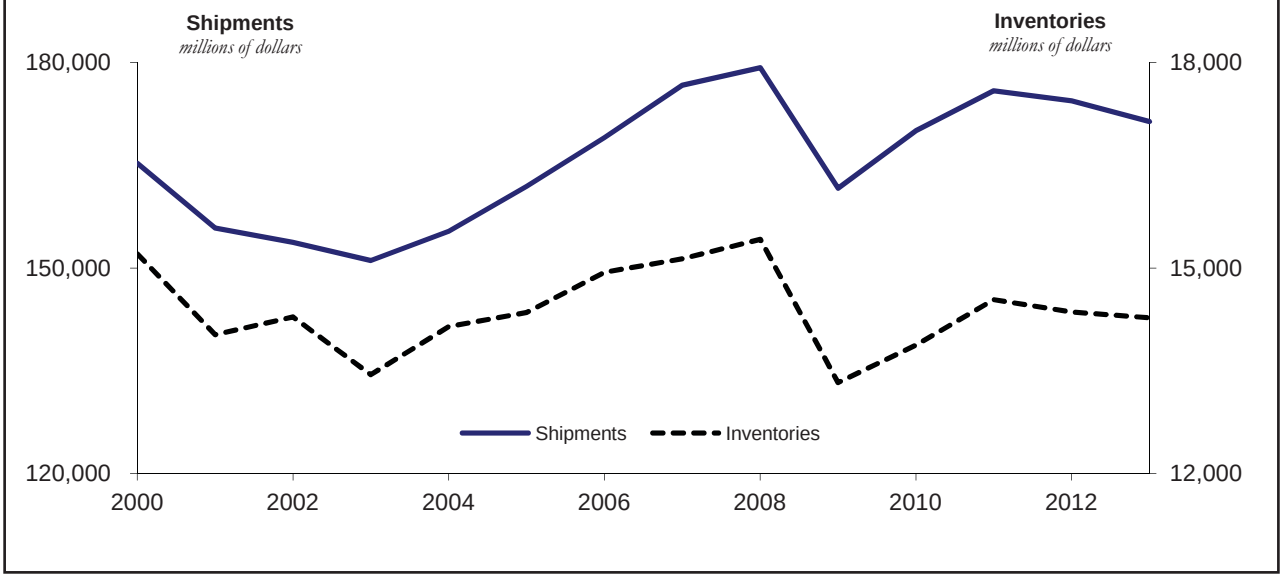


TABLE 25 General Statistics for the Paper Manufacturing Industry By State 2011

	Number of All Employees (000)	Total Payroll $ millions	Number of Production Workers (000)	Wages of Production Workers	Value Added by Manufacture	Value of Shipments	Capital Expenditures
				$ millions			
Northeast	**61.7**	**3,387**	**47.3**	**2,250**	**12,748**	**28,313**	**913**
New England	**17.7**	**1,054**	**13.6**	**717**	**3,297**	**8,485**	**443**
Maine	6.8	432	5.5	325	1,472	4,028	328
Massachusetts	7.6	427	5.7	269	1,088	2,896	72
Connecticut	3.3	195	2.4	122	737	1,560	42
Middle Atlantic	**44.0**	**2,334**	**33.8**	**1,533**	**9,451**	**19,828**	**470**
New York	14.0	738	10.8	484	2,297	5,659	150
New Jersey	8.7	438	6.5	267	1,089	2,588	47
Pennsylvania	21.4	1,158	16.5	782	6,066	11,581	272
North Central	**110.3**	**5,812**	**85.0**	**3,853**	**23,016**	**49,554**	**1,366**
East North Central	**84.7**	**4,427**	**65.5**	**2,963**	**15,467**	**36,052**	**971**
Ohio	18.7	939	14.3	620	3,161	7,433	200
Indiana	9.9	469	7.8	316	1,450	3,901	96
Illinois	14.7	714	11.5	466	2,425	5,281	137
Michigan	10.8	567	8.5	386	1,853	4,971	124
Wisconsin	30.5	1,737	23.4	1,176	6,578	14,465	414
West North Central	**25.6**	**1,385**	**19.5**	**890**	**7,548**	**13,503**	**395**
Minnesota	11.3	676	8.4	409	3,287	5,853	179
Iowa	3.3	165	2.7	111	1,009	1,634	38
Missouri	8.0	389	6.2	271	2,814	4,886	149
Nebraska	1.5	74	1.2	50	264	592	12
Kansas	1.6	81	1.1	49	173	538	17
South	**127.8**	**7,355**	**100.5**	**5,183**	**35,016**	**73,654**	**3,505**
South Atlantic	**61.6**	**3,532**	**48.7**	**2,481**	**15,795**	**33,926**	**1,990**
Maryland	3.0	139	2.5	101	439	1,056	22
Virginia	6.9	395	5.3	270	1,462	3,490	284
North Carolina	15.7	808	12.4	565	2,815	6,644	242
South Carolina	11.3	683	8.9	488	3,239	7,138	667
Georgia	17.2	1,065	13.9	760	5,666	11,128	534
Florida	7.4	441	5.7	297	2,174	4,470	242
East South Central	**34.7**	**2,036**	**27.2**	**1,444**	**9,943**	**20,750**	**833**
Kentucky	9.0	462	6.9	301	2,130	5,014	106
Tennessee	10.8	558	8.5	397	2,478	5,205	280
Alabama	11.3	792	9.1	604	4,168	8,219	372
Mississippi	3.6	223	2.7	142	1,167	2,313	75
West South Central	**31.6**	**1,788**	**24.6**	**1,258**	**9,278**	**18,977**	**682**
Arkansas	7.7	433	6.2	322	2,479	4,569	167
Louisiana	6.7	446	5.3	330	2,614	5,300	233
Oklahoma	3.3	198	2.7	146	1,233	2,376	69
Texas	14.0	711	10.3	459	2,952	6,732	213
West	**42.1**	**2,491**	**33.0**	**1,663**	**10,128**	**22,127**	**653**
Mountain	**8.1**	**460**	**6.6**	**316**	**1,625**	**3,993**	**198**
Idaho	1.7	127	1.4	84	350	956	D
Colorado	1.3	67	0.9	44	D	428	4
Arizona	2.0	103	1.6	71	378	768	17
Utah	2.0	109	1.7	83	703	1,403	161
Nevada	1.1	52	0.9	35	195	439	16
Pacific	**34.0**	**2,032**	**26.4**	**1,347**	**8,503**	**18,134**	**455**
Washington	9.0	623	7.2	424	2,312	5,389	141
Oregon	4.1	278	3.3	196	1,554	3,097	78
California	20.8	1,131	16.0	727	4,637	9,649	236
TOTAL REPORTED	**341.9**	**19,045**	**265.9**	**12,949**	**80,908**	**173,648**	**6,437**
TOTAL U.S.A.	**346.5**	**19,268**	**269.2**	**13,086**	**81,881**	**175,552**	**6,587**

Source: U.S. Bureau of the Census: Annual Survey of Manufactures, Geographic Area Statistics.
D - Data withheld to avoid disclosure; data are included in the U.S. Totals.
Data for 2012-13 not available at time of publication.

TABLE 26 Expenditures on Plant and Equipment in the Paper Manufacturing Industry *millions of dollars*

		Primary Mills				Converting Plants				
Year	Total NAICS 322	Total Primary 3221	Pulp Mills 32211	Paper Mills 32212	Paperboard Mills 32213	Total Converting 3222	Paperboard Container Mfg. 32221	Paper Bag, CTD & Treated Paper Mfg. 32222	Stationary Product Mfg. 32223	Other Converted Paper Mfg. 32229
2001	6,797	4,373	193	3,150	1,030	2,424	1,328	481	127	488
2002	6,254	3,776	189	2,761	816	2,488	1,294	531	143	519
2003	5,999	3,690	182	2,743	765	2,309	1,210	410	94	595
2004	5,140	3,147	188	2,032	927	1,993	1,176	331	92	394
2005	5,521	3,331	139	2,238	955	2,190	1,040	549	122	479
2006	7,604	3,593	363	2,236	993	4,011	2,945	519	141	405
2007	6,602	3,667	276	2,261	1,130	2,935	1,444	821	145	526
2008	6,267	3,659	343	1,929	1,388	2,608	1,291	696	125	496
2009	4,380	2,405	264	1,272	869	1,975	947	442	81	505
2010	5,755	3,483	394	1,857	1,232	2,271	1,227	363	77	605
2011 R	6,587	3,693	330	1,679	1,684	2,894	1,315	452	115	1,013

Capital Expenditures

Source: U.S. Bureau of the Census: Annual Survey of Manufactures, Statistics for Industry Groups and Industries.
Data for 2012-13 not available at time of publication. R - Revised

TABLE 27 Employment in the Paper Manufacturing Industry *thousands*

		Primary Mills				Converting Plants				
Year	Total NAICS 322	Total Primary 3221	Pulp Mills 32211	Paper Mills 32212	Paperboard Mills 32213	Total Converting 3222	Paperboard Container Mfg. 32221	Paper Bag, CTD & Treated Paper Mfg. 32222	Stationary Product Mfg. 32223	Other Converted Paper Mfg. 32229
2001	530.2	170.7	7.5	114.7	48.8	359.6	205.0	70.6	45.1	38.8
2002	491.8	159.0	8.0	102.8	48.2	332.8	184.5	66.3	38.9	43.1
2003	465.9	143.0	8.1	97.0	43.0	317.9	178.0	64.6	36.6	38.6
2004	439.2	136.6	7.7	89.2	39.7	302.5	169.0	61.0	35.7	36.9
2005	426.7	134.2	7.2	89.7	37.4	292.5	163.1	60.1	33.3	36.0
2006	413.4	127.9	6.7	85.1	36.1	285.4	161.1	56.5	31.5	36.3
2007	417.1	124.8	7.3	80.8	36.7	292.4	165.8	60.1	31.3	35.1
2008	403.7	118.5	7.5	76.7	34.3	285.2	164.6	57.8	28.9	33.9
2009	362.6	113.4	6.5	72.0	34.9	249.2	142.4	50.4	24.1	32.4
2010	351.4	109.6	6.8	67.7	35.1	241.9	137.5	51.2	20.7	32.5
2011 R	346.5	108.0	6.9	65.9	35.2	238.6	135.8	48.8	20.7	33.3

Number of Employees [1]

Source: U.S. Bureau of the Census: Annual Survey of Manufactures, Statistics for Industry Groups and Industries.
Data for 2012-13 not available at time of publication. R - Revised
[1] Number of employees refers to all employees.

SECTION IV - EMPLOYMENT, WAGE AND PRODUCTIVITY RELATED DATA

Page 29: State Employment Data for the Paper Manufacturing Industry

U.S. Bureau of the Census, Annual Survey of Manufactures
www.census.gov/manufacturing/asm/index.html
Go to "Statistics for All Manufacturing by State"

Page 30: Compensation of Employees in the Paper and Allied Products Industry, from the National Income and Product Accounts

U.S. Bureau of Economic Analysis, National Data
http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1
From the list of all NIPA tables, Section 6--Income and Employment by Industry, see 6.2D - 6.6D.

Pages 32- 33: Wage Rates and Employment in the Paper and Allied Products Industry

U.S. Bureau of Labor Statistics
www.bls.gov/data/home.htm
Go to "Employment, Hours, and Earnings - National" and click on "One-Screen Data Search" to build a query.

SECTION V - FINANCIAL AND CAPITAL EXPENDITURE RELATED DATA

Pages 34 -35: Profit and Loss Data, Cash Inflow and Selected Balance Sheet Data for the Paper and Allied Products Industry

U.S. Bureau of the Census, Quarterly Financial Report
www.census.gov/econ/qfr/historicpub.html
Note: Annual figures in Table 22 are based on data for each quarter in the QFR.

Page 36: General Statistics for the Paper Manufacturing Industry

U.S. Bureau of the Census, Annual Survey of Manufactures
www.census.gov/manufacturing/asm/index.html
Go to "Statistics for Industry Groups and Industries"

Page 37: Value of Paper Products Manufacturers' Shipments and Inventories

U.S. Bureau of the Census, Manufacturers Shipments, Inventories, and New Orders
www.census.gov/manufacturing/m3/historical_data/index.html
Download the "Shipments" and "Total Inventory" Excel files.
Refer to the 6-digit M3 Series Identification Codes on the website to navigate through the files.

Page 38: General Statistics for the Paper Manufacturing Industry by State

U.S. Bureau of the Census, Annual Survey of Manufactures
www.census.gov/manufacturing/asm/index.html
Go to "Statistics for All Manufacturing by State"

Page 39: Capital Expenditures and Employment in the Paper Manufacturing Industry by Sector *(based on NAICS)*

U.S. Bureau of the Census, Annual Survey of Manufactures
www.census.gov/manufacturing/asm/index.html
Go to "Statistics for Industry Groups and Industries"

OTHER GOVERNMENT SOURCES

Producer Price Index for Commodity Groupings and Individual Items

U.S. Bureau of Labor Statistics
www.bls.gov/ppi/home.htm
Under "PPI Databases," go to "Commodity Data" and click on "One-Screen Data Search" to build a query.

Producer Price Index for the Net Output of Selected Industries and Products

U.S. Bureau of Labor Statistics
www.bls.gov/ppi/home.htm
Under "PPI Databases," go to "Industry Data" and click on "One-Screen Data Search" to build a query.

PAPER GRADES

NEWSPRINT

Uncoated paper used for the printing of newspapers, traditionally made from a furnish containing at least 65% mechanical pulps, unsized or very lightly sized having a smoothness on each side not exceeding 200 seconds Bekk, weighing not less than 40g per square meter and not more than 65g per square meter and having an ash content by weight not exceeding eight percent. Does not include printing papers of types generally used for purposes other than newspapers such as mechanical printing papers for catalogs, directories, inserts, etc.

PRINTING & WRITING and RELATED PAPERS

Coated or uncoated paper used primarily for the purpose of printing, writing, or other type of communications. This includes Bristols manufactured for non-packaging purposes but does not include newsprint.

Uncoated Mechanical: Uncoated papers usually containing more than 10% mechanical pulps (stone groundwood, refiner or thermomechanical) in their furnish, excluding newsprint.

Coated Mechanical: Bleached papers traditionally containing more than 10% mechanical pulp in their furnish and with a coating weight of at least 2.5 pounds (25 x 38-500) on either side and at least 50% of the coating consisting of pigment. Surface coatings are added for the purpose of improving the appearance and printing surface. The coater can be on or off the machine.

Coated Free Sheet: Bleached paper traditionally containing not more than 10% mechanical pulps in their furnish and with a coating weight of at least 2.5 pounds (25 x 38-500) on either side (or on one side in the case of one-sided grades) and at least 50% of the coating consisting of pigment. Surface coatings are added for the purpose of improving the appearance and printing surface. The coater can be on or off the machine.

Uncoated Free Sheet: Bleached uncoated papers usually containing not more than 10% mechanical pulps in their furnish; includes offset, tablet, envelope, business papers (bond, ledger, mimeo, duplicator), forms bond, cover and text, and related papers. Also includes "thin papers" - carbonizing, bible, stencil, and similar papers.

