

Assessing the Environmental Impacts of Disposable Facial Tissue Use versus Reusable Cotton Handkerchiefs

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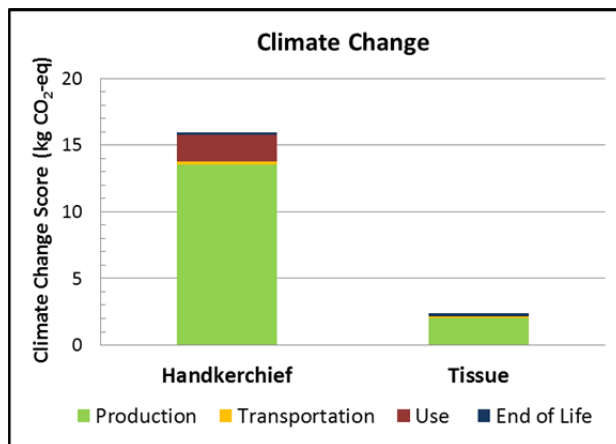
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Executive Summary

Household use of disposable facial tissue can add up – a Kimberly Clark LCA reports that affluent households in the Eastern U.S. purchase and use 5,600 sheets of facial tissue a year per household (Madsen, 2007). A previous LCA on reusable handkerchief versus disposable tissue use (Blackburn, 2009) found that handkerchiefs were environmentally superior, but the study only computed impacts for energy, water use, and waste, and also assumed a much longer lifespan of the handkerchief (520 washes) compared to previously published LCAs on textile products (50 washes) (Laursen et al., 2007; Collins & Aumonier, 2002). For this process LCA, the cradle-to-grave environmental impacts of disposable, virgin-paper facial tissues and reusable cotton handkerchiefs were evaluated using a functional unit (nose blows/area) which assessed the variations in product usage over one year's worth of respiratory illnesses and base, well-periods. Use scenarios for an average American adult living in New England were constructed and modeled to better understand how impacts can vary based on intensity of use, frequency of use, and time length of use, taking into account published information on nose blowing frequency in colds and frequency of respiratory illnesses (Dick et al., 1987; Yale & Liu, 2004).



In calculating the environmental impacts for the functional unit, this LCA found that there is no environmental advantage to using reusable handkerchiefs versus disposable facial tissue. All 4 endpoint impact categories – Climate Change, Human Health, Ecosystem Quality, and Resources are between 5 and 7 times greater for the handkerchief functional unit than those calculated for the facial tissue functional unit. Facial tissue end-of-life disposal, the prime reason why many would consider switching to handkerchiefs, only accounted for 10% of climate change impacts.

For all one-year use scenarios, disposable facial tissues had lower environmental impacts in every IMPACT 2002+ midpoint and endpoint category relative to handkerchief use. Using handkerchiefs exclusively was only found environmentally preferable when used for the entire useful life of the handkerchief (50 washes, or 9.4 years), following a use pattern that led to the lowest handkerchief versus facial tissue use rate for the same number of nose blows (1 handkerchief vs. 5 tissues), due to higher intensity of handkerchief use prior to washing.

The electricity used in initial manufacturing of the handkerchief (producing the cotton yarn and weaving the cotton) dominated the impacts for all the use scenarios. Even with over 9 years of handkerchief washing, 65% of the climate change impacts are still due to handkerchief production. The impacts of electricity production (coal mining, coal burning, and coal ash disposal) dominated the Human Health, Climate Change, and Resources categories for handkerchiefs, due to the heavy reliance on coal-derived

electricity in the Chinese electricity mix. However, even when handkerchief manufacturing was modeled for the functional unit using a European electricity mix (and facial tissue production modeled with a majority Chinese electricity mix), facial tissue use for one year still resulted in 3 times higher climate change impacts.

Modeling the impacts with an alternative impact assessment model did not alter the overall conclusions. For most users, facial tissues are the environmentally preferable choice. Handkerchief manufacturers would gain the greatest environmental impacts by decreasing the electricity used in cotton textile weaving and yarn production.