

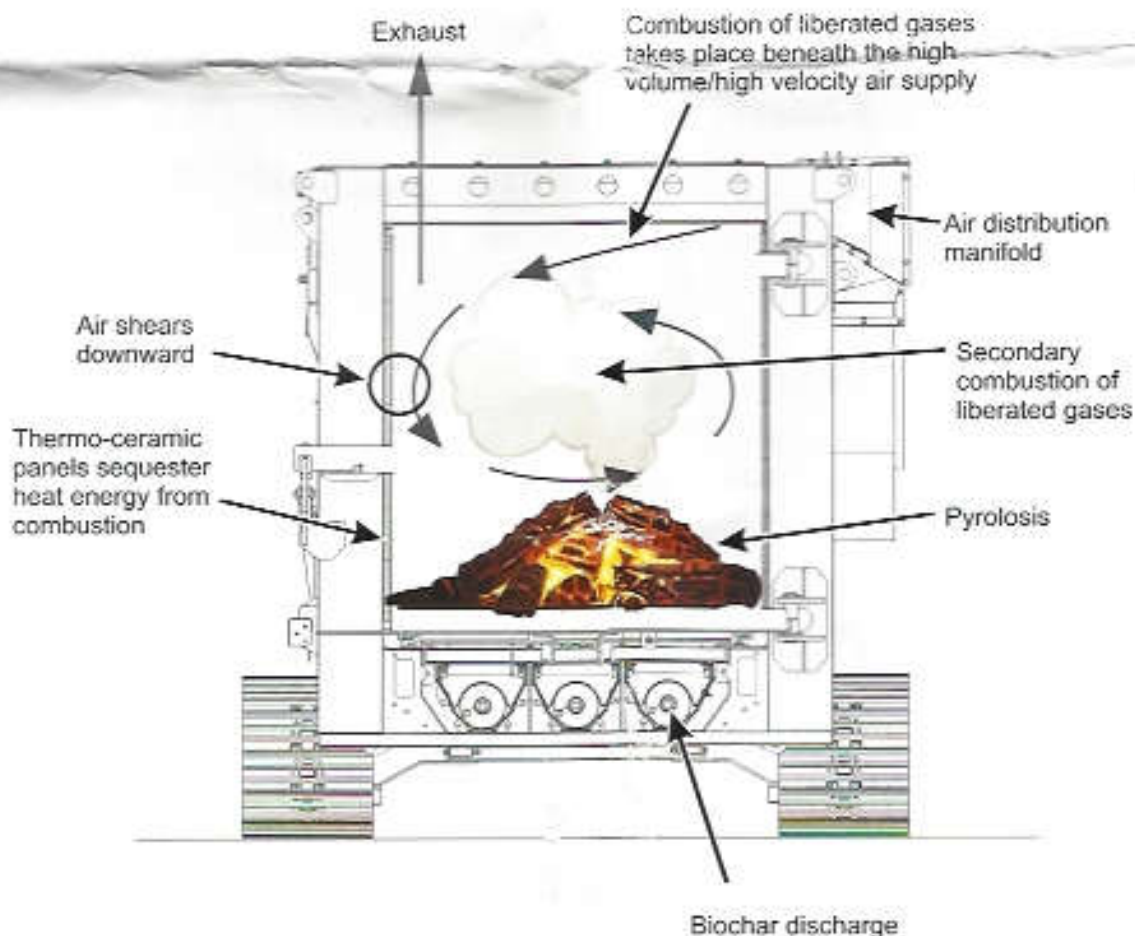
Introducing 6050 Carbonator

The 6050 carbonator is the most advanced, cost-effective and environmentally friendly clean wood debris conversion system on the market. The carbonizing process reduces wood debris down to 5% to 7% of its original volume.

6050 key selling points

- **Quick, efficient volume reduction** – Reduce wood debris by approximately 90% without processing or disposal costs and very low operating costs.
- **High processing capacity** - Wood debris is carbonized at high throughput rates, and with no material pre-processing required
- **Environmentally friendly** – Large blower recirculates air for re-combustion and keeps smoke inside the carbonizing chamber.
- **Carbon-based output** - Often referred to as biochar, the end product is a carbon-based material which can be used in soil and water remediation.

What is Carbonizing?