Solid Bleached Bristols: Heavyweight paper, coated or uncoated, used primarily for graphic communications and for business office and school supplies. Includes tabulating index, tag, file folder, index, postcard, and coated cover bristols.

Cotton Fiber: Papers containing 25% or more in their furnish of cotton, cotton rags, cotton waste, linters, linter pulp, flax, or similar fibers.

PACKAGING & INDUSTRIAL CONVERTING

Wrapping paper, shipping sack, bag and sack other than shipping sack, and other converting papers. Also includes paper and board used in specialty packaging and industrial end uses.

Unbleached Kraft: Paper traditionally containing more than 80% unbleached sulfate wood pulp. Includes wrapping paper, shipping sack, grocers sack and other bag, and other converting papers -18 lbs. and over (24 x 36-500).

Bleached Packaging and Industrial Converting: Paper made for similar end uses as unbleached Kraft, but made from bleached, and semi-bleached sulfate and unbleached sulfite pulps. Includes wrapping paper, shipping sack, grocers and other bag and sack, and other converting papers -18 lbs. and over (24 x 36-500).

Specialty Packaging: Paper and board of all weights and furnishes, usually used as protective packaging for food and other consumer products, such as bakery bags, fast food and frozen food wraps. Also includes glassine, greaseproof and some vegetable parchment paper.

Special Industrial: Paper and board, of all weights, calipers and furnishes, designed for specialized end uses and manufactured to exact customer specifications; includes abrasive paper, electrical insulation, filter paper, and similar grades. Does not include wet machine board.

TISSUE

Includes sanitary grades, such as toilet, facial, napkin, toweling, sanitary napkins, wiper and special sanitary papers, waxing, wrapping, wadding, and miscellaneous grades.

PAPERBOARD GRADES

UNBLEACHED KRAFT PAPERBOARD

Paperboard made from a furnish containing not less than 80% wood pulp produced by the sulfate process.

Linerboard: Unbleached Kraft paperboard used as facing material in the manufacture of corrugated or solid fiber boxes. Includes solid unbleached Kraft linerboard, white top linerboard and clay coated unbleached Kraft linerboard.

Folding: Paperboard, such as clay coated unbleached Kraft and bleached lined unbleached Kraft backed, manufactured for conversion into folding cartons and beverage carriers.

Other: All unbleached Kraft paperboard whose end use is not otherwise classified, such as board to be fabricated into a shipping container, tube, can, drum, file folder, tag, automotive panel, etc.

SOLID BLEACHED PACKAGING PAPERBOARD

Paperboard for use in packaging made from a furnish containing not less than 80% bleached wood pulp. Bleached bristols manufactured for non-packaging uses are included in the bleached bristol classification under paper grades.

Linerboard: Solid bleached paperboard used as facing material in the manufacture of corrugated or solid fiber boxes.

Folding: Solid bleached paperboard for conversion into folding cartons, such as folding cartons for ice cream, butter, margarine, frozen foods, bakery products, cosmetics, drugs, etc.

Liquid Packaging and Food Service:
Liquid Packaging - Solid bleached paperboard for conversion into cartons packaging fluids which are packed fresh or aseptically, such as milk, cream and fruit juices. May be waxed, coated, laminated, extruded or otherwise treated.
Food Service - Solid bleached paperboard for conversion into cups and round nested food containers, plates, dishes and trays, and packaging for moist, liquid or oily foods.

Other: Solid bleached paperboard for conversion into products like can stock, milk bottle hood and lip cover (snap-in or coverall type), cup lid, milk bottle plug, layers separator stock, bacon boards, meat pads, blister packs, tubes, etc., other products not classified above and industrial products not classified under bleached bristols.

SEMICHEMICAL PAPERBOARD

Paperboard made from a furnish traditionally containing not less than 75% wood pulp, the predominant portion of which is produced by a semi-chemical process.

Corrugating Medium: Semi-chemical paperboard used as the fluting material in the manufacture of corrugated or solid fiber boxes.

RECYCLED PAPERBOARD

Paperboard manufactured from a combination of recycled fibers from various grades of paper stock with the predominant portion of its furnish being recycled fibers; sometimes includes wood pulp as described below.

Linerboard: Recycled paperboard produced from a furnish usually containing less than 80% wood pulp and used as facing material in the manufacture of corrugated or solid fiber boxes.

Corrugating Medium: Recycled paperboard produced from a furnish traditionally containing less than 75% wood pulp and used as the fluting material in the manufacture of corrugated or solid fiber boxes. Also includes container chip and filler board.

Folding: Recycled paperboard manufactured with bending quality for conversion into folding cartons (including unlined chipboard, Kraft lined, white lined and clay coated).

Set-Up: Recycled paperboard manufactured with non-bending specifications for conversion into rigid or set-up boxes (including plain chipboard, newslined and white vat lined).

Gypsum Wallboard Facing: Recycled paperboard manufactured for use as liner or facing on gypsum board and plasterboard (includes white, cream, gray, blue and all colors).

Other: Recycled paperboard with the same characteristics as paperboard for folding and set-up, but mostly used in non-packaging applications. Also includes recycled paperboard for uses not otherwise classified. Examples of end uses include panelboard, commercial printing pre-printed board, tag, file folder, tube, can, drum, match, stem, tablet backs, toys, etc.

CONSTRUCTION PAPER & BOARD

CONSTRUCTION PAPER

Sheathing paper, felts (roofing felts, floor covering, automotive felts, deadening, industrial, pipe covering, refrigerator, etc.), flexible wood fiber insulation.

WET MACHINE BOARD

Binders board, shoe board (e.g., counter board, heel board, innersole, etc.), automotive board, chair seat backing, coaster board, luggage, mill board, panel board, table top board, etc.

INSULATING BOARD

A fibrous-felted homogenous panel made by interfelting of the fibers (e.g., interior building board, wallboard, sound deadening board, acoustical tile, exterior sheathing board, roof insulation board, trailer board, etc.).

WOOD PULP

DISSOLVING & SPECIAL ALPHA

Highly refined bleached white sulfite or sulfate pulp with a high content of alpha (pure cellulose) fiber.

SULFITE PAPER GRADES

Paper grade pulps produced by the sulfite process. Bleached pulp must achieve a G.E. Brightness of more than 75.

SULFATE PAPER GRADES

Bleached Hardwood, Bleached Softwood, Unbleached Sulfate: Paper grade and fluff pulps produced by the sulfate or soda process. Bleached pulp must achieve a G.E. Brightness of more than 75. Semi-bleached pulp must achieve a G.E. Brightness of not less than 45 nor more than 75. Unbleached pulp has a G.E. Brightness of less than 45.

SEMICHEMICAL

High yield pulps produced with the use of some chemical agent such as neutral sulfite (N.S.S.C.), alkaline cook, chemipulp (defibrated pulp put through reaction chambers), or chemimechanical pulp, with a yield usually above 60%.

MECHANICAL

Fine textured, usually bright pulps, used in paper and paperboard manufacture and produced by mechanical rather than chemical processes.

Stone Groundwood: Pulp produced by grinding wood logs or bolts (usually 4 ft. in length) into relatively short fibers.

Refiner: Pulp produced by subjecting wood chips and/or residues to atmospheric or open discharge refining.

Thermomechanical: A high-yield pulp produced by a thermomechanical process in which wood particles are softened by preheating under pressure prior to pressurized primary refining stage. Usually replaces or reduces the chemical pulp component in newsprint or mechanical papers.

WOOD PULP FOR CONSTRUCTION PAPER & BOARD

Coarse, often brown, pulps used in the manufacture of insulating board and construction paper. Also includes similar pulps if used in the manufacture of wet machine board. Excludes pulp for hard pressed board.

Stone Groundwood and Refiner: Pulps produced by the stone groundwood or refiner processes but used in the manufacture of construction paper and board.

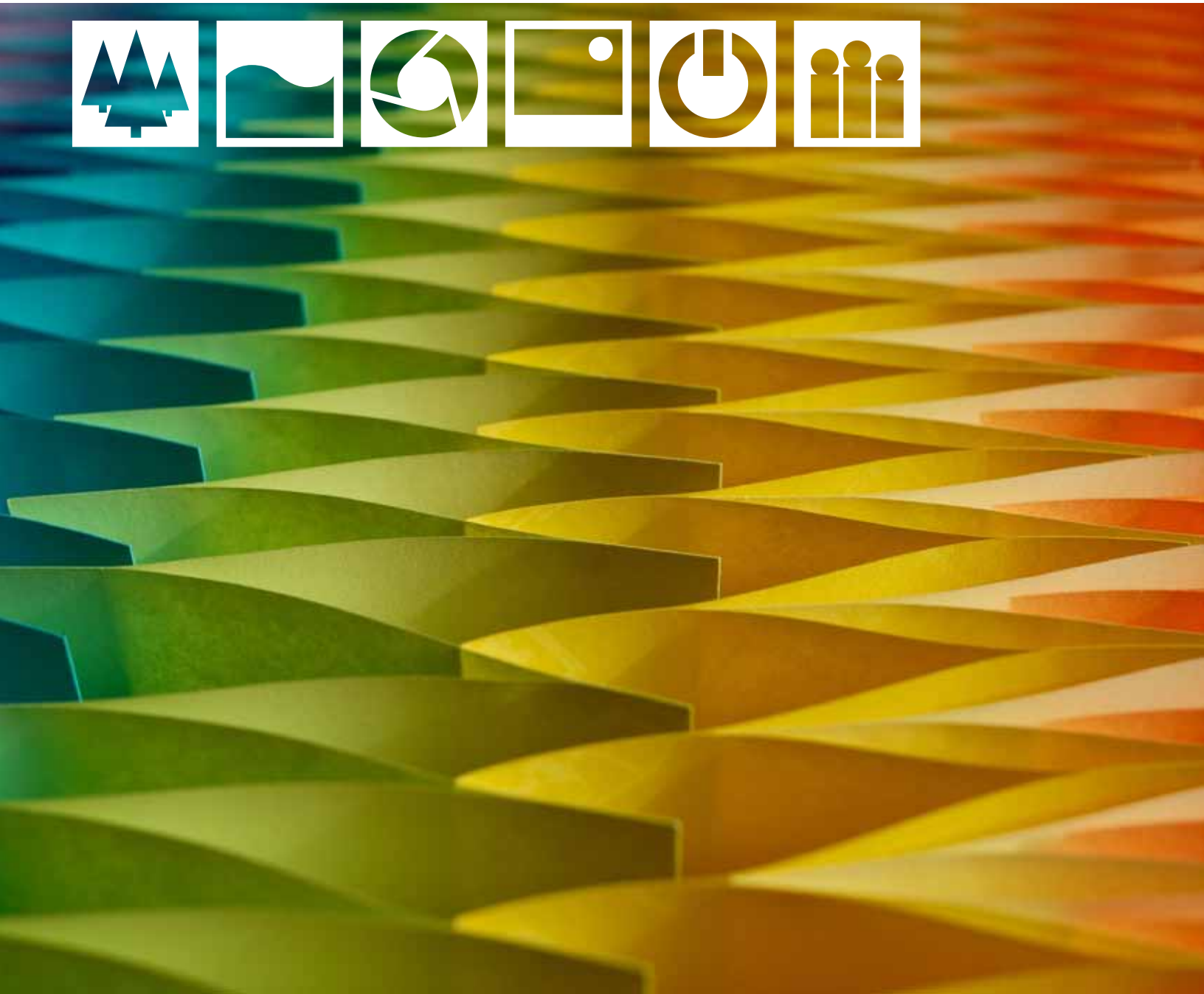
Defibrated/Exploded: Pulps produced by subjecting wood chips to preheating and pressurized refining. Similar to the thermomechanical process except that operation variables produce an economical, coarse brown pulp suitable only for construction paper and board.

Appendix C

BETTER PRACTICES
BETTER PLANET 2020
Continuing AF&PA's Commitment to Sustainability

American Forest & Paper Association

2014 AF&PA Sustainability Report



Introduction

The American Forest & Paper Association (AF&PA) has a long history of achievement in, and reporting transparently on, sustainability actions taken by the industry. Our members are committed to using sustainable manufacturing processes to produce reusable and recyclable products from a sustainably-managed renewable resource. People across the country and around the world rely on our products to communicate and inform, provide shelter and hygiene, package and deliver necessities, and capture life's memorable moments.

AF&PA members represent the diverse spectrum of the forest products industry — ranging from large to small, publicly and privately owned, U.S. and global companies that manufacture pulp, paper, packaging and wood products, and some that own and manage forests. These member companies are an integral part of the communities in which they operate, contributing to community leadership, education, health and wellness, and recreational opportunities. The jobs our members provide are a vital driver of the overall economic health of those communities.

AF&PA's sustainability efforts help member companies strive toward their own sustainability goals by providing:

- Environmental, Health & Safety (EHS) Principles, as well as Sustainable Forest Management and Sustainable Procurement Principles for wood sourcing. AF&PA members comply with these principles as a condition of membership;
- Periodic tracking of progress towards sustainability performance through a set of economic, social, and environmental indicators;
- Initiatives such as *Better Practices, Better Planet 2020* that establish sustainability goals for the combined AF&PA membership; and
- Forums for industry, governments, communities, and others to work together towards improved sustainability performance for the benefit of all stakeholders.

We report biennially on AF&PA members' sustainability performance. This reporting reaches beyond environmental performance to also integrate the economic and social elements essential to our industry's viability and the communities and families that we support. We have made great strides to continue our proven performance and push to reach new heights.

One of the best examples of our focus on continued improvement is AF&PA members' commitment to the goals within our sustainability initiative — *Better Practices, Better Planet 2020* — which includes one of the most extensive collections of quantifiable sustainability goals for a major U.S. manufacturing industry.

AF&PA received three **Green Globes®** for the build-out of our new office space in Washington, D.C. The rating system is an online program for green building certification that uses third-party assessors and evaluates environmental impacts. AF&PA's three Green Globes awards demonstrate leadership in applying best practices regarding energy, water, and environmental efficiency. The new offices feature extensive use of daylight; energy-efficient lighting and mechanical systems; low-emitting paints, coatings, adhesives and flooring; and the incorporation of wood and paper-based design elements.

Our members continuously strive for improved performance, which we recognize through annual AF&PA Sustainability Awards. These awards encourage and recognize exemplary industry programs and initiatives contributing to innovation in sustainable processes and procurement.

We are proud to represent member companies who take seriously their commitment to sustainability.

Donna Harman
President and CEO
July 2014

BETTER PRACTICES
BETTER PLANET 2020
Continuing AF&PA's Commitment to Sustainability

Progress toward the *Better Practices, Better Planet 2020* sustainability goals:

GOAL: Exceed 70 percent rate of paper recovery for recycling by 2020
Paper recovery for recycling reached 63.5 percent in 2013 — exceeding 60 percent for the past 5 years.

GOAL: Improve members' purchased energy efficiency use by at least 10 percent from 2005 to 2020
Improved energy efficiency led to a reduction in purchased energy of 8.8 percent. On average, about two-thirds of our members' energy needed for forest products production comes from the use of carbon-neutral biomass.

