Vacuum-Bag Lumber Kiln on a Concrete Pad Using Wood Fired Boiler Water Heat

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https://globalmicroturbine.com/vacuum-bag-kiln-energy-wood-boiler-by-global-energy.html

Trade the steel pressure vessel for a concrete pad. A flat, reinforced pad and a vacuum bag can dry lumber by the same physics as a commercial vacuum kiln — draw down the pressure, drop the boiling point of water, and pull moisture out at 140 F instead of 200 F. We ran the numbers for a 5,000 board-foot charge using USDA Forest Products Laboratory data as the baseline: 3,363 kWh of heating energy, a 101.5 kW peak load on the resistance blankets, a 10 hp vacuum pump, and a 110 kW connected service — all to dry a charge in 58 hours instead of 12 days.

This webpage QR code

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Electrical Savings per Year Using Wood Boiler for Heat Source

Running back-to-back with no turnaround loss, the kiln completes 151 charges a year (58-hr cycles, 8,760 hrs/yr) — about 755,000 board feet.

Electric resistance design: 530,886 kWh/yr → $58,397/yr at $0.11/kWh.
Wood-fired hot water design (pumps + controls only): 43,785 kWh/yr → $4,816/yr.

Annual electrical savings: 487,101 kWh, or $53,581/yr (92% less grid electricity).

That comes at the cost of about 95 cords/yr of wood fuel. If that wood isn't actually free and you priced it at $200/cord ($19,030/yr), the wood-fired design still comes out $34,551/yr ahead of the electric design (59% total cost savings) — the boiler fuel is just cheaper per delivered BTU than grid electricity even when it isn't free.

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