

# Building a Jean Pain Compost Heat Mound

The Energy & Heat chapter's Tier 3 Biomass Processing item is about squeezing more usable heat out of a finite woodlot. This is a different way to do exactly that: a large mound of chipped wood that generates its own sustained heat through decomposition, with water-filled tubing coiled through it to pull that heat out as hot water. It's also a real option for extending Utah's short growing season, the same goal behind the Water & Food chapter's Greenhouse / Season Extension item; see Building a Walipini for a real passive-only design this mound can add active heat on top of. See Stirling Engines for the honest reality of trying to pull electricity back out of this mound as it cools, rather than just heat.

## Where this comes from

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The method is named for Jean Pain, a French innovator who built large compost mounds on his land in southern France through the 1970s. His own account, documented in his book *Another Kind of Garden*, describes a mound roughly 18 feet across and 9 feet high, built from around 50-60 tons of chipped brushwood, that produced 140-145°F water at close to a gallon a minute, continuously, for as long as 18 months. He used that hot water for washing, cooking, and heating his home, and separately fed some of the same chipped material into an anaerobic digester to produce methane for a generator, a stove, and his truck.

### Treat Jean Pain's own numbers as a ceiling, not a guarantee

Those figures come from his own account, not an independent or peer-reviewed study. The best real-world replication found for this guide, a compost heat mound built at Western Michigan University's Gibbs House to heat a hoop house through winter, used a smaller mound (roughly 13 feet across, 6.5 feet high) and reached soil temperatures of 40-70°F, useful for season extension, but far short of Jean Pain's domestic-hot-water numbers. Other documented backyard-scale builds land in between: a roughly 6-ton test mound produced water around 85°F at a 2-gallon-per-minute draw (up to 112°F when the loop sat stagnant), and froze up partway through winter; a separate backyard builder reported 145°F for the first 4 days, settling down to a sustained 110-115°F after that. Mound size, chip quality, climate, and insulation all matter, and a smaller or less carefully built mound will produce less heat for less time. Plan around this realistic range, not Jean Pain's own best-case historical figure.

## How it actually works

Microbes breaking down the carbon in wood chips release heat as a byproduct, the same reaction behind any hot compost pile, just deliberately scaled up and insulated to sustain it for months instead of weeks. A coil of tubing buried in the pile acts as a heat exchanger: water (or an antifreeze loop) circulates through the coil, picks up heat from the surrounding compost, and comes out the other end hot.

| Component            | What it needs to be                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feedstock            | Chipped or shredded brushwood and small branches, not whole logs; a wood chipper is effectively required. A high carbon-to-nitrogen mix (wood chips) generates more sustained heat than a nitrogen-heavy mix (fresh manure or grass alone). It must be freshly chipped, green wood, not dried or seasoned: green wood runs close to 100% moisture content relative to a tree's dry weight, versus roughly 20% for seasoned wood, and that moisture and the still-active cambium underneath the bark are what feeds the microbial reaction. A pile built from seasoned or dried chips largely won't heat up at all. |
| Moisture             | Damp but not soggy, roughly the wrung-out-sponge feel used for any hot compost pile. Too dry and microbial activity stalls; too wet and airflow drops, which also stalls it.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Chip volume needed   | Wood chips run roughly 20 lb per cubic foot dry, up to 40-60 lb per cubic foot once saturated with water. Convert a target mound's length x width x height in feet, divided by 27, to get cubic yards of chips to source. A documented real backyard build used a 10x10x15 foot chip pile as its material source, a useful concrete anchor for what a serious build actually requires.                                                                                                                                                                                                                             |
| Mound size           | Documented builds range from about 6 feet across up to Jean Pain's original 18-foot mound. Bigger mounds hold heat longer, since the pile's own mass insulates the hot core, but need proportionally more chipped material to build, and see the fire-risk sizing note below before building at the larger end of this range.                                                                                                                                                                                                                                                                                      |
| Heat-exchange tubing | PEX or CPVC, or the black polyethylene tubing commonly used for drip irrigation. Standard PVC is not a good choice here, see below. Plan on roughly 300 feet of 1-inch tubing for a mound with about a 7-foot radius, coiled with about 7 inches between each pass; a smaller or larger mound scales this length roughly with its coil surface area, not its overall volume.                                                                                                                                                                                                                                       |

## Building it

1. Chip or shred brushwood down to a consistent, small size; this is the single biggest driver of how fast and how hot the pile heats up.
2. Build a rough frame (a cylinder of chicken wire and stakes, or a bamboo/wood form) to hold the pile's shape as you fill it.