GOAL: Reduce our members' greenhouse gas emissions by at least 15 percent from 2005 to 2020
Greenhouse gas emissions were reduced by 14.5 percent — nearly reaching our goal!

GOAL: Increase the amount of fiber procured from certified forestlands or through certified fiber sourcing programs in the U.S. from 2005 to 2020 and work to decrease illegal logging
AF&PA members' procurement of fiber from certified forestlands reached 29 percent, and fiber procured through certified programs reached 95 percent. Members also continue to support programs to decrease illegal logging.

GOAL: A vision for the industry of zero injuries and measuring progress toward that vision by further improving our incidence rate by 25 percent from 2006 to 2020
The safety incidence rate in our facilities improved by 24 percent.

GOAL: Reduce water use in members' pulp and paper mills by 12 percent from 2005 to 2020
Water use at member pulp and paper mills was reduced by 6 percent.

The Forest Products Industry's Sustainable Record

The American Forest & Paper Association (AF&PA) is proud to present our 2014 Sustainability Report documenting the sustainability performance of AF&PA member companies, representing the U.S. pulp, paper, packaging, and wood products manufacturing industry. This report outlines the social, economic, and environmental contributions made by our members, as well as the performance metrics that show the positive actions taken to improve the efficiencies of our processes. Information contained in this report was obtained through AF&PA's most recent surveys collecting data on environment, energy, health and safety, and certified fiber, as well as from public sources.[1]

Our industry seeks to preserve and grow its economic contribution, and that of the individual companies, to society; works to foster the well-being of our communities; and uses sustainable manufacturing and fiber procurement practices to protect the environment, ensuring that our resources will be available to meet the needs of future generations.

Unique qualities that characterize our industry include:

- The essential bio-based products produced by our members that support and protect everyday life in our society;
- Increased efficiencies in our production and use of energy, reductions of our carbon footprint, and substantial reductions in the release of environmental pollutants; and
- Planning for the future through development and production of new bio-based products.

Sustainability advocates and practitioners have worked to refine the concept for decades. In 1987, the United Nations World Commission on Environment and Development (the Brundtland Commission) defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Over time, the understanding of sustainability has matured. While in the past there has been a primary focus on the environmental elements, it is now broadly recognized that the social and economic elements must be pursued equally if we are to achieve long-term sustainability.[2]

[1] Unless stated otherwise, data are from the survey results for the 2012 operating year.

[2] United Nations (2013) *Global Sustainable Development Report – Building the Common Future We Want*. New York: United Nations Department of Economic and Social Affairs, Division for Sustainable Development. 2013, http://sustainabledevelopment.un.org/globalsdreport/

Providing Society's Essential Products

Forest products are essential components of modern life. They are made from a renewable resource — trees. They encompass an incredibly wide range of products with nearly limitless everyday uses from facilitating education, communications, hygiene, food storage, and product protection to providing shelter and homes. New and innovative forest products are being developed while constant improvements are made to existing products.

- Printing and writing papers include paper used for books, magazines, office and home printers, birthday cards, wedding invitations, printed photos and vital documents, such as birth certificates, social security cards, and diplomas. These papers have continually adapted to fit the needs of each new generation, serving an important role in enabling the flow and exchange of information throughout all sectors of society and around the world.

Sustainability Award Winner

Graphic Packaging International developed an innovative packaging solution for 12 and 18 bottle beer packs, reducing greenhouse gas emissions by 30 percent and glass bottle breakage without increasing total packaging materials. The "Tite-Pak® Innovation Beverage Packaging" project won the 2013 Innovation in Sustainability Award from AF&PA.

- Paper-based packaging is a versatile and cost-efficient method to transport, protect and preserve a wide array of items. It is engineered to be sturdy, yet lightweight, and is customizable to meet product- or customer-specific needs. Corrugated containerboard is used to ship and transport everything from electronics to fragile glassware to perishable goods; paperboard packages food, medicine and toiletries for handy storage and display; and paper bags give customers a sustainable option to carry their purchases home.
- Wood provides shelter, furniture, flooring, and cabinetry, as well as smaller items from bowls to toys to chopsticks. It is the building material of choice for strength, aesthetic appeal and environmental responsibility. In addition, wood stores carbon and is less energy- and carbon-intensive to produce than competing materials like concrete and steel.

Economic Contributions — a Critical Element of Sustainability

In 2012, the forest products industry (paper, paperboard, converting and wood products) contributed almost 4 percent of the U.S. manufacturing gross domestic product (GDP). Sector sales totaled $210 billion in 2013, and the industry paid estimated state and local taxes of $4.6 billion.

In the U.S., the industry's employment of nearly 900,000 people exceeds employment levels of the automotive, chemical, and plastics sectors. The forest products industry pays approximately $50 billion a year in wages and other compensation.

In the small, rural communities where our mills generally are located, these are highly sought after, well-paying jobs. Indeed, more than 75 percent of U.S. pulp and paper mills are located in counties designated by the U.S. Census Bureau as more than 80 percent rural.[3] These jobs play a key role in the standard of living, education, and cultural fabric of the area.

Wages at pulp and paper mills are 50 percent higher than the average private sector job.[4] In addition, every 100 paper industry jobs supports 325 additional jobs in supplier industries and within local communities.[5]

In 2009, the U.S. paper, paperboard, and converted products sector achieved a positive trade balance for the first time in nearly 100 years. In 2013, exports exceeded imports by 2.6 million tons.

Efficiency is essential to international competitiveness. From 2001 to 2011, worker productivity rose 36 percent at pulp, paper, and paperboard mills. The productivity contributions of our workers are critical to the U.S. industry's ability to compete in the world marketplace.

Forest Products Industry Labor Productivity Gains

[3] The U.S. Census Bureau basically defines rural in two forms, as: 1) census designated areas having "less than 2,500 persons"; and 2) "other places" based on housing units and other demographic information.

[4] Calculated by AF&PA using December 2013 Bureau of Labor Statistics payroll data.

[5] *Updated Job Multipliers for the U.S. Economy* (table 9), Economic Policy Institute, August 2003.

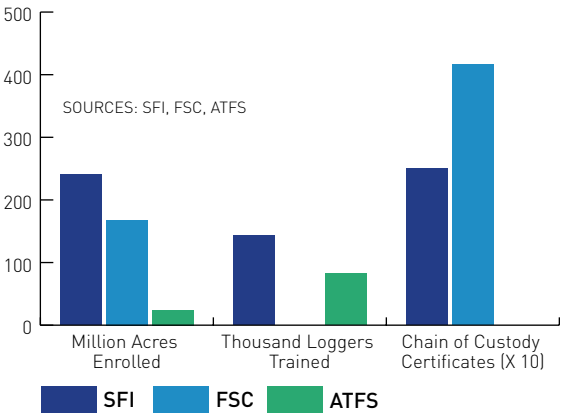
AF&PA members operate in a very competitive global market. To enhance our sustainability, we are working to take advantage of our strengths and to find additional opportunities for our unique bio-based supply chain to produce new products and other applications for our existing products.

Sustainable Use of Wood — Our Basic Raw Material

Trees are the ultimate renewable resource because they can be planted, grown, harvested and replanted. AF&PA members have long supported and followed sustainable forestry practices. More than 20 years ago, members agreed to adhere to a set of Sustainable Procurement Principles that reach far beyond legal requirements. The Principles encourage members to procure wood fiber from suppliers trained in sustainable forestry practices and principles and who use qualified logging professionals; provide research funding for forestry; and seek to improve forest management practices. Additional work led to the development of a sustainable forestry standard, which later became the Sustainable Forestry Initiative (SFI®), an independent non-profit. Today, AF&PA members use standards and methods developed and maintained by the SFI®, the Forest Stewardship Council (FSC®), the American Tree Farm System (ATFS), and the Programme for the Endorsement of Forest Certification (PEFC™). For us, sustainability is not just an option; it's a necessity for maintaining forest resources into the future.

The photosynthesis associated with tree growth captures and converts carbon dioxide from the atmosphere into fiber and other wood components. Wood stores carbon indefinitely, even as a finished product, helping to reduce the effects of greenhouse gas emissions over the long haul. In addition, growing trees

2013 North American Sustainable Forestry Management Program Statistics



Sustainability Award Winner

Domtar formed the Four States Timberland Owners Association in 2010 to educate landowners and managers on how to obtain sustainable forest management certification. Domtar, along with 55 individual landowners owning more than 70,000 acres, achieved certification of their forestland. AF&PA awarded Domtar the 2013 Leadership in Sustainability Sustainable Forestry Management Award for this project.

also release oxygen into the atmosphere, thereby supporting life on our planet. In 2011, U.S. forests and wood products captured and stored roughly 16 percent of all carbon dioxide emitted by fossil fuel consumption in the United States.[6]

More trees are planted annually in the U.S. than are harvested by the forest products industry. Currently, 1.2 billion trees are planted per year according to the U.S. Forest Service.[7] Today, the United States has 20 percent more trees than it did on the first Earth Day celebration more than 40 years ago. One-third of the United States is forested — 751 million acres.

Privately-owned forests supply 91 percent of the wood used by the U.S. forest products industry, while state, tribal and municipal forests supply 7 percent, and federal forests supply only 2 percent. More than 56 percent of U.S. forests are privately owned, much of it by family forest owners who manage their lands to provide value for future generations. Maintaining a healthy and economically viable forest products industry business sector creates a market for wood, providing an incentive for landowners to keep land forested rather than convert it to other uses such as development or agriculture. It also provides a profitable market outlet for removing trees to reduce overcrowding, which helps to maintain healthy, resilient forests, which in turn reduces wildfires and insect and disease infestations.

The reforestation activities that take place on managed lands after harvest provide numerous ecological and social benefits not possible if forest stands are left in the mature state. Each stage of the forest succession process provides unique habitat and environmental protection benefits that would not occur without the rotational harvest and reforestation cycles.

Sustainability Award Winner

Green Bay Packaging achieved 100 percent fiber yield recovery at its Arkansas Kraft Division facility and was recognized by AF&PA with the 2012 Innovation in Sustainability Award. The mill attained zero-landfill of fiber collected in the mill waste treatment system, diverting over 60,000 cubic yards of usable fiber from landfills in 2011.

Sustainable Manufacturing

Our commitment to sustainable manufacturing is one of the most significant of any industrial sector, and AF&PA's *Better Practices, Better Planet 2020* sustainability initiative includes one of the most extensive collections of quantifiable goals for a major U.S. manufacturing industry. Our members created this program to focus on achieving a suite of six sustainability goals (see Part II for a goals progress report).

But progress on our goals only tells part of the story. Sustainable manufacturing is an economic as well as environmental imperative for AF&PA members. Efforts to improve the efficiency of how we use

[6] *Climate Changes in the United States, Third National Climate Assessment*, May 2014.

[7] *Forest nursery seedling production in the United States—fiscal year 2012* – USDA Forest Service, 2013.

resources have resulted in decreased emissions and natural resources needed to manufacture our products. For example, wood fibers used to make a sheet of paper are separated and prepared in water-based slurries. Water and other materials are added and then removed to produce the finished paper, thus recycling and reusing raw materials. Water is reused 10 times before being treated and returned to the environment. Spent pulping chemicals and organic substances from the biomass material are combusted to capture and reuse the pulping chemicals and to generate valuable carbon neutral fuel to power our mills. At kraft pulp mills (the most commonly used process in the U.S.), up to 98 percent of the pulping chemicals are recovered and recycled in virtually a closed loop.

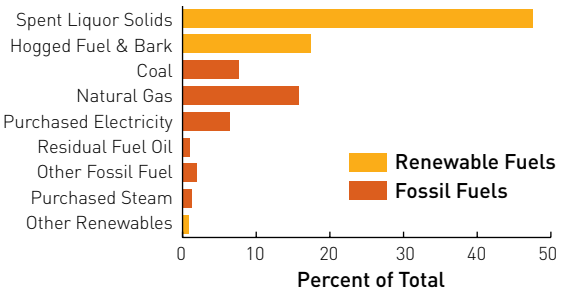
Renewable Energy and Energy Efficiency

AF&PA members strive to minimize energy costs, as energy constitutes the third largest expense category for the forest products industry (with the cost of materials such as fiber ranking number one and employee compensation number two).

Member mills produce solid wood products, pulp, paper, paper-based packaging, and other wood-based materials. Residuals that do not end up in products can be used as an energy source for manufacturing or used to generate electricity that is sold to the grid as green power.

We self-generate most of our energy needs; more importantly, most of that is renewable energy. On average, about 66 percent of the energy used at AF&PA member pulp and paper mills is generated from carbon-neutral biomass. In fact, forest and paper products

2012 Pulp and Paper Mill Energy Sources



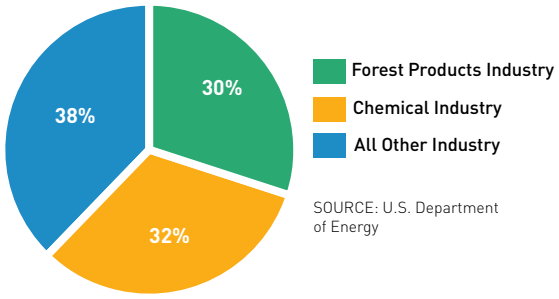
facilities accounted for 62 percent of the renewable biomass energy consumed by all manufacturing facilities in all sectors. Fifty-nine percent of the electricity used by our members was self-generated. Indeed, 42 percent of our members' mills self-generated more than half of their power, and 23 percent sold excess power back to the grid, much of it renewable as well.

The industry has long relied on the much more efficient combined heat and power (CHP) generation process to produce the electricity and steam needed

Sustainability Award Winner

A comprehensive, multi-year energy management program developed for **Georgia-Pacific**'s manufacturing facilities spawned more than 200 energy efficiency projects and other efforts. Collectively, they generated savings of more than $50 million in purchased energy and reduced energy use by over two trillion Btu. These results and the resultant greenhouse gas reductions were recognized by AF&PA with a 2012 Leadership in Sustainability Energy Efficiency/Greenhouse Gas Reduction Award.

2012 CHP Electricity Generation by Industry



SOURCE: U.S. Department of Energy

to manufacture its products. In this process, exhaust steam from electricity-generating turbines is used directly to dry wood and paper and to heat production processes or buildings before being condensed and recycled back to steam generation boilers. The use of CHP results in efficiencies in the range of 50 to 80 percent at forest products plants, in comparison to non-CHP electrical stations, such as utilities, with typical efficiencies around 33 percent. In 2012, 96.4 percent of the electricity the industry generated was through CHP. The forest products industry produced 30 percent of CHP electricity generated by manufacturing facilities in the U.S. Of all manufacturing sectors, only the chemical industry produced more.

Water

Water is a vital part of the papermaking process. Technology and innovation enable water to be reused and recycled ten times throughout the paper mill process.

After water is used inside the mill, it is treated in a wastewater system and then returned to the environment. The forest products industry directly returns to the environment about 88 percent of the water it withdraws and uses in its manufacturing processes. Another 11 percent evaporates, once again becoming part of the water cycle. The remaining one percent is incorporated into our products.

