

Caluwe, Inc.

Storage Bin for Wood Chips with Integrated Drying System

Innovation in Biomass Fuel Supply, Storage and Delivery

We all agree: we can't burn water! The same is true for wet wood Chips

Technical Background: EVAPORATION of WATER IN WOOD CHIPS

1 TON (2,000 Lbs) of wood chips at 50% WC (100% MC) > **1,000 Lbs of water** AND 1,000 Lbs of wood

1 TON (2,000 Lbs) of wood chips at 23% WC (30% MC) > **460 Lbs of water** AND 1,540 Lbs of wood

To dry the wood chips from 100%MC to 30%MC we need to **EVAPORATE** 1,000 - 460 = **540 Lbs of water**

Technical Background: DRY WOOD CHIPS HAVE A MUCH HIGHER HEATING VALUE

Pine chips at 50% WC (100% MC) > 2.30 kWh/kg or 3,530 BTU/Lb

Pine chips at 23% WC (30% MC) > 3.49 kWh/kg or 5,360 BTU/Lb

By drying the wood chips from 100% MC to 30% MC the **HEATING VALUE INCREASED by 52%**

Source: www.biomasseverband-oec.at

ADVANTAGES ?

- Dryer wood chips = lower emissions (optimal MC for most European wood chip boilers is between 25%-30%)
- More heating energy out of fewer chips
- Fewer wood chips need to be transported
- Use of less wood chips = conservation of fuel resource
- Use the wood chips as a thermal storage
- This results in longer run time of the wood chip boiler
- Drying process can be fully automated
- Including moisture measurement
- Additional benefit is protection against freezing of the wood chips

What does it cost to bring the MC down from 50% to 30% ?

To evaporate **1 Litre of water** we need **0.6 kWh thermal energy** (hot water from boiler)

To evaporate **1 Litre of water** we need **0.02 kWh electrical energy** (Blower fan)

Source: <http://www.holz-kraft.de> At 100% process efficiency

540 Lbs of water = 243 Litre of water * 0.6 kWh/L = 146 kWh_T = 500,000 BTU_T

540 Lbs of water = 243 Litre of water * 0.02 kWh/L = 5 kWh_E

Thermal Energy cost per unit = \$0.04/kWh_T * 146 kWh_T = \$5.84

Electrical Power cost per unit = \$0.25/kWh_T * 5 kWh_T = \$1.25

Total Drying Cost = \$7.00 per TON of chips * 50% process efficiency = \$10.00 per TON

Cost of wood chips in MA ?

30 TON truck load of 100% MC Biomass Chips = \$1,000 > \$33.00/TON + \$10.00 = \$43.00/TON

30 TON truck load of 100% MC Bole Chips = \$1,500 > \$50/TON + \$10.00 = \$60.00/TON

HEAT LOCAL = Get your wood chips from local landscaping companies, arborists or mulch companies

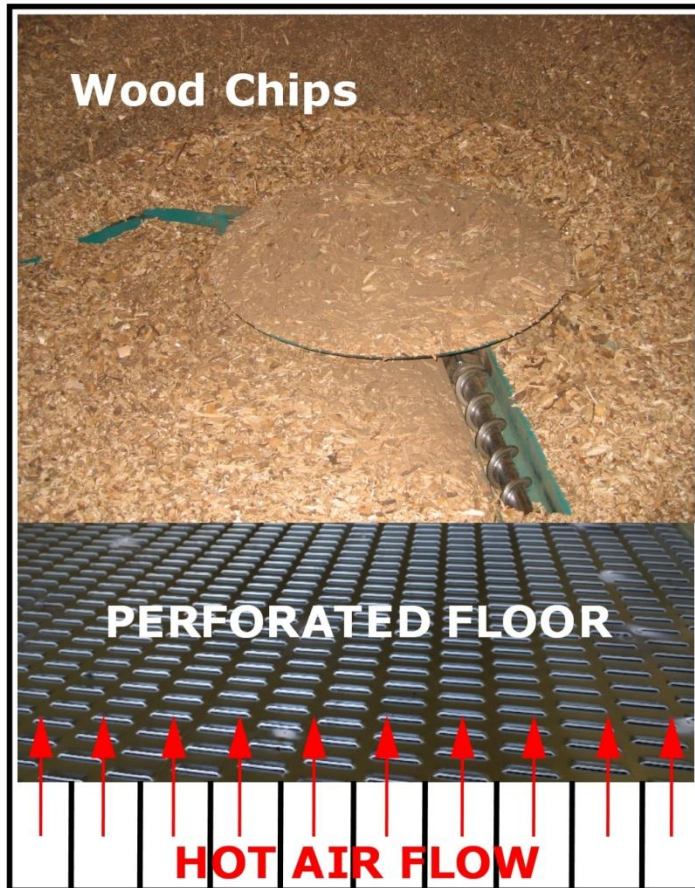
CALUWE

Biomass Heat & Power Solutions

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STORAGE BIN FOR WOOD CHIPS WITH INTEGRATED DRYING SYSTEM



WE ALL AGREE:
We can't burn Water!
The same is true for
WET WOOD CHIPS

DRYING BIN ADVANTAGES:

- Drier wood chips = lower emissions
- More heating energy out of less chips
- Less wood chips need to be transported
- Use of less wood chips = conservation of fuel resource
- Use the wood wood chips as a thermal storage
- This results in longer run time of the wood chip boiler
- Can be fully automated
- Moisture measurement
- Freeze protection



Water-to-Air-HX
Hot water comes from wood chip boiler

HEAT LOCAL = Get your wood chips from local landscaping companies, arborists or mulch companies

WOOD CHIPS STORAGE BIN

- Modular: 8x8, 10x10, 12x12, 16x16 or 20x20
- All Materials are readily available
- Location of bin can be outside or inside or even in transportable containers

IASCO

Heizomat

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SINCE 1921
HEAT WITH VISION