Math for Burying Mattresses

What does it really cost to landfill a mattress?

The answer is $45.51 per mattress in equipment, labor and space costs.

Plus, a societal cost in greenhouse gas emissions of $5.42.

By Brian Tippetts 8/24/21
7 Rivers Recycling

HERE is the math for calculating the cost of burying a mattress:

One buried mattress costs an additional $6 in equipment and labor costs

Why?

- Mattress springs become entangled in the landfill equipment. Equipment entangled with a mattress becomes less effective and can be damaged. The entangled springs must be pulled and cut free from the equipment, which is not only a nasty job but can injure an employee. This is extra labor and downtime which costs money.

- Mattress don't compact well and leave air pockets in a landfill that can aid in the spreading of underground fires, thus costing more in equipment and labor to stop a landfill fire.

- Mattresses buried on an outside landfill slope can become drainage conduits for leachate; resulting in side slope leachate seeps. When this happens, the mattress must be dug up and moved to the interior of the landfill. This is extra time and money.

- Mattresses buried at the end-of-the-day create another additional expense because the working face of the landfill is usually sloped and the daily cover slides off the mattress. Law requires 6 inches minimum of daily cover, so to get 6 inches of cover at the high end of the mattress there may need to be a foot of daily cover at the bottom. This is wasted daily cover, wasted landfill space, and extra time and money.

So, what is the extra equipment and labor costs to manage mattresses in the landfill? Ten minutes a mattress? Five minutes a mattress? Of course, a skilled landfill operator has learned ways to minimize the problems of handling mattresses such as stockpiling them until the best time to bury them and to be extra careful not to get the springs entangled in the equipment. And of course, this too takes extra time and costs, but not as much as not ignoring the mattresses. To find the answer of how much additional time it takes to handle mattresses at a landfill, as compared to the same weight of trash, a study was done by a major solid waste entity in Southwest United States and they found it was 3 minutes a mattress. Of course, another landfill's time may be more or perhaps less. If we use a combined equipment and labor rate of $120/hour, then 1 minute of addition effort cost $2.00 ($120/hour ÷ 1 hour/60 minutes = $2.00/minute). So, an extra 3 minutes equal $6, which means it costs six additional dollars to handle a mattress.

One mattress uses $45.51 in landfill airspace.

How so?

The landfill financial model has a peculiarity. Landfills account for their revenue by weight, e.g. $60/ton, but their expenses are by volume e.g. licensed airspace for waste. This means landfills want to tightly compact waste to minimize consuming landfill air space.

The point is; regular trash compacts well thereby minimizing the consumption of landfill airspace while mattresses do not compact well, thereby consuming far more space for their weight.

The revenues a landfill receives for 1 ton of household trash or 1 ton of mattresses are the same. If a landfill charges $60 per ton, the landfill will receive $60 for whatever weighs a ton -- it doesn't matter. (See Table 1)

Weight revenue for household trash and mattresses
Table 1

Material	Disposal Fee	Revenue
1 ton (2,000 lb) of Household trash	$60/ton ($.03/lb)	$60/2,000 lb
75 lb of Household trash	$60/ton ($.03/lb)	$2.25/ 75 lb
1 ton (2,000 lb) of Mattresses	$60/ton ($.03/lb)	$60/2,000 lb
75 lb of Mattress	$60/ton ($.03/lb)	$2.25/75 lb

However, when considering costs landfill space is paramount and mattresses hog space!

There are two basic landfill space questions when it comes to mattresses.

Q1. What is landfill space worth?

A. According to the US EPA[1], the standard compaction level of regular Municipal Solid Waste (MSW) in a landfill is 1,700 to 2,000 (1,850 average) pounds per cubic yard. Therefore, at a landfill tipping fee of $60 per 2,000 pounds (1 ton); 1,850 pounds of MSW would use $55.50 of landfill space.

Q2. What is the value of space worth used by mattresses?

A. According to often sited sources[2] mattresses compacted in landfills consume 22-23 cubic feet of space or 66% of their original size (or .82 cubic yards per mattress or 82% of 1 cubic yard). This would be 1.22 mattresses per cubic yard. This means 1.22 mattresses consume $55.50 worth of landfill space or 1 mattress consumes $45.51 of landfill space.

What is the air space cost of burying a mattress and your local landfill?

Take the landfill tipping fee of $_____/2,000 pounds x landfill compaction rate of 1,850* pounds/cubic yard x .82 cubic yards/mattress = $_____ per mattress of landfill air space

* *If the landfill is not getting an US EPA average compaction rate there are other compaction issues for the landfill or maybe the landfill is trying to bury too many mattresses.*

In addition to the landfill costs for burying mattresses, there a are also known environmental cost for burying mattresses of $10.84 per mattress set or assuming this includes two units, $5.42 per mattress.

The environmental costs of burying mattresses have been studied by the California Department of Resources Recycling and Recovery (CalRecycle) and presented in the Mattress and Box Spring Case Study report dated May 2012.

Here is what was found:

- The net greenhouse gas (GHG) cost of burying a mattress instead of recycling it is 59.9 Kg CO_2e (carbon dioxide equivalents) per set.

- The avoided landfill, reverse logistics and production benefits equals 114.9 CO_2e (carbon dioxide equivalents)

- According to the USEPA carbon costs[3], the average 2020 value of a metric ton (1,000 Kg) (greenhouse gas) CO_2e (carbon dioxide equivalents) is $62. Therefore, the total 174.8 Kg GHG environmental benefit of recycling a mattress is worth $10.84 per mattress set.

In conclusion, it is expensive and problematic to landfill mattresses. When possible, mattresses should not be buried but recycled.

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[1] Volume-to-Weight Conversion Factors U.S. Environmental Protection Agency Office of Resource Conservation and Recovery April 2016 https://www.epa.gov/sites/default/files/2016-04/documents/volume_to_weight_conversion_factors_memorandum_04192016_508fnl.pdf

[2] A study by Gregory Conigliaro and Paul Careau on behalf of Conigliaro Industries, Inc concluded that mattresses can be compressed by 66% in a landfill. *(By the way, King County Washington and others site this study.)* http://www.conigliaro.com/downloads/TECHNICAL_PUB-Mattresses_and_Landfills.pdf

[3] The Social Cost of Carbon. Estimating the Benefits of Reducing Greenhouse Gas Emissions. https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html