Carbonizing is the process of reducing wood debris through Pyrolysis, which is the decomposition of organic materials at very high temperatures, under oxygen deprived conditions. The Carbonator uses two large blowers to provide over air and under air which assist the combustion process and create ideal conditions for carbonizing. The biochar drops through a bottom grate and is cooled by water jets as augers move it out the discharge area.

Uses for biochar

Remediation of soils - Biochar's large porous surface area allows it to absorb heavy metals and organic pollutants. It is an alkaline material which can increase soil pH and help stabilization of heavy metals.

Remediation of water - Organic and non-organic pollutants in contaminated water can be immobilized through biochar filtration.

Landfill Leachate - Landfill leachate treatment is necessary to remove various organics and contaminants that can have an environmental impact on groundwater and surface water, and in turn have a negative impact on human health.

Soil amendment - Biochar reduces acidity, accelerates decomposition, and provides habitat for microorganisms, which in turn help increase plant productivity. The porous structure of biochar increases soils water holding capacity, while at the same time improves drainage of standing surface water.

Air filtration - The porous structure of biochar allows it to remove bacteria, harmful pollutants, and allergens from the air. It also absorbs moisture, preventing mold and mildew. Biochar filters can be easily removed and re-used.

What can be carbonized?

- Clean wood and vegetation such as logs, limbs, stumps, branches and yard waste.
- Unpainted, untreated or uncoated wood debris such as dimensional lumber or pallets.

Use caution

- Dense debris such as dense wet grass clippings and leaves
- Manufactured wood such as Plywood or particle board
- Dirt - Pick debris from the top of the pile avoiding large amounts of dirt

Do not use

Painted, coated and treated wood such as Railroad ties, utility poles, and pressure treated wood



Service and maintenance

Replacement parts

Qty Anually	Description
9	Oil Filter
9	Fuel Filter
9	Fuel/Water Separator
4	Inline filter
4	Primary air filter
4	Secondary air filter
2	Breather filter
4	Return filter, hydraulic tank element
4	High pressure filter element
4	Parker filter element
36	Auger/conveyor trough wear strips
4	Replacement grate inserts

The thermoceramic side panels have a life of approximately 10,000 hours. scratches and gouges can be filled using a trowel and suitable patching compound.

The bottom grates are the most frequently replaced part at 2000 to 3000 hours. The grate consists of 4 pieces.

Maintenance intervals and procedures are listed in the machies operator's manual.

Engine

Caterpillar C4.4 ACERT 148 HP at 2200 RPM, intermittent "C" rated EPA TIER 4 FINAL

WARRANTY

The standard warranty period is 24 months at 3000 hours, or 12 months at unlimited hours, after date of delivery to the first end-user. See attached Caterpillar Warranty Statement SELF5611 for further details. We would be glad to quote Caterpillar Extended Service Coverage (ESC) upon request. The equipment quoted is covered solely by the manufacturer's standard limited warranty. Copies are available upon request. Caterpillar Limited Warranty is also available at www.toromontwarranty.com. All other warranties, express or implied, are hereby specifically excluded. Non-Caterpillar supplied items subject to individual vendor warranty.



Carbonization is achieved through the pyrolysis process.

All functions can be controlled using the radio remote.



An optional conveyor or quenching auger are available for managing the end product.

6050 Carbonator FAQ

What is the material throughput? - Average in-feed rate is 17 to 20 tons per hour.

What is the average yield of end product for a carbonizing cycle? - 20 tons of wood debris in will produce about 4-5 yards of end product (biochar).

What is the water supply requirement? - Approximately 12 litres per minute (3 to 5 gpm).

What is the operating temperature of the 6050? - The operating temperature can reach up to 1540°C (2800°F).

Are there different bottom grates available? - Yes, there are different bottom screen with different sized openings which will alter the char size and throughput rate.

How often do the bottom grates last? - Grates will last 2000 to 3000 hours.

How long do the thermoceramic panels last? - The panels have a lifespan of approximately 10,000 hours, and can be easily repaired if cracked or chipped.

Is the IQAN control system similar to other Tigercat machines? - Yes, it is an IQAN MD4 system.

What is the the carbon content of the end product? - The carbon content of the output material is dependant on the in-feed material. It is generally in the 80 to 90% range.

What types of materials can be carbonized?