AF&PA shares the global concerns about water scarcity and access to potable water. The environ-

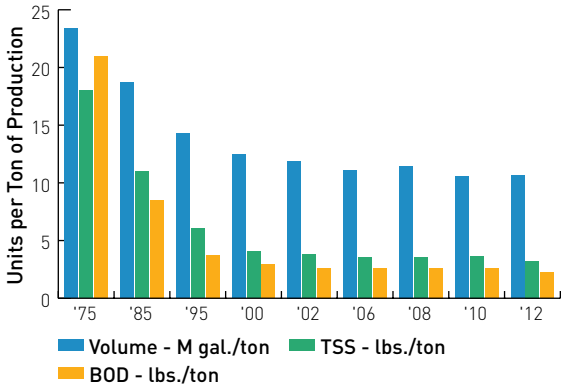
mental impacts of water use and the economic and social aspects of that use are very site-specific. We have actively participated in global water sustainability initiatives to help advance understanding of the impacts of water use at our mills, as we believe that it is the impact of that use — which includes positive economic impacts — that is most important. We have participated in the development of the Alliance for Water Stewardship's International Water Stewardship Standard released in April 2014, as well as the Water Footprint Standard developed by the Water Footprint Network and its partners.

While we focus on achieving our water use reduction goal, we continue to make progress reducing the regulated constituents in our water discharges. For example, compared to 2010, total suspended solids (TSS) releases were reduced by 11.5 percent and Biochemical Oxygen Demand (BOD), a measure of the amount of organic material in the effluent that results in lowered oxygen content of receiving streams, was reduced by 12.9 percent.

Sustainability Award Winner

The 2012 AF&PA Leadership in Sustainability Water Award winner, **MWV's Mahrt Mill** in Cottonton, Alabama, reduced water usage by 20 percent, energy usage by over 8 percent, and CO_2 emissions by 10 metric tons per day while maintaining existing production quality and capacity.

Pulp and Paper Mill Effluent Discharges

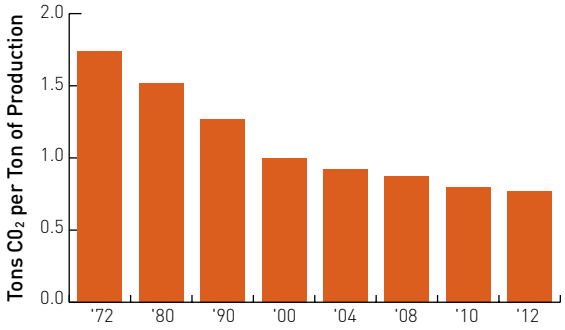


Greenhouse Gas (GHG) Emissions

The carbon-neutral renewable energy generated by our members is equivalent to 200 million barrels of oil annually, and its use avoids fossil fuel-based GHG emissions. Virtually all of this energy comes from biomass residuals left over from the manufacturing process; diverting these residuals from landfills also curbs potential GHG emissions.

At pulp and paper mills, the emission rate expressed in tons of carbon dioxide (CO_2) equivalents per ton of production has been reduced by 55.8 percent since 1972, 23.1 percent since 2000, and 3.9 percent compared to 2010. The emissions intensity rate for pulp and paper mills and wood products facilities combined decreased by 22.5 percent since 2000. Between 2010 and 2012, this rate was reduced by 4.4 percent.

Pulp and Paper Mill Greenhouse Gas Emissions



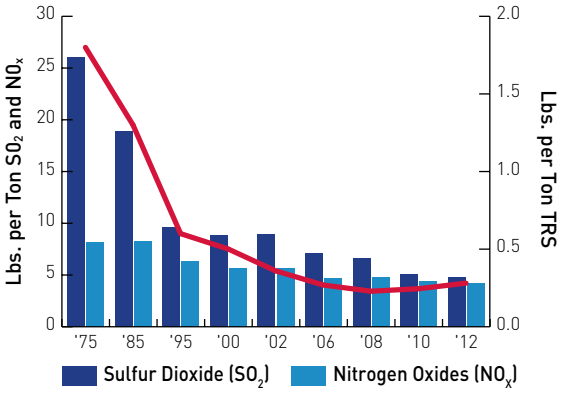
A recent study by the National Council for Air and Stream Improvement (NCASI) shows that the GHG reduction benefits of using biomass residuals for energy by the forest products industry are equivalent to about 218 million tons of carbon dioxide. This is comparable to removing about 40 million cars from the road.

The sustainable management of forests supported by the industry plays a large part in the cycle to offset carbon emissions. In 2011, U.S. forests and wood products captured and stored roughly 16 percent of all carbon dioxide emitted by fossil fuel consumption in the United States.

Air Emissions

EPA's Clean Air Act initiatives have been the focus of AF&PA policy advocacy for the last several years. Some of the emission standards are still not finalized and may not be for several more years. AF&PA members, nonetheless, are continuing to reduce their air emissions. For example, in 2012, sulfur dioxide emissions were 27.4 percent lower than in 2008 due to changes in our fuel mix and continual environmental improvement, and nitrogen oxide emissions were 12.3 percent lower than in 2008.

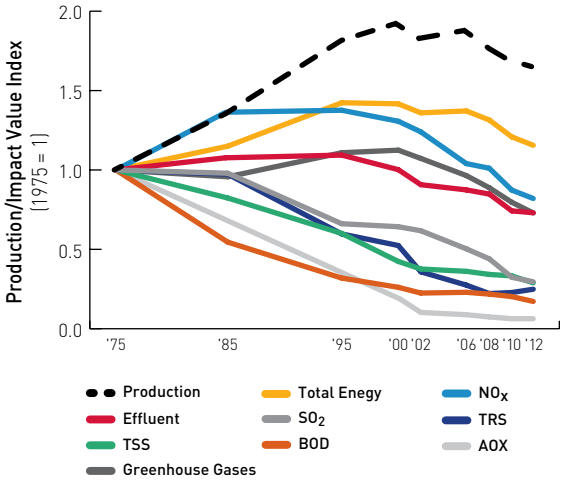
Pulp and Paper Mill Air Emissions



Producing More with Less Environmental and Energy Impact

The result of our sustainable manufacturing efforts has been a "decoupling" over many years of our environmental and energy footprint from our levels of business activity and production. Advances we made in reducing environmental and energy impacts were "decoupled" from the amount of product we produced. The trend plot above shows that while we generally continue to reduce emissions and energy use on a percentage basis (and in some cases, significantly so), as we get closer to background levels of emissions it becomes much more challenging and costly to achieve continued reductions.[8] Appendix I of this report compiles all the environmental metrics on which we are reporting our progress.

Producing More with Less Impact



Sustainability Award Winner

KapStone's Longview Mill received the 2013 AF&PA Leadership in Sustainability Energy Efficiency/Greenhouse Gas Reduction Award for reducing greenhouse gas emissions by 72 percent over the last decade; reducing overall energy use by 37 percent since 2007; reducing overall energy used per ton of paper produced by 17.6 percent since 2007; and increasing total tons of paper produced by 50 percent since 2006.

Paper Recovery for Recycling

Industry-led efforts to increase paper recovery are among the best examples of how we are protecting our environment and preserving and growing the economic contributions of the industry and its businesses. Our industry's 2013 paper recovery rate is 63.5 percent, and we have exceeded 60 percent recovery for the past 5 years. Our goal is to exceed 70 percent recovery by 2020. The amount of paper recovered for recycling has increased by more than 70 percent since our industry committed to setting and achieving recovery goals in 1990. Paper recovery is important to the U.S. economy; it is a success because it is voluntary and market-driven.

[8] Pollutant and energy consumption data have been extrapolated from reporting AF&PA member companies to the entire industry by multiplying weighted average per ton intensities of reporting companies by industry level production.

AF&PA Outreach

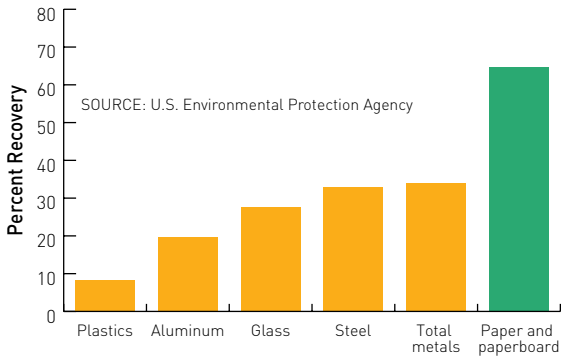
RecycleMania, an annual eight-week competition for colleges and universities, engaged 461 schools across the U.S. and Canada — collecting 89.1 million pounds of recyclables and organic materials. Rutgers, the United States Military Academy, Antioch University, Kalamazoo College and Valencia College were the top award winners. The 2014 competition is sponsored by AF&PA, Alcoa Foundation, the Coca-Cola Company, and SCA. The collection of recyclable materials by contestants prevented the release of 126,597 metric tons of carbon dioxide equivalents.

Paper recovery for recycling extends the useful life of fiber. Approximately 78 percent of all U.S. paper mills use some recovered fiber to make everything from paper-based packaging to tissue to office paper and newspaper.

The paper industry's recycling success leads the way for all other U.S. recycling efforts and also keeps paper out of landfills. Approximately 2.5 times more paper is recycled than is sent to landfills, and every ton of paper recovered for recycling saves 3.3 cubic yards of landfill space. According to the U.S. Environmental Protection Agency (EPA), only 27.7 percent of glass, 19.8 percent of aluminum, and 8.8 percent of plastics consumed were recovered for recycling in 2012, compared to 64.6 percent of paper.

Paper recovery for recycling is also widely accessible: In 2010, 87 percent of Americans had access to community curbside and/or drop-off paper recycling.

2012 Paper Recycling vs. Other Materials



AF&PA member companies' use of recovered fiber resulted in avoided greenhouse gas emissions of nearly 18 million metric tons of CO_2 equivalents in 2013. This has the added benefit to society of reducing other air pollutants that would be released if the paper were to end up in a landfill.

To help educate students and their families about the importance of paper recycling, AF&PA partners with Kaleidoscope to deliver standards-based curricula straight to the classroom. Further, the AF&PA Recycling Awards recognize outstanding paper recycling programs in three categories: Business, Community and School. This year, the program was redesigned to reflect the diversity of paper recycling programs across the country. In each category, there are prizes for creativity, participation, partnerships, and volume of paper collected.

This year's winners in each category are:

Creativity — unique and innovative ways that have been used to market the program, raise awareness and generate interest

- *Community*: Township of Nutley (Nutley, NJ)
- *School*: Greenhill School (Addison, TX)
- *Business*: Michael Dunn Center (Kingston, TN)

Participation — unique and innovative ways successful programs increased participation and tonnage collected

- *Community*: Vance Air Force Base (Enid, OK)
- *School*: Damascus Elementary School (Salem, OH)
- *Business*: Michael Dunn Center (Kingston, TN)

Partnerships — innovative partnerships (community, business, non-profit organizations) used to promote increased recovery

- *Community*: Metro Waste Authority (Des Moines, IA)
- *School*: Ocosta High School (Westport, WA)
- *Business*: Michael Dunn Center (Kingston, TN)

Volume — total amount of paper and paperboard collected

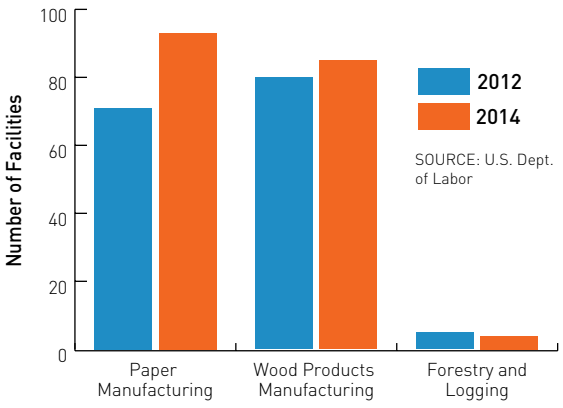
- *Community:* Township of Nutley (Nutley, NJ)
- *School:* Damascus Elementary School (Salem, OH)
- *Business*: Curly's Foods, Inc. (Sioux City, IA)

People

Worker Safety

Because any injuries to our employees are not acceptable, we are continuing to work toward our vision of zero injuries for the industry. Our members continue to look for innovative worker safety programs to realize this vision. Members have increased their participation in the OSHA Voluntary Protection Programs (VPP). Program members are industrial facilities that voluntarily work to maintain job illness and injury rates below national Bureau of Labor Statistics averages.

Member VPP Enrolled Facilities



AF&PA Sustainability Award Winner

International Paper received the 2012 AF&PA Leadership in Sustainability Safety Award for the "It's about...LIFE" campaign. After the campaign was launched in 2010, Life-changing Injuries and Fatality Elimination (LIFE) were reduced across the company. Along with five specific areas of focus, LIFE put a face to safety with its "This is Why I Work Safe" toolkit, video and website, asking employees to bring photos of loved ones into their workplace as a constant reminder to work safely.

Communities

AF&PA member companies remain a vital source of skilled jobs in rural communities throughout the U.S. More than 75 percent of U.S. pulp and paper mills are located in counties designated by the U.S. Census Bureau as more than 80 percent rural. A majority of the workers employed in the forest products industry possess at least a high school diploma (or equivalent).[9] Member companies provide training to their employees either through on-the-job training programs or by providing the opportunity for employees to take courses at local colleges or universities to improve their skill base.

In anticipation of the need for highly skilled and specialized workers, member companies have engaged educational institutions to ensure that future

[9] Source: Employment Projections Program, U.S. Department of Labor, U.S. Bureau of Labor Statistics.

employees have the appropriate skills and vocational training.[10] This support has come through donations to university programs, partnerships with local high schools or universities to provide internship opportunities, mentoring programs, and engagement in the development of curricula and classes that will provide graduates with the proper skill set to succeed in the job market.

Member companies also are involved in projects and programs to enhance the well-being of the communities in which they operate. These programs include watershed cleanups, recycling drives, and forest restoration and regeneration. Some programs are yearly events to help beautify a watershed or neighborhood. Others are programs that have both social benefits for the community and benefit the economics of the company, e.g., recycling drives provide companies that manufacture recycled paper products with raw materials, and conservation projects ensure the long-term viability of the forests that provide the raw material for virgin pulp.

AF&PA Member Case Studies

Sappi Fine Paper pledged $250,000 for three initiatives to support Science, Technology, Engineering and Math (STEM) and other education programs at targeted colleges and universities near company mills.

Sonoco has committed $5 million over five years to fund Partners for Unparalleled Local Scholastic Excellence (PULSE), a public/private partnership to expand student development and curriculum opportunities through collaborative academic and social development initiatives, focused on schools located in the company's hometown of Hartsville, South Carolina.

[10] According to a survey conducted by McKinsey & Company, a consultancy, 45 percent of employers in the U.S. believed that there was a lack of skills among graduates, which led to vacancies in entry-level positions. (McKinsey Center for Government, *Education to Employment: Designing a System that Works*).

Building the Bio-based Economy

According to the U.S. Census Bureau, the world population will exceed 9 billion by 2050. All these people will have needs — many of which can be filled by forests. Forests are incredibly rich and complex ecosystems, delivering services that are necessary for human well-being and survival — like fresh water, food, and shelter. Many industries depend on forests for their resources, not just the forest and paper industry.

Bio-based products already help meet the growing global demand for a wide range of existing and new sustainable products. Pulp is used in items as diverse as sanitary products, like diapers and feminine care products; tissue products, such as napkins and wipes; electronics, including the flat screens of televisions and laptops; and car tires.

For decades, the pulp and paper industry also has produced ingredients used in detergents, cleaning aids, asphalt emulsifiers, ink resins, and oil drilling fluids as valuable co-products of papermaking. Extractives in wood include resins and fatty acids that are recovered in the pulp mill, thereby avoiding their release into the atmosphere or surface waters. The recovered components are separated and converted into products tailored to specific market needs. Making these products makes pulp and paper mills more sustainable and supplies green chemicals to global markets.

Through nanotechnology, which manipulates matter on an atomic and molecular scale, scientists are looking into ways that trees can improve the sustainability of existing paper-based products as well as deliver a new generation of sustainable products, including high-tech materials that are only beginning to be imagined. Wood contains cellulosic nanomaterials that provide strength and stiffness to trees. When isolated, these materials can be used to strengthen other items, such as plastic fiber-reinforced composites.

Forest biomass is increasingly becoming an important feedstock for green chemicals. Technologies to convert the sugar-based carbohydrates in wood and the building blocks in lignin to a wide range of plastics and chemicals that now are made from fossil fuels are available, and more efficient methods are under development. The sustainability initiatives of many chemical companies, including several that supply essential raw materials for papermaking, are encouraging new efforts to make chemicals from renewable resources such as wood.

Performance Tracking: The Statistics of Sustainability

AF&PA's ambitious *Better Practices, Better Planet 2020* initiative includes one of the most extensive collections of quantifiable goals for a major U.S. manufacturing industry. We are proud to report that AF&PA members are on track to meet our 2020 sustainability goals, based on the following 2012 calendar year performances (except for recovery for recycling, which is the 2013 rate).[11]

- **Increase paper recovery for recycling:** Currently at 63.5 percent, we have exceeded 60 percent recovery every year since 2009.
- **Increase energy efficiency:** We are more than three-quarters towards meeting our energy efficiency goal to reduce our use of purchased energy by 10 percent between 2005 and 2020. AF&PA members' purchased energy use is currently just 11.8 million BTUs per ton of production,[12] an 8.8 percent reduction from 2005 levels.
- **Reduce greenhouse gas emissions:** AF&PA mills have come very close to achieving the goal to reduce greenhouse gas emissions by at least 15 percent by 2020. Emission rates in 2012 were 14.5 percent lower than those in 2005.
- **Promote sustainable forestry:** Companies continue to seek to increase fiber procured from both third-party certified forestlands and through certified fiber sourcing programs. In 2012, the percentage for each of these wood fiber sources was 29 and 95, respectively, both of which are increases from the 2005 baseline. We are continuing to work with governments and other stakeholders to combat illegal logging.
- **Strive for the safest possible workplace:** Because injuries to our employees are not acceptable, we established a vision for the industry of zero injuries. We are measuring progress toward that vision by setting a goal to further improve our safety incidence rate by 25 percent from 2006 to 2020. AF&PA member companies have reduced their recordable case incidence rate by 24 percent since 2006.
- **Reduce water use:** Member pulp and paper mills are working to reduce water use by 12 percent by 2020. Currently, mills report using 6 percent less water than in the 2005 baseline year.

Reporting Our Progress

AF&PA and its predecessor organization, the American Paper Institute, have tracked paper product production and industry economic performance for decades. Over that time, the paper and wood products markets have grown more global. Consequently, our industry's sustainability depends on our ability to successfully compete in those global markets, increasing the importance of the social and economic metrics, along with the environmental metrics.

Setting relevant and challenging goals is another important step in the sustainability pursuit. AF&PA's first goal, set in 1990, was to achieve a 40 percent paper recovery rate by 1998. This goal was achieved four years early, and a new 50 percent recovery goal was established. After achieving that goal in 2003, two successively higher goals were set — and achieved — before the decade was out. AF&PA's current suite of six goals, established in 2011 through the *Better Practices, Better Planet 2020* program, continues to seek increased paper recovery rates in addition to

[11] Except for the recovery for recycling and safety goals, all numeric goals use a 2005 baseline year. The 2005 baseline is derived from the averaging of 2004 and 2006 data as reported by member companies through our regular biennial data collection process. The recovery goal does not have a baseline, and the safety goal baseline is 2006. Production-based statistics quoted in this report refer only to quantities of pulp, paper, and primary wood products produced. They do not include converted paper or fabricated wood products.

[12] Wood products generally require significantly less energy to manufacture than pulp and paper products. Such differences can distort energy efficiency comparisons if there are major changes in the paper-wood production mix, as occurred between the 2005 base year and 2010, when wood's share of the production mix declined significantly. Thus, the 2005 production mix between wood and paper has been adjusted to be the same as it was in 2010 to ensure a more representative comparison of energy efficiency performance, and we will be using this same 2010 mix in 2012 and in future years.

improved energy efficiency, reduced greenhouse gas emissions, improved sustainable forestry practices, better workplace safety, and reduced water use.

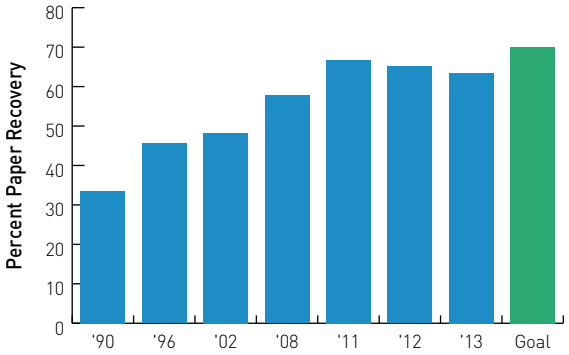
Our progress towards meeting these goals is reported here. Trends associated with all of the other sustainability indicators on which we are reporting are included in the Appendix that follows.

Increase Paper Recovery for Recycling

GOAL: Exceed 70 percent rate of paper recovery for recycling by 2020

U.S. paper recovery has increased by more than 70 percent since 1990 due to the efforts of the industry and the millions of Americans who recycle every day. Recovering valuable resources extends the fiber supply, allowing our industry to reuse its products to make new ones. In addition, paper recovery saves landfill space — an average of 3.3 cubic yards of landfill space is saved for each ton of paper recycled. U.S. paper recovery exceeded 60 percent for the past 5 years, reaching 63.5 percent in 2013. Paper recovery is a success because it is voluntary and market-driven. Recovered paper markets are driven by the same supply-demand dynamics that characterize the broader economy. Recovered paper that was sorted or processed in the U.S. had a 2012 market value of $8.4 billion. The value of U.S. recovered paper exports totaled $3.1 billion in 2013. Paper recovery has fostered a dynamic marketplace that allows recovered fiber to find its highest-value end. That, in turn, helps to encourage more recycling.

Progress Toward Recycling Goal



Sustainability Award Winner

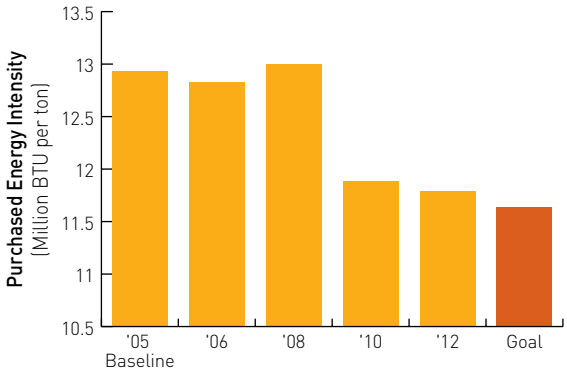
A unique partnership between **RockTenn** and a customer created sustainability awareness and increased recycling through an employee education program that focused on disposal decisions and removal of recyclables from the waste stream. The initiative resulted in 61.6 percent of the customer's waste stream being recycled and reduced waste management expense by 16 percent. The program received a 2013 Leadership in Sustainability Paper Recovery for Recycling Award from AF&PA.

Improve Energy Efficiency

GOAL: Improve members' purchased energy efficiency use by at least 10 percent from 2005 to 2020

Energy generation and use at AF&PA member mills is an exciting success story. Purchased energy use in 2012 was 11.8 million BTUs per ton of production against a goal of 11.6 million BTUs per ton. Improving our industry's energy efficiency in purchased energy allows us to produce more with less, leaves more natural resources for future use, and saves resources, which helps to keep and create jobs. Improved energy efficiency has led to a reduction in purchased energy of 8.8 percent compared to the 2005 baseline of 12.9 million BTU per ton of production.

Progress Toward Energy Goal



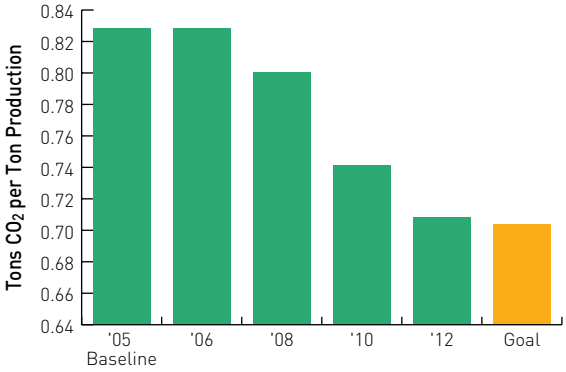
Reduce Greenhouse Gas Emissions

GOAL: Reduce our members' greenhouse gas emissions by at least 15 percent from 2005 to 2020

In 2012, AF&PA members came close to achieving the 15 percent greenhouse gas (GHG) reduction goal. Emissions were 0.709 tons of CO_2 equivalents per ton of production versus a goal of 0.704. This amounts to a decrease of 14.5 percent from the 2005 baseline. Reducing our members' greenhouse gas emissions is part of a global environmental effort. It is closely related to other AF&PA sustainability goals. Recovering paper for recycling keeps paper out of landfills — where it releases GHGs when it decomposes — and improving energy efficiency leads to fewer GHG emissions resulting from the manufacturing process.

Reliance on carbon-neutral biomass derived energy, improvements in energy efficiency, and increases in paper recovery for recycling have all contributed to this reduction. Additionally, promotion of sustainable forestry can increase carbon storage in the managed

Progress Toward Greenhouse Gas Reduction Goal



forests that provide raw materials for our mills. In 2011, U.S. forests and wood products captured and stored roughly 16 percent of all carbon dioxide emitted by fossil fuel consumption in the United States.

Promote Sustainable Forestry

GOAL: Increase the amount of fiber procured from certified forestlands or through certified fiber sourcing programs in the U.S. from 2005 to 2020 and work to decrease illegal logging

All AF&PA members that own forestland are required to conform to a credible forest management program. These credible certification programs include the Sustainable Forestry Initiative® (SFI®), the Forest Stewardship Council (FSC®) program, the American Tree Farm System (ATFS), and the Programme for the Endorsement of Forest Certification (PEFC™)-endorsed programs. In 2012, 29 percent of member fiber was procured from certified forestlands, and 95 percent was procured through certified fiber sourcing programs, both of which are increases from the 2005 baseline.

Individual member companies work diligently to safeguard against procurement of fiber from illegally-logged sources. Illegal logging contributes to global deforestation and climate change, threatens many species with extinction, denies forest-dependent communities access to resources, and undermines legitimate businesses. Companies identify and document sources, require suppliers to sign agreements, use third-party certification of chain-of-custody records, and can conform to sustainable fiber sourcing standards to help in achieving this goal.

AF&PA and its members support and promote efforts to reduce illegal logging in a number of ways. In the U.S., that effort has centered on the implementation of the 2008 Lacey Act amendments, which are helping transform the global marketplace. Those amendments serve to increase transparency and due care, shifting supply chains towards legally-sourced product. AF&PA members are finally able to compete on a more level playing field, and countries and businesses are becoming much more aware and concerned about the legality of their sourcing practices, which helps support good forest governance efforts. Anecdotal information indicates that more and more customers in major wood markets are seeking legal sources of wood and are avoiding sources of wood of questionable origin.

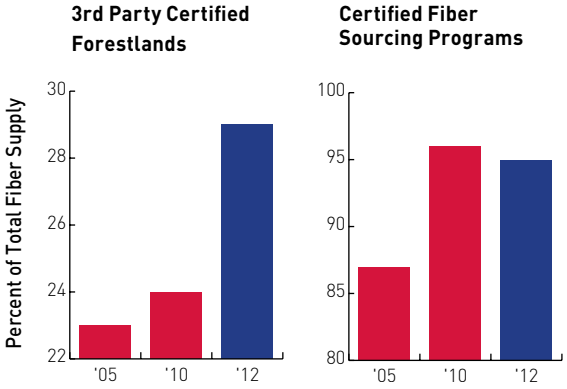
The Lacey Act and other U.S. efforts to curb illegal logging have gained traction; the European Union and Australia both have implemented their own laws to address the illegal timber trade and to encourage trade in legally sourced wood and plant products. However, this shift is far from complete, as illegal logging remains a serious problem in many parts of the globe.

AF&PA and its members are actively promoting measures to maintain the integrity and effectiveness of the amendments. For instance, we have advocated for adequate funding in the federal budget for agencies involved in the implementation and enforcement of the Lacey Act. We also worked with our allies against legislative efforts to reduce the effectiveness of the 2008 Lacey Act amendments. Finally, we have supported provisions in free trade agreements being negotiated by the U.S. government intended to curb illegal logging and associated trade.

Sustainability Award Winner

Through its "Climate Leadership Initiative," **International Paper** aggressively managed and reduced greenhouse gas emissions at its facilities by 40 percent from 2000 to 2011 through investments in capital projects and increased manufacturing efficiencies, new technologies, and encouraging employees to find new ways of working. The company was recognized by AF&PA, through a 2012 Leadership in Sustainability Energy Efficiency/ Greenhouse Gas Reduction Award, and by the U.S. Environmental Protection Agency for its achievement.

Progress Toward Sustainable Forestry Goal

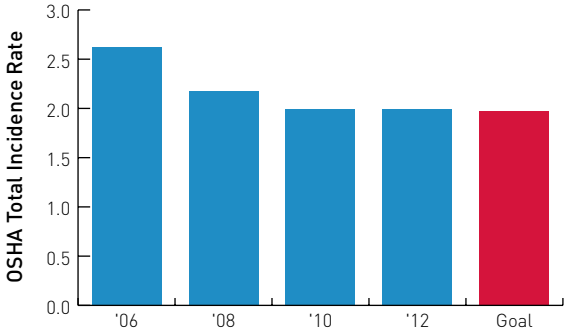


Strive for the Safest Possible Workplace

GOAL: A vision for the industry of zero injuries and measuring progress toward that vision by further improving our incidence rate by 25 percent from 2006 to 2020

The safety of our industry's employees is a priority of our sustainability program, critical to both employee well-being and the success of our businesses. The Occupational Safety & Health Administration (OSHA) recognizes industrial facilities that implement enhanced safety programs and maintain on the job injury and illness rates below national Bureau of Labor Statistics averages for their respective industries. This recognition includes enrollment in OSHA's Voluntary Protection Programs (VPP). The forest products industry has consistently had the second largest number of facilities of any sector registered by VPP. Because any injuries to our employees are not acceptable, we are continuing to work toward our vision of zero injuries for the industry. AF&PA member-implemented worker training initiatives, increased automation, and a host of injury preventive measures and safeguards have resulted in a recordable case incidence rate reduction of 24 percent since 2006. AF&PA's mandatory Environment, Health & Safety Principles require that members have health and safety policies in place and that the companies perform frequent safety audits. Our members continue to look for innovative worker safety programs to realize our vision of zero injuries.

Progress Toward Safety Goal

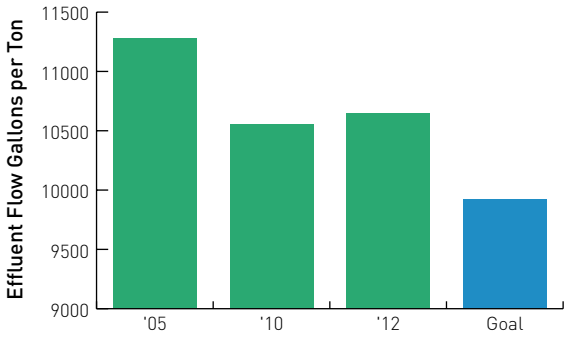


Reduce Water Use

GOAL: Reduce water use in members' pulp and paper mills by 12 percent from 2005 to 2020

Reducing water use in the paper manufacturing process is responsible stewardship of an important local resource. Just like trees, water is a valuable natural resource that our industry strives to manage in a sustainable manner. Water sustainability is achieved, in part, through water reuse and recycling. Because effluent measurements are precise and can be accurately and transparently reported, they serve as the surrogate measure of our water withdrawals. Since 2005, AF&PA member paper mills have reduced water use by 6 percent. AF&PA members continue to seek ways to reduce water use, increase water reuse and recycling, and disseminate information about the role of water in our industry.

Progress Toward Water Goal



Sustainability Award Winner

Domtar received the 2013 Leadership in Sustainability Safety Award for its Hazard Mapping Program at a large mill in Alabama. The company worked with the United Steelworkers Union to bring the Hazard Mapping Program to the mill. The mill was systematically mapped to rate hazards: checklists were developed as well hazard identification symbols. In response, 324 hazards were eliminated and, in the second year, the recordable incident rate was 1.07.

BETTER PRACTICES BETTER PLANET 2020
Continuing AF&PA's Commitment to Sustainability

The AF&PA Sustainability Award Winners 2012-13

2012

Leadership in Sustainability – Energy Efficiency/ Greenhouse Gas Reduction (Large Company)

Georgia-Pacific
Improving Energy Efficiency

International Paper
Climate Leadership Initiative

Leadership in Sustainability – Energy Efficiency/ Greenhouse Gas Reduction (Small Company)

Expera Specialty Solutions
(formerly Thilmany Papers)
Energy and Water Restructuring Program

Leadership in Sustainability – Safety

International Paper
It's about...LIFE

Leadership in Sustainability – Water

MWV
Mahrt Mill Water and Energy Reduction Project

Innovation in Sustainability

Green Bay Packaging
Fiber Reclaim Project

2013

Leadership in Sustainability – Energy Efficiency/ Greenhouse Gas Reduction

KapStone Paper and Packaging Corporation's Longview Mill
A One-Year Snapshot of Longview's Multi-Year Journey

Leadership in Sustainability – Paper Recovery for Recycling

RockTenn
RockTenn & Customer Recycling and Waste Reduction Initiative

Leadership in Sustainability – Safety

Domtar
Hazard Mapping at Ashdown

Leadership in Sustainability – Sustainable Forest Management

Domtar
Four States Timberland Owners Association

Leadership in Sustainability – Water

Georgia-Pacific Brunswick Cellulose Operation
Water Use Reduction Project

Innovation in Sustainability

Graphic Packaging International
Tite-Pak® Innovation Beverage Packaging

Appendix One:

Results from AF&PA's 2012 member survey regarding economic, social, and environmental sustainability indicators, plus information from government sources.

The Economic Indicators of Sustainability

Employment Trends

The forest products industry makes substantial contributions to global, U.S., and, especially, local economies. Pulp, paper, paper converting, and wood products manufacturing plants are major employers. In all, the sector currently employs nearly 900,000 people and is among the top 10 manufacturing employers in 47 of the 50 states.

Although employment in the sector declined sharply in 2008 (8.1 percent) and 2009 (15.8 percent), the rate of decline decreased substantially in 2011 (1.8 percent) and 2012 (0.6 percent). Preliminary data from the Bureau of Labor Statistics suggest that forest products industry employment rose 2.3 percent in 2013. Much of this rebound occurred at wood products plants. At pulp, paper, and paperboard mills, employment stood at about 108,000 people in 2012. This compares to 132,000 in 2007, one year prior to the start of the recession.

Labor Productivity

The forest products industry must operate in a highly competitive world marketplace. Improving worker productivity is an important part of the drive to reduce production costs. Output per man-hour at pulp, paper, and paperboard mills increased 36 percent during the ten-year period 2001 through 2011. The average annual increase for the period was 3.1 percent. At wood products facilities during the same period, labor productivity rose 23 percent, or at an average rate of 2.1 percent per year. The productivity contributions of our workers are critical to the U.S. industry's ability to compete in the world marketplace.

Forest Products Industry Labor Productivity Gains

Compensation

The forest products industry provides skilled jobs paying high wages. According to data compiled by the Bureau of Labor Statistics (BLS) and the Bureau of Economic Analysis, total compensation for the sector in 2012 was approximately $52 billion. These sectors include pulp, paper, and paperboard mills, paper converting, wood products mills, wood kitchen cabinets, and logging.

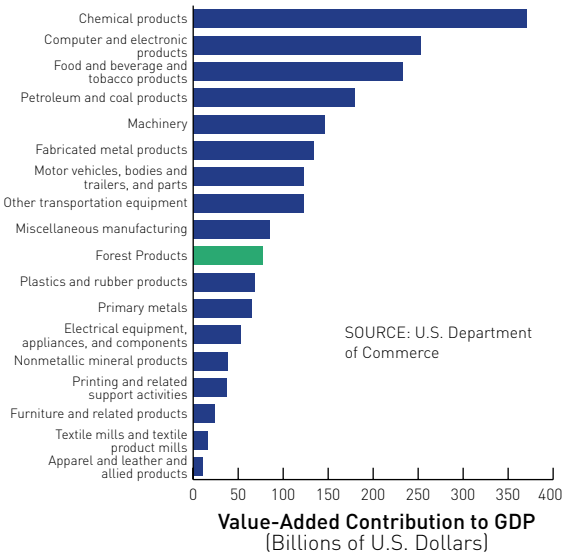
Contribution to Gross Domestic Product (GDP)

In 2012, the forest products industry contributed almost 4 percent of the U.S. manufacturing GDP, according to Census Bureau data. Pulp, paper, and paperboard contributed 2.6 percent and wood products, 1.2 percent.

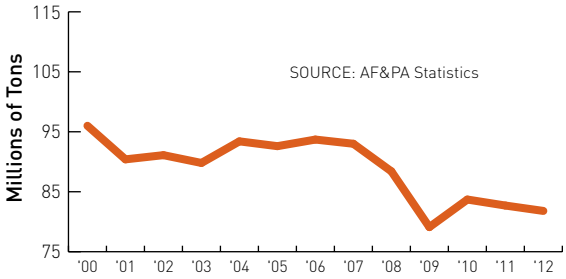
Production

U.S. paper and paperboard production fell sharply during the recession years, declining 4.9 percent in

Forest Products Industry Contribution to U.S. Manufacturing GDP (2012)



Paper Industry Production

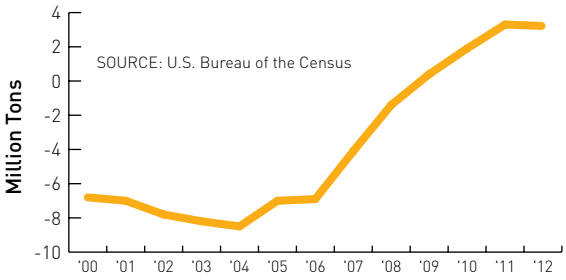


2008 and 10.6 percent in 2009. Though declines have continued, they have been much smaller in recent years. Production was off 1.1 percent in 2012 and, according to preliminary data, 0.8 percent in 2013.

U.S. Trade Competitiveness

The U.S. has traditionally run a trade deficit with respect to paper and paperboard. That deficit reached 8.5 million tons in 2004 and then began to contract.

Paper Industry Trade Balance Improvement

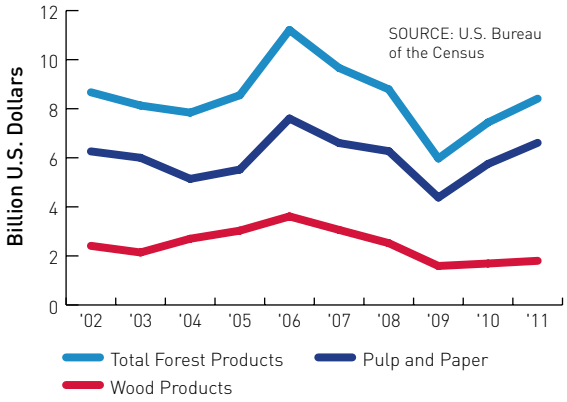


The U.S. recorded a small trade surplus with respect to paper and paperboard in 2009, which continued to grow to reach 3.2 million tons in 2012.

Capital Expenditures

Forest products industry capital expenditures fell from $11.2 billion in 2006 to $6.0 billion in 2009 before beginning to rebound. They reached $7.4 billion in 2010 and increased further to $8.4 billion in 2011, the latest year for which data are available. The 2011 level of expenditures was on par with average forest products industry capital spending of $8.5 billion a year for the period 2002 through 2011. In 2011, paper and paperboard mills spent $6.6 billion on plant and equipment, while wood products facilities spent $1.8 billion.

Forest Products Industry Capital Expenditures



AF&PA Member Case Study

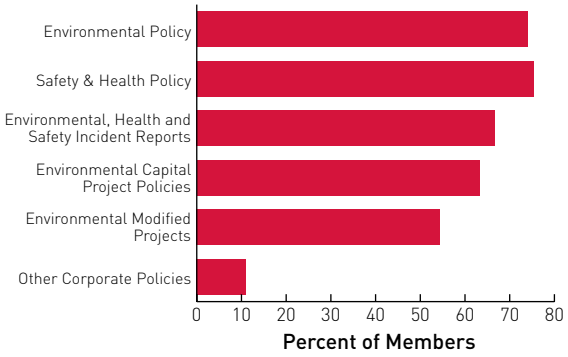
Employees at **Clearwater Paper Corporation**'s Shelby, North Carolina, mill partnered with Communities in Schools to provide backpacks for hundreds of school children in need.

The Social Indicators

Individual Member Policies

Members adhere to AF&PA EHS policies in a variety of ways. These can include formal written internal policies, agreements with employees and other stakeholders, incorporation of principles in meetings and training programs, etc. Safety and health policies were reported by 75.4 percent of members; environmental policies by 73.7 percent. In addition to EHS policies, members also have policies for reporting EHS incidents to senior management, highlighting the need for environmental capital projects, use as

Members Reporting Internal Policies

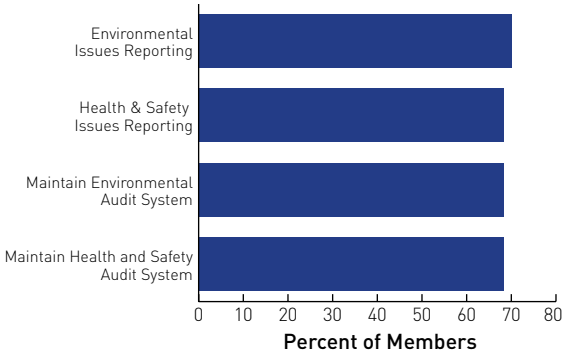


guidance regarding environmentally-oriented product design, and other proclamations (social responsibility policies, stewardship measures, sustainability policy statements, etc.) during 2012.

Internal Reporting

Members establish internal reporting systems to inform senior management, middle management, and line employees of the company's sustainability performance and trends. Details regarding these systems vary member to member but are guided by the AF&PA EHS Principles. Environmental issues reporting systems were recorded by 70.2 percent of members in the 2012 survey. Health and safety reporting systems were recorded by 68.4 percent, while the same number of members also reported having audit systems in place for both health and safety and environmental programs.

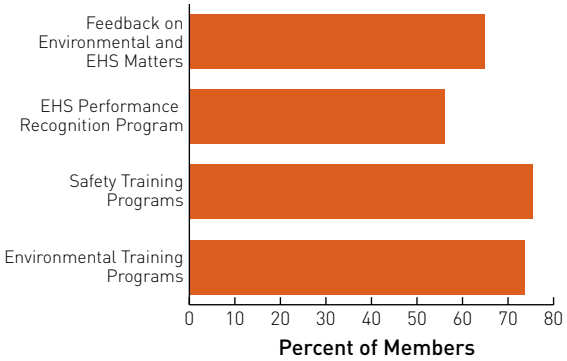
Members Internal Reporting Systems



Employee Programs

Company programs include several measures that aid and encourage employees to follow sustainable practices. These include environmental and safety training programs, employee recognition programs, and confidential feedback arrangements employees can use to report any problematic safety or environmental performance practices that they encounter on the job. In response to the 2012 survey, AF&PA members reported that 73.7 percent utilized environmental training programs, 75.4 percent utilized safety training programs, 56.1 percent sponsored EHS employee performance recognition programs, and 64.9 percent provided employee feedback mechanisms regarding environmental and safety matters.

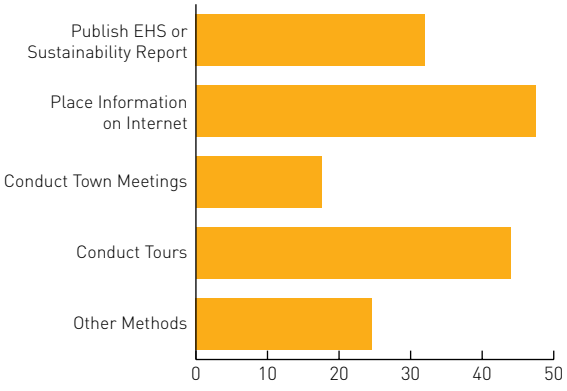
Employee Sustainability Program Measures



Public Reporting

AF&PA members strive to keep stakeholders informed of their sustainability activities through public engagement initiatives. Such initiatives include published reports, Internet postings, town hall meetings, plant tours and other means. Many members use a mix of methods. In 2012, 32 percent of members published EHS or sustainability reports. Nearly half (47.4 percent) made information regarding sustainability performance available on the Internet. Town meetings were held by 17.5 percent, while 43.9 percent conducted plant tours and 24.6 percent used other means for public reporting such as newsletters and newspaper articles, responses to direct stakeholder inquiries, cooperation with trade organizations, and presentations to local civic organizations.

Members Public Engagement Reporting

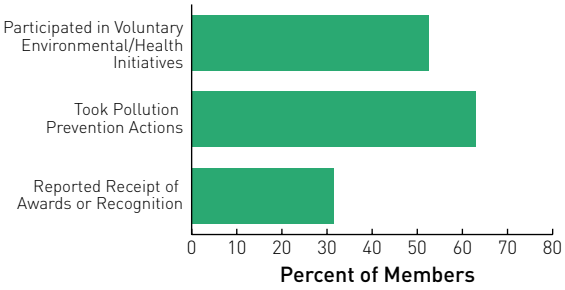


Voluntary Efforts, Pollution Prevention, and External Recognition

AF&PA members actively participate in voluntary pollution reduction and pollution prevention initiatives. Examples include the U.S. EPA's Energy Star program, U.S. EPA's Climate Leadership program relating to greenhouse gas emissions reductions, and others. In response to the 2012 EHS member survey, AF&PA members reported on participation in voluntary environmental and health-related programs and on initiatives taken in the area of pollution prevention. Members also received recognition for their environmental and sustainability accomplishments from outside organizations and officials. Examples of these awards and recognition include:

- Energy excellence awards from public utilities;
- Safety awards from state departments of labor officials and/or governors;
- Awards and recognition from universities;
- Awards and recognition from customers and/or supply chain organizations; and
- Environmental sustainability awards from AF&PA and other associations.

Voluntary Efforts, Pollution Prevention, and External Recognition

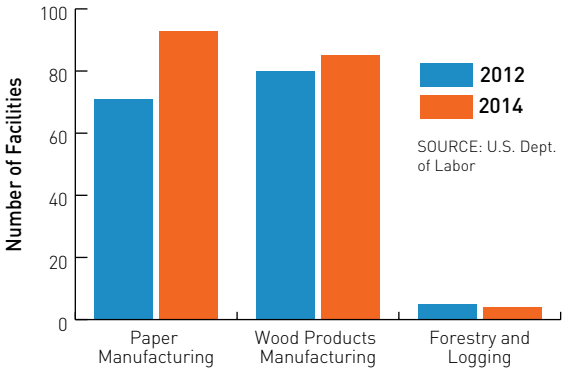


Worker Safety Performance

AF&PA member OSHA incidence rates reported via the EHS Principles Verification Program 2012 Survey show that the number of injury or illness cases per 100 equivalent full-time employees at pulp and paper mills decreased 4.3 percent between 2010 and 2012. However, incidence rates at wood products facilities increased.

The OSHA VPP status is awarded to industrial facilities that voluntarily work to maintain job illness and injury rates below national Bureau of Labor Statistics averages. As of February 2014, AF&PA members had 4 forestry and logging operations, 85 wood products manufacturing plants, and 93 pulp and paper manufacturing facilities awarded VPP status. These numbers compare with 80 wood products plants and 71 pulp and paper facilities recorded in February of 2012. The number of forestry and logging operations recorded as obtaining VPP status was 5 in 2012.

Member VPP Enrolled Facilities



Public Policy and Community Outreach

It is important for AF&PA member companies to be engaged in the development of public policy and in community outreach. In this way, policymakers have an opportunity to hear directly from regulated entities regarding how proposed policies or regulations will affect the industry. Through collaborative processes they get a better understanding of measures likely to produce the best and most cost-effective results. Community members gain the opportunity to become better informed about local facility operations. They can present their own points of view and concerns, as well as have an opportunity to support the company. Based on the 2012 member survey results, 63.2 percent of members reported conducting public policy and community outreach activities.

The Environmental Indicators

AF&PA members have tracked and worked to reduce releases to the environment for decades. This practice has provided an important database from which our substantial progress towards sustainability can be reported.

Energy Production

Renewable biomass fuels at member mills provided 65.9 percent of energy produced at pulp and paper mills and 70.6 percent of energy produced by wood products facilities. These carbon neutral materials include bark, sawdust, wood shavings, and other woody material collectively known as "hogged fuel," as well as spent pulping liquors.

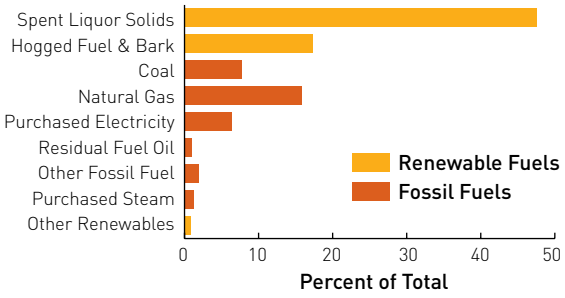
Use of purchased energy (fuels used to produce electricity and steam on-site, as well as steam and electricity purchased directly) at pulp and paper mills has decreased by 44.7 percent since 1972, 25.4 percent since 1990, and 14.6 percent since 2000.

Combined heat and power (CHP) production is an important part of energy generation at forest products manufacturing plants. CHP energy is produced in the forest products industry by utilizing the heat contained in electricity generation turbine exhaust steam in production processes, equipment, and buildings before the condensed steam is returned to boilers for reuse. This process raises the energy production efficiency from 33 percent for non-CHP generation processes to between 50 and 80 percent. In 2012, 96.4 percent of the electricity the industry generated was through CHP, which enabled many members to efficiently generate significant portions of their electricity. Fifty-nine percent of the electricity used by our members was self-generated (the remainder was purchased). Indeed, 42 percent of our members' mills self-generated more than half of their power, and 23 percent sold excess power back to the grid — much of it renewable as well.

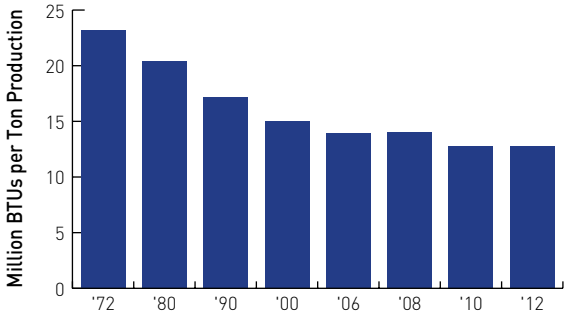
Sustainability Award Winner

Throughout a two-year period, **Expera Specialty Solutions** (formerly Thilmany Papers) completed more than 35 energy-efficiency projects, and its Kaukauna, Wisconsin mill joined the U.S. Department of Energy's (DOE) "Better Buildings Better Plants" program, resulting in a 19 percent reduction in purchased energy intensity. AF&PA awarded them a 2012 Leadership in Sustainability Energy Efficiency/Greenhouse Gas Reduction Award for their accomplishments.

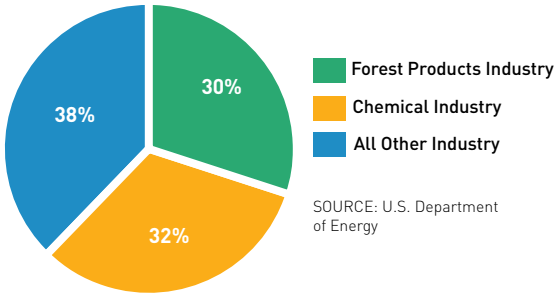
2012 Pulp and Paper Mill Energy Sources



Pulp and Paper Mill Purchased Energy Use



2012 CHP Electricity Generation by Industry



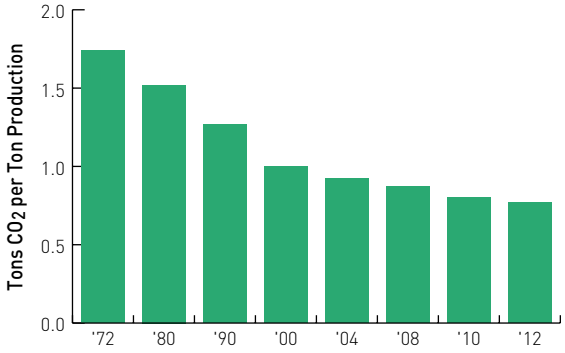
SOURCE: U.S. Department of Energy

The forest products industry is the second largest producer of CHP electricity in the manufacturing sector; only the chemical industry produces more.

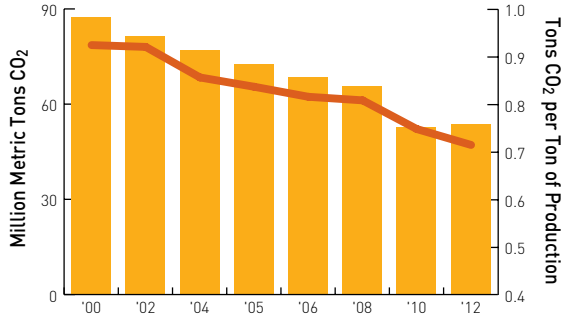
Greenhouse Gas Emissions

Forest products industry greenhouse gas emissions have been significantly reduced. At pulp and paper mills, the emission rate expressed in tons of CO_2 equivalents per ton of production has been reduced by 55.8 percent since 1972, 23.1 percent since 2000, and 3.9 percent compared to 2010. The absolute emis-

Pulp and Paper Mill Greenhouse Gas Emissions Reductions



Member Greenhouse Gas Emissions
(Total Direct and Indirect)

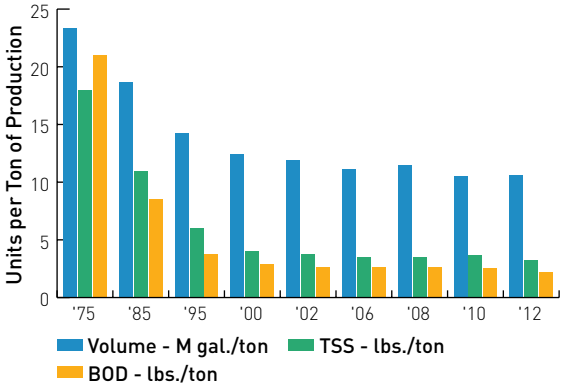


sions from pulp and paper mills and wood products facilities combined, expressed in tons of CO_2 equivalents, have decreased by 38.6 percent since 2000. The emissions intensity rate for pulp and paper mills and wood products facilities combined, expressed in tons of CO_2 equivalents per ton of product, decreased by 22.5 percent since 2000. Between 2010 and 2012, this rate was reduced by 4.4 percent.

Water Discharges

AF&PA member pulp and paper mills utilize sizeable quantities of water in the manufacture of their products. Mills actively seek to employ water conservation and water use reduction practices. Water withdrawn by the mills is recycled and reused up to ten times before being discharged to biological systems for treatment and release back into the environment. Consumptive water use by member mills is low. About 88 percent of water withdrawn for use in the mills is returned after treatment. Since 1975, mills have reduced the quantity of water discharged by 54.5 percent. Since year 2000, water use as measured at the point of release has decreased 14.5 percent. Water use in 2012 was essentially the same as in 2010 — 10,600 gallons per ton of production. Of greater significance is the progress made in effluent quality. Since 1975, the quantity of total suspended solids (TSS) released to receiving waters by mill treatment systems has decreased by 82 percent. Biochemical Oxygen Demand (BOD), a measure of the amount of organic material in the effluent that results in lowered oxygen content of receiving streams, has been reduced by 89.3 percent. BOD reduction since year 2000 is 22.7 percent. Compared to 2010, TSS releases were reduced by 11.5 percent, and BOD releases were reduced by 12.9 percent.

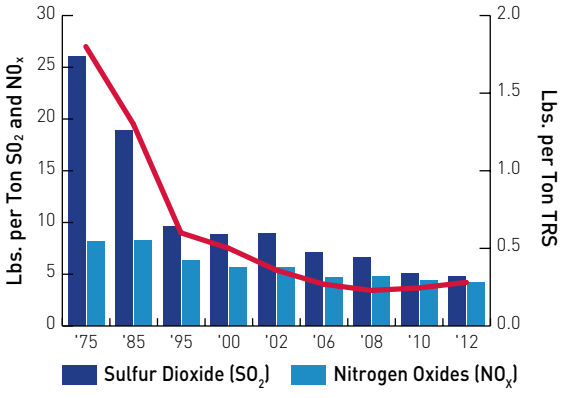
Pulp and Paper Mill Effluent Discharges



Air Emissions

AF&PA member mills have also substantially reduced air emissions. Releases of sulfur dioxide, nitrogen oxides, and total reduced sulfur compounds at pulp and paper mills have been reduced through process modifications and energy conservation measures. Wood products facilities have reduced nitrogen oxide releases compared to those of the late 1990s. Between 1975 and 2012, paper mill sulfur dioxide emissions have been reduced by 81.6 percent. Since 2000, sulfur dioxide emissions were 46 percent lower. For 2012, sulfur dioxide emissions were 6.4 percent lower than 2010, due to changes in our fuel mix and continual environmental improvement. Nitrogen oxide emissions since 1975 were down 48.9 percent in 2012. Since year 2000, nitrogen oxide emissions have been reduced 26.4 percent. The 2012 emissions of these nitrogen compounds were 3.7 percent lower than 2010. Total reduced sulfur (TRS) compound emissions have been reduced 84.5 percent since 1975 and 44.3 percent since 2000. However, compared to 2010, in 2012 these low level TRS emissions increased by 13.9 percent — from 0.245 pounds per ton to 0.279 pounds per ton.

Pulp and Paper Mill Air Emissions



Chemical Releases[13]

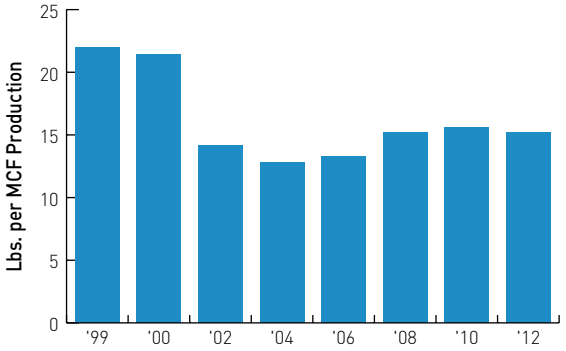
AF&PA members track and report on chemical releases. Compounds of interest include substances listed by U.S. EPA for reporting through the Toxics Release Inventory (TRI) program and compounds specifically related to operations at pulp and paper mills and wood products facilities. These specific compounds include chlorine, chlorine dioxide, chloroform, and methanol

Sustainability Award Winner

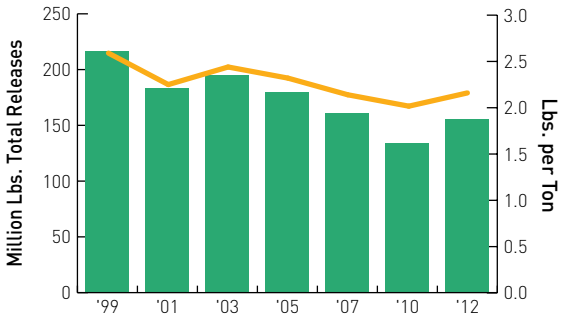
Georgia-Pacific's Brunswick Cellulose, Inc. subsidiary received the 2013 Leadership in Sustainability Water Award for its "Water Use Reduction" project at the Brunswick, Georgia, mill. The mill installed a single-line bleach plant to replace three older pulp bleaching processes, resulting in a reduction in overall groundwater use of nearly 10 million gallons per day, or 30 percent of the mill's total daily use.

[13] The chemical release data in this section are from the EPA TRI database, except for the pulp mill AOX data, which are from the AF&PA EHS Survey. The data are from AF&PA members only. One factor that makes comparison of these data difficult is that AF&PA membership has changed between these benchmarking years. The membership has not consisted of exactly the same set of mills for each of the comparison years.

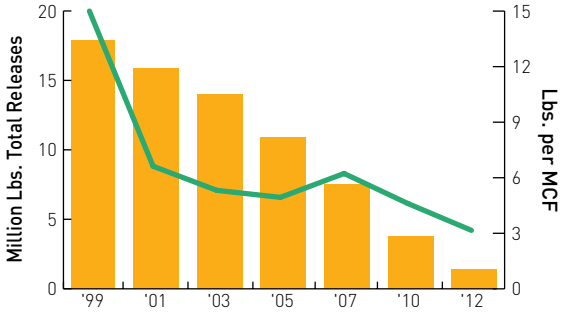
Wood Products Facility NO_X Emissions



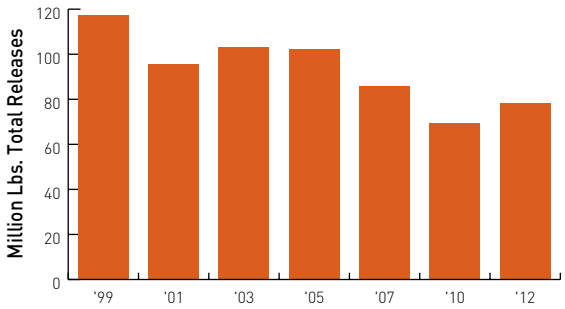
Pulp and Paper TRI Releases



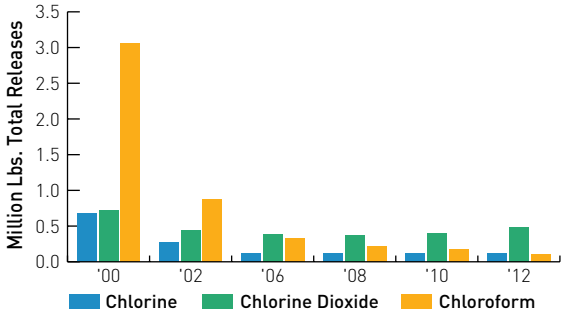
Wood Products TRI Releases



Pulp and Paper Mill Methanol Releases



Pulp and Paper Mill Chlorine Compound Releases



at pulp and paper mills; methanol and formaldehyde at wood products facilities. Since 1999, pulp and paper mill total TRI releases have been reduced by 28.1 percent. Between 2010 and 2012, total TRI releases increased 16 percent. On a pound per ton of product basis, the reduction between 1999 and 2012 has been 16.6 percent. Between 2010 and 2012, pound per ton release rates increased by 7.5 percent.

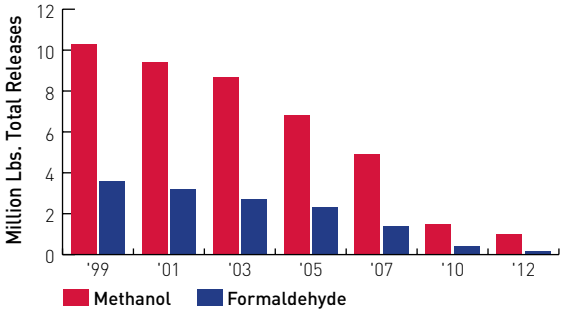
At wood products facilities, TRI total releases have been decreased by 92.2 percent between 1999 and 2012. Between 2010 and 2012, TRI compound total releases decreased 63.2 percent. On a pounds per 1000 cubic feet of product basis, the reductions achieved were 78.6 percent between 1999 and 2012 and 30.4 percent between 2010 and 2012.

Pulp and paper mill releases of chlorine, chlorine dioxide, and chloroform are tracked by looking at total industry release rates as reported by U.S. EPA's TRI Explorer database. Releases of these chlorine compounds have been substantially reduced since 2000. During this period, releases of chlorine have been reduced by 82.6 percent, chlorine dioxide by 32.3 percent, and chloroform by 96.6 percent. Between 2010 and 2012, chlorine releases remained the same at 0.12 million pounds, chlorine dioxide releases increased from 0.40 million pounds to 0.49 million pounds, and chloroform releases decreased 39.3 percent from 0.17 million pounds to 0.10 million pounds.

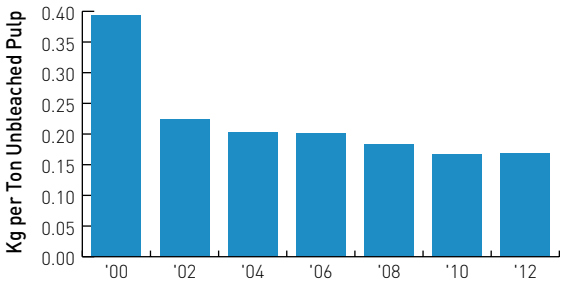
Methanol releases at member pulp and paper mills have been reduced by 33.4 percent between 1999 and 2012. Between 2010 and 2012, methanol releases increased 11.2 percent.

At AF&PA member wood products facilities, methanol releases between 1999 and 2012 decreased by 90.3 percent. Between 2010 and 2012, they decreased by 33.3 percent. Formaldehyde releases decreased by 95.8 percent at wood products facilities between 1999 and 2012. Between 2010 and 2012, formaldehyde releases decreased 50.0 percent, in part because the California Air Resources Board standards, which generally are being met nationally, became effective.

Wood Products Facility Methanol and Formaldehyde Releases



Paper Mill Effluent AOX Discharges

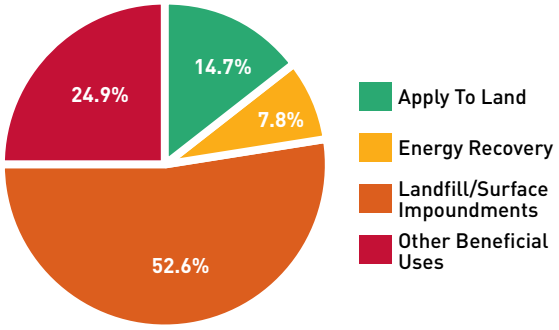


Adsorbable organic halides (AOX) are chlorinated organic compounds that can, under certain conditions, be formed during pulp bleaching. Through process changes, member companies have virtually eliminated AOX releases from pulp mill effluents. Since 1975, AOX releases have been reduced by 95.8 percent and by 57.4 percent since year 2000. Releases recorded in 2012 matched those in 2010, 0.17 kilograms per ton of unbleached pulp.

Beneficial Use of Manufacturing Residuals

Member pulp and paper mills strive to utilize as much raw material brought to the mills as possible. Any materials not utilized for primary products, by-products, or as primary energy sources are known as manufacturing residuals. These include soil contaminated wood yard wastes, wastewater treatment plant residuals, boiler ash, etc. These materials are beneficially used by spreading on land as soil conditioners and amendments, burned for energy recovery with other biomass fuels, or utilized in other ways. Materials that cannot be beneficially used are placed in landfills or surface impoundments. In 2012, 52.6 percent of generated residuals were disposed in landfills, 14.7 percent land spread, 7.8 percent burned for energy recovery, and 24.9 percent utilized in other ways. In 2012, the portion of residuals disposed in landfills decreased, and beneficial use of these materials increased. In 2010, the residuals portion discarded was 58 percent.

Pulp and Paper Mill Residuals Management



Research, Development and Innovation

AF&PA members utilize many technical resources as they seek continued improvements in process efficiency, product quality, and sustainability. In responses to the 2012 EHS Principles Verification Program Corporate survey, AF&PA members reported using a variety of research and development (R&D) and technical innovation resources. These included internal company R&D groups, R&D sponsored at external academic or contract research organizations, and industry-sponsored research organizations or initiatives.

Notable organizations or programs supported by AF&PA members include:

- **National Council for Air and Stream Improvement (NCASI)** — The forest products industry has pioneered environmental improvement measures since 1943 when the National Council for Air and Stream Improvement (NCASI), a non-profit research institute focused on environmental topics relevant to forest management and the manufacture of forest products, was founded.
- **Institute of Paper Science and Technology (IPST)** — The Institute of Paper Science and Technology (IPST) was created in 1929 to provide science, technology, and education in support of the forest products industry. Today, IPST is an industrial research and development center integrated within the vast resources of the Georgia Institute of Technology. IPST is focused on providing solutions to strategic, economic, scientific, and technical challenges facing the forest products industry.
- **Center for Paper Business and Industry Studies (CPBIS)** — Established in 2000 as part of the Alfred P. Sloan Industry Studies Program and now affiliated with the Industry Studies Association,

the Center for Paper Business and Industry Studies (CPBIS) at the Georgia Institute of Technology is one of 23 Industry Studies Program Centers. The CPBIS mission is to create and disseminate knowledge to further the understanding of business, management, organizational and social issues of importance to the paper industry.

- **Agenda 2020 Technology Alliance** — Agenda 2020 is a non-profit organization established for scientific and educational purposes. Agenda 2020 works to transform the forest products industry through innovation in its manufacturing processes and products. Guided by the 2010 Forest Products Industry Technology Roadmap that presents important R&D needs, Agenda 2020's work addresses the priority R&D needs as determined by member companies. Teams of representatives from member companies, universities, and government work together to form an integrated technology strategy. Agenda 2020 members envision a forest products industry that is fully sustainable, has profitable long-term growth, and continues to reduce its environmental footprint and requirements for energy and water — an industry that is transformed through the use of breakthrough technologies.

Appendix Two:

AF&PA Sustainability-Related Requirements for Members

AF&PA Sustainable Procurement Principles

1. Take part in the Sustainable Forestry Initiative® program as a program participant; or

2. Adhere to the following principles:

i. Support programs that supply regionally appropriate information or services to forest landowners, describing the importance of and providing implementation guidance on best management practices (BMPs); reforestation; afforestation; visual quality management; management of harvest residue; control of invasive exotic plants and animals; characteristics of special sites; and conservation of critical wildlife habitat elements and threatened and endangered species, and Forests with Exceptional Conservation Value.

ii. Encourage landowners to utilize the services of qualified resource professionals and qualified logging professionals in applying principles of sustainable forest management.

iii. Maintain a program for the purchase of raw material from wood producers that have completed training programs and are recognized as qualified logging professionals.

iv. Maintain a program to address adverse weather conditions.

v. Monitor and evaluate the use of BMPs across the wood and fiber supply area.

vi. Monitor the use of BMPs by wood producers supplying the company's facilities and use the information to maintain rates of conformance to best management practices and to identify areas for improved performance.

vii. If the company procures wood fiber outside North America, maintain programs to:

- Promote conservation of biodiversity hotspots and major tropical wilderness areas.
- Ensure fiber sourcing programs support the principles of sustainable forestry, including efforts to thwart illegal logging.
- Assess the risk that fiber-sourcing programs could acquire material from illegal logging.
- Assess the risk that fiber-sourcing programs could take place in countries without effective laws addressing worker safety, fair labor practices, indigenous people's rights, anti-discrimination, anti-harassment, prevailing wages, and worker's right to organize.

viii. Individually and/or through cooperative efforts provide support or funding for forest research to improve forest health, productivity, and sustainable management of forest resources, and the environmental benefits and performance of forest products.

ix. Provide funding and other support for training and education programs to foster improvement in the professionalism of wood producers, including awareness and implementation of sustainable forest management practices.

x. Comply with applicable federal, provincial, state, and local forestry and related environmental and social laws and regulations.

3. Participate in one of the qualifying sustainable forest management programs, including chain-of-custody certification.

AF&PA Environmental, Health & Safety (EHS) Principles

The EHS Principles require members:

- To make environmental, health and safety considerations priorities in operating existing facilities, as well as in the planning of new operations.
- To recognize, in developing and designing products to meet customer needs, the environmental, health and safety effects of product manufacture, distribution, use, and disposal.
- To monitor their environmental, health and safety performance and to report regularly on these matters to their Boards of Directors, as well as to confirm their adherence to these principles annually to the American Forest & Paper Association.
- To train employees in their environmental, health and safety responsibilities and to promote awareness and accountability on these matters.
- To improve environmental, health and safety performance through support of research and development that advances the frontiers of knowledge.
- To communicate with employees, customers, suppliers, the community, public officials, and shareholders to build greater understanding on environmental, health and safety matters.
- To participate constructively in the development of public policies on environmental, health and safety matters.
- To continue to pursue energy conservation, increased energy efficiency, greater utilization of alternatives to fossil fuels, and opportunities for cogeneration of electricity.

AF&PA Sustainability Leadership Highlights

1990
Set first paper recovery goal — 40 percent by 1998

1994
Achieved 40 percent recovery goal

1995
Launched mandatory AF&PA EHS Principles

1996
Set higher recovery goal — 50 percent by 2004

1998
Sustainable Forestry Initiative (SFI®) certification and licensing programs

1999
SFI® Program receives national sustainability award from Renew America and President's Council for Sustainable Development

2000
Published first Environmental, Health & Safety (EHS) Report

2002
Partnered with U.S. State Department to eliminate global illegal logging

2003
Achieved 50 percent goal and set new goal to recover 55 percent by 2012

2005
Launched AF&PA Recycling Awards program

2006
AF&PA member companies reach GHG intensity reduction goal 6 years ahead of schedule

2007
Achieved paper recovery goal early by achieving 56 percent

2008
Set goal to recover 60 percent by 2012

2009
Exceeded 60 percent paper recovery goal ahead of schedule

2011
Launched *Better Practices, Better Planet 2020* sustainability program

Set goal to exceed 70 percent recovery by 2020

2012
Released first sustainability goals progress report

2013
Fifth consecutive year of recovering more than 60 percent of paper in the U.S.

Internet Addresses for Forest Products Organizations

American Forest & Paper Association
www.afandpa.org

National Council for Air and Stream Improvement
www.ncasi.org

Technical Association of the Pulp and Paper Industry
www.tappi.org

Institute of Paper Science and Technology
www.ipst.gatech.edu

Center for Paper Business and Industry Studies
www.cpbis.gatech.edu

Agenda 2020 Technology Alliance
www.agenda 2020.org

Society of Wood Science & Technology
www.swst.org

American Forest & Paper Association

1101 K Street, NW, Suite 700, Washington, DC 20005
www.afandpa.org

10% total recycled fiber