

# RENEWABLE ENERGY AND CARBON FOOTPRINT

Like many major manufacturing operations, papermaking is an energy-intensive endeavor. However, the forest products industry produces and uses more renewable energy than any other industrial sector.<sup>1</sup>

A look across the life cycle of paper shows that its carbon footprint can be divided into three basic elements: greenhouse gas emissions, carbon sequestration and avoided emissions. Each of these elements is influenced by important characteristics that make paper's carbon footprint smaller than might be expected: it's made from a renewable resource that stores carbon, it's manufactured using mostly renewable energy and it's recyclable.

## Greenhouse gas emissions reduction

- A carbon footprint is the amount of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases that a person, organization, event or product causes to be released to the atmosphere, either directly or indirectly, during its life. For paper products, this life includes everything from harvesting trees through the manufacturing process to use and disposal or recycling.
- The major proportion of carbon dioxide generated during the life cycle of paper comes from combustion of fossil fuels during production. In a study of four paper grades (office paper, catalog, telephone directory and magazine), the largest portion of the carbon footprint came from the production stage (44-67%) and the smallest portion from transportation. The end of life stage (disposing of paper in landfill sites and its subsequent breakdown producing methane, a potent greenhouse gas) accounted for 19-38% of the total carbon footprint. Increasing the recovery of office paper and catalogs had the potential to reduce the carbon footprint of these paper grades by 15-25%. By eliminating these products from landfill and using them instead as a source of biomass for energy production further reduced their global warming impact.<sup>5</sup>

- The pulp and paper sector is responsible for only 1.2% of total U.S. industrial greenhouse gas emissions (Figure 1). Between 2011 and 2017, the carbon footprint of the sector decreased by 19% from 44.2 to 35.8 MMT CO<sub>2</sub>e.<sup>2</sup>

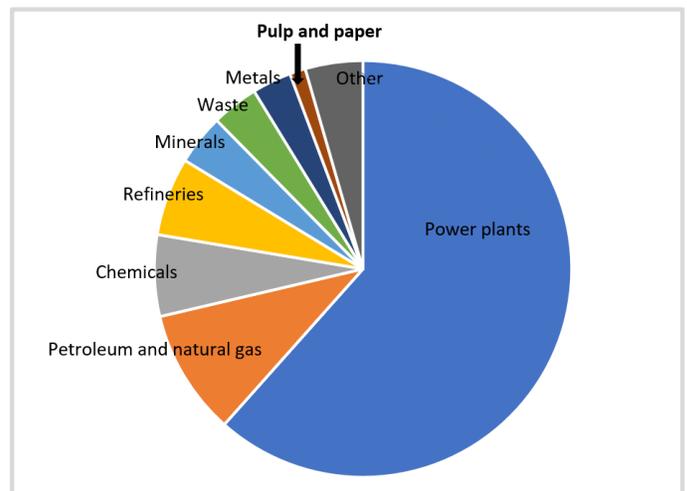


Figure 1: U.S. industrial greenhouse gas emissions in 2017 (million metric tons of CO<sub>2</sub>e) (4)

- Investment in new technologies is making forest industry operations more efficient. By generating "bioenergy from waste products and increasing energy efficiency, Canada's forest industry cut its total energy use by 31% and reduced

its greenhouse gas emissions by 49% between 2005 and 2015.”<sup>3</sup>

## Carbon sequestration

- Forests provide an important ecosystem service by sequestering carbon. CO<sub>2</sub> is removed from the atmosphere by trees as they grow and it is stored for a period before being returned to the atmosphere when the trees die. The sequestered carbon is stored not only in trees but also in forest products [including paper] for periods ranging from days to centuries. Growing trees also release oxygen into the atmosphere, thereby supporting life on our planet.<sup>6</sup>
- “Land management programs that restore forests to healthy and productive conditions will help ensure the long-term maintenance and transformation of forest carbon stocks. Ecosystems managed to adapt to changing conditions will capture carbon and store it more securely over the long term, while also furnishing wood-based materials.”<sup>7</sup>
- CO<sub>2</sub> uptake by forests in the contiguous U.S. offsets about 12 to 19% of total U.S. CO<sub>2</sub> emissions each year.<sup>8</sup>
- Forest lands in Canada removed between 150 and 160 million tonnes (Mt) of CO<sub>2</sub>e annually from the atmosphere between 2005 and 2016. Over this same period, emissions from harvested wood products originating from domestic harvest declined from 140 Mt in 2005 to a low of 120 Mt in 2009, and have since increased to 130 Mt in 2016.<sup>9</sup>

## Sources

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## Avoided emissions

- There is a vital difference between energy production from fossil fuels and biomass. Burning fossil fuel releases CO<sub>2</sub> that has been locked up for millions of years and introduces “new” carbon to the atmosphere. By contrast, burning biomass simply returns the CO<sub>2</sub> to the atmosphere that was absorbed as the trees grew and there is no net release of CO<sub>2</sub> if the cycle of growth and harvest is sustained.<sup>10</sup>
- In 2016, carbon-neutral biomass and renewable fuels provided, on average, about 66.6 % of AF&PA member facility energy needs.<sup>1</sup>
- By reducing the amount of paper and paperboard products going to landfills through recycling and energy recovery, greenhouse gases in the U.S. were lowered by 152.55 MMT CO<sub>2</sub>e in 2015. This is equivalent to taking 32.7 million cars off the road for an entire year.<sup>11</sup>
- Paper and wood products mills use biomass residuals [waste wood] from their manufacturing operations to produce bioenergy, diverting material from landfills where it would decompose and release greenhouse gases. This use of residuals for energy avoids the emission of about 181 million metric tons of CO<sub>2</sub>e in the U.S., equivalent to removing about 35 million cars from the road.<sup>12</sup>
- The Canadian Forest Products industry has eliminated the use of coal and cut oil use by more than 90% since 2000.<sup>13</sup>

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