

## 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, in conjunction with land trusts<br>+Strategic component of a complete land conservation plan. | +Land protection<br>+Nutrient contributions to soil communities                                                                                                                                                               |
| <b>Human Composting</b>    | —Indeterminate greenhouse emissions.                                                                                                                    | —Scope 2: Sowing, watering, harvesting, processing, transporting of alfalfa, wood chips, bulking agents to facility; storage.<br>—Scope 1: Heating, cooling, maintenance of facility and its operating units.<br>—Scope 1: Transporting of finished material. | —1+ cubic yard of leftover material.<br>—10 to 15 lbs. pulverized bone ( <i>calcium phosphate and sodium, 11.8 pH, 200 to 2000 x what plants can tolerate</i> ). | -0-                                                                                                       | —Materials acquisition.<br>—Facility maintenance.<br>—Trucking of leftover materials.<br>—Smothered plant and soil communities if surface disposal.<br>+Restoration of depleted soil if intentionally tilled or incorporated. |
| <b>Alkaline Hydrolysis</b> | —Up to 150 lbs. CO <sub>2</sub> per person.<br>—Most AH waste will be turned into carbon and nitrogenous GHG by public wastewater treatment facilities. | —Scope 1: Electricity or propane to heat 100 gallons of water under pressure 3-12 hrs.<br>—Scope 2: Processing and transportation of potassium hydroxide ( <i>lye</i> ).                                                                                      | —100 to 300 gallons of effluent.<br>—10 to 15 lbs. pulverized bone ( <i>calcium phosphate and sodium, 11.8 pH, 200 to 2000 x what plants can tolerate</i> ).     | -0-                                                                                                       | —Potential algae bloom from phosphorus run-off due to scatterings.<br>—Tree root girdling from burial close to tree roots.<br>—Disposal of effluent (no state EPA has permitting).                                            |
| <b>Flame Cremation</b>     | —Up to 250 lbs. CO <sub>2</sub> emissions per person.<br>—Mercury, particulate emissions into air and waterways.                                        | —Scope 1: Up to 500 gallons of fuel, usually natural gas, to burn at 1700 to 2000° for 3-4 hours.                                                                                                                                                             | —7 to 10 lbs. pulverized bone ( <i>calcium phosphate and sodium, 11.8 pH, 200 to 2000 x what plants can tolerate</i> ).                                          | -0-                                                                                                       | —Potential algae bloom from phosphorus run-off.<br>—Tree root girdling from burial close to tree roots.<br>—Mercury poisoning of air and water.                                                                               |

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**For State-based, non-commercial information** on care for the dead, go to New Hampshire Funeral Resources at [nhfuneral.org](https://nhfuneral.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* <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)*