

## Final Disposition (*what happens to a body after death*): Comparison of Potential Environmental Benefits and Costs

### Guiding Questions:

What matters most to you? Environmental impact? Religious, family or cultural tradition? Ceremony with the body and/or memorialization or ceremony with the remains? Working with a locally owned and operated facility? Relationship with established conservation stewards? Cost?

METHOD	NET CARBON FOOTPRINT	FUEL EXPENDITURE	AMOUNT OF LEFT-OVER PRODUCT FOR DISPOSAL	LAND ACREAGE PROTECTED	ENVIRO COSTS OR BENEFITS
<b>Conservation Burial</b>	+Sequesters 25 lbs. CO <sub>2</sub> per burial, 10 tons per acre.	—Transportation to the cemetery.	-0-	+Unlimited. +Strategic component of a complete land conservation plan.	+Land protection. +Nutrient contributions to soil communities.
<b>Human Composting</b>	—Indeterminate greenhouse emissions	—Sowing, watering, harvesting, processing, transporting of alfalfa, wood chips, bulking agents to facility; storage. —Construction, heating, cooling, maintenance of facility and its operating units. —Transporting of finished material.	—1+ cubic yard of leftover material 10 – 15 lbs. pulverized bone ( <i>calcium phosphate and sodium, 11.8 pH, 200 – 2000 x what plants can tolerate</i> ).	-0-	—Materials acquisition. —Facility maintenance. —Trucking of leftover materials. —Smothered plant and soil communities in surface disposal. +Restoration of depleted soil if intentionally tilled or incorporated.
<b>Alkaline Hydrolysis</b>	—150 to 200 lbs. CO <sub>2</sub> per person. —Most AH waste will be turned into carbon and nitrogenous GHG by public wastewater treatment facilities.	—Electricity or propane to heat 100 gallons of water under pressure 3-12 hrs.: —Processing and transportation of potassium hydroxide (lye).	—100 – 300 gallons of effluent. 10 – 15 lbs. pulverized bone ( <i>calcium phosphate and sodium, 11.8 pH, 200 – 2000 x what plants can tolerate</i> ).	-0-	—Potential algae bloom from phosphorus run-off due to scattering. —Tree ringing ( <i>girdling</i> ) from burial close to tree roots. —Disposal of effluent (no state EPA has permitting).
<b>Flame Cremation</b>	— 250 to 536 lbs. CO <sub>2</sub> emissions per person. —Mercury, particulate emissions into air and waterways.	—Up to 500 gallons of fuel, usually natural gas, to burn @ 1700 to 2000° for 3-4 hours.	—7-10 lbs. pulverized bone ( <i>calcium phosphate and sodium, 11.8 pH, 200 – 2000 x what plants can tolerate</i> ).	-0-	—Potential algae bloom from phosphorus run-off. —Tree ringing from burial close to tree roots. —Mercury poisoning of air and water.

**For State-based, non-commercial information** on care for the dead, go to Oregon Funeral Resources at [Oregonfuneral.org](http://Oregonfuneral.org) and Washington Funeral Resources at [Washingtonfuneral.org](http://Washingtonfuneral.org)

**For research-based information** on environmentally responsible disposition options, see: *Cremation Curious* <https://vimeo.com/767868604>

*The Natural Burial Experience* <https://vimeo.com/769978957>

**For educational programs and courses** focusing on end-of-life issues, go to: [RedesigningtheEnd.com](http://RedesigningtheEnd.com) <https://www.redesigningtheend.com>

## **Natural Burial** (*green burial, conservation burial*)

- Sequesters 25 lbs. of carbon per person
  - Protects land for community use; protects animal habitat
  - Avoids environmental harms of embalming, use of concrete or metal grave liners, and imported or manufactured casket materials
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## **Flame Cremation**

- Emits 250 to 536 lbs. of carbon per person
  - Burns fossil fuels (*natural gas*) 2 - 3 hours at 1700 - 1900° F
  - Releases mercury, nitrous oxide, and particulate matter into air and water (*Minnesota study 14% of mercury emission attributable to crematories*)
  - Nutrients incinerated or locked and unavailable
  - Phosphorus run-off from scattering creates algae bloom that kills fish and plants; girdles trees, killing microbial and plant communities
  - Increased risk of radiopharmaceutical contamination for crematory operators (*Journal of the American Medical Association, 2.26.19*)
  - Final product: 7 - 10+ lbs. of pulverized bone comprised of calcium phosphate and sodium (*pH of 11.8; 200 - 2000x too alkaline for plants/roots to tolerate*)
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## **Alkaline Hydrolysis** (*water cremation, bio cremation, aquamation, aqua cremation*)

- Emits 150 to 200 lbs. of carbon per person through applying 100 - 300 gallons of 200 - 350° water pressure in a potassium hydroxide alkaline solution (*lye*) for 3 - 12 hours
  - Cytotoxins and embalming fluid neutralized; mercury captured but not mitigated
  - Uses 80% less energy than flame cremation; emits 20% less CO<sub>2</sub>
  - Leftover: 100 - 300 gallons of effluent, no current regulations for safe disposal
  - Final product: 10 - 15 lbs. finely pulverized bone (*20 -32% more than flame cremation, needing larger urns*)
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## **Human Composting** (*natural organic reduction (NOR), terramation, soil transformation, Precision Organics*)

- Carbon emissions inestimable at this time that include:
  - Industrial facility construction if in an urban or suburban setting
  - Commercial production and transport of feedstock and bulking agents such as alfalfa and wood chips used for the composting process (for reference, alfalfa production uses a third of the water needed for livestock irrigation which accounts for 86% of the water draining the Colorado River Basin)
  - Fuel to transport and dispose of a pick-up truck's load quantity of leftover composted material for each composted body to a separate location
  - Resulting composted material can be retained by the family or donated.
  - Material may be disposed of on established, non-profit conservation property to support soil restoration in depleted areas (*beware of surface dumping that is not part of a conservation plan*).
- Takes 2+/- months for microbes to break down tissue
  - Low impact if managed as natural decomposition in a non-industrial setting
  - Fuel costs to control temperature, humidity, and other facility functions in industrial facilities
- Bones removed, pulverized, returned to mix
- Final product: 1 - 1.5+ cubic yards leftover composted material to transport (*approx. 1,685.55 lbs./+ disposed of pp, or one truckload*)