3. Fill in layers, wetting each layer as you go, and coil the tubing through the pile as you build, starting near the base and spiraling upward with roughly 7 inches between adjacent coils, rather than trying to thread it through after the fact.
4. Cap and compact the outside of the mound to hold moisture and insulate the core; a finished mound should feel firm, not loose and airy.
5. Connect the tubing ends to your water system (a simple gravity-fed loop to a storage tank, or a pump loop) and give the pile one to two weeks to reach working temperature before expecting useful hot water.

**WARNING**

**Large wood-chip piles have a real, documented fire risk, and it's in real tension with building one big enough to work**

Spontaneous combustion in large compost and wood-chip piles is a well-documented hazard, not a theoretical one: internal temperatures above roughly 158°F meaningfully raise the risk, especially in piles that are large, dry on the outside while insulated and hot inside, or unevenly mixed. Standard fire-safety guidance for wood-chip and mulch piles calls for keeping any pile at least 15 feet from structures, fences, or anything else flammable, and for capping individual pile dimensions to roughly 4-6 feet high, 6-10 feet wide, and 10-30 feet long specifically to limit how much heat and flammable material sit in one contiguous mass. That's smaller than several of the mound sizes described above, including Jean Pain's own 18-foot mound, and there's no way around the tension: a mound built at that scale for maximum heat output is also a larger fire risk than standard guidance recommends for a wood-chip pile. If you build at the larger end of the size range above, treat the 15-foot clearance as non-negotiable regardless of pile size, monitor internal temperature if you can (a long compost thermometer is cheap), and keep the pile's moisture consistent rather than letting it dry out and reheat unevenly after rain; if you want to stay inside the standard fire-safety dimension caps, plan around the smaller, hoop-house-scale output described below rather than Jean Pain's own numbers.

**Why not standard PVC**

Standard PVC pipe is only rated for sustained use up to about 140°F, right at or below the temperatures this method is meant to produce, and heat exposure over time makes PVC brittle and prone to failure. PEX and CPVC both tolerate higher sustained temperatures and are the better choice for tubing that will sit inside a hot compost mound for months at a time.

## The methane half: a separate, higher-hazard system

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Jean Pain's full method also included feeding material into a sealed anaerobic digester to produce biogas (roughly 60% methane, 40% carbon dioxide, with trace hydrogen sulfide), which he burned for cooking, electricity, and vehicle fuel. That's a materially different and more hazardous project than the compost mound above: biogas is explosive in roughly 10-30% air concentrations, requires gas-tight construction, pressure relief, and monitoring, and needs spark-free equipment and no open flame anywhere nearby. This guide deliberately doesn't walk through building one; treat a home biogas digester as a distinct, advanced project requiring its own dedicated study, not an add-on to a weekend compost-mound build.

## Sources

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- Jean Pain's original design, output figures, and duration: Wikipedia, Jean Pain; Walden Labs; Jean Pain, *Another Kind of Garden*
- Modern build technique and dimensions: Midwest Permaculture
- Independent replication and real-world output (Gibbs House hoop house study): Western Michigan University, Gibbs House Compost Heat Recovery System report
- Spontaneous combustion risk in compost/wood-chip piles: BioCycle
- Pipe material temperature ratings: The Engineering Toolbox; FlowGuard Gold, PEX vs. CPVC
- Biogas composition and explosion/safety hazards: Farm Energy (eXtension)
- Pipe coil spacing and tubing-length sizing: Walden Labs; Mother Earth News
- Wood chip weight per cubic foot and a documented 10x10x15 foot chip-pile build: Cornell Small Farms Program
- Fire-risk clearance and pile-dimension caps for wood-chip and mulch piles: Safety Insurance
- Documented backyard-scale output figures (6-ton test mound and a second private build): Mother Earth News
- Green vs. seasoned wood moisture content: Wikipedia, Green wood