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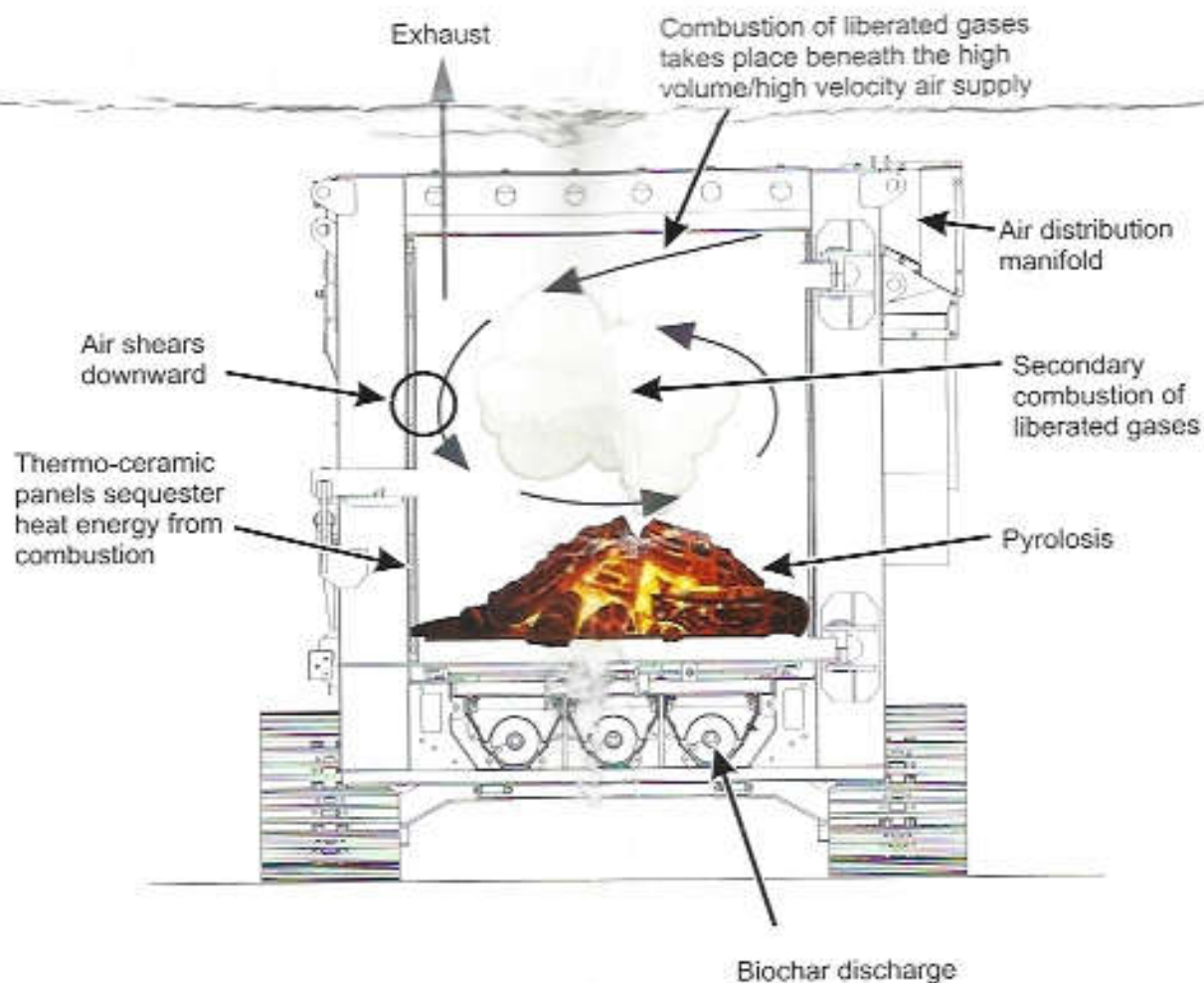
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What is the fuel consumption during the carbonizing process? - It is approximatley 20 litres per hour (5 gph) for the 148 hp Tier 4 final engine.

Is any other fuel required to start and maintain the carbonizing process? - The only fuel that is required is an accelerant (diesel fuel) and the propane "weed burner torch" to get the initial fire started within the carbonizing chamber. Once ignited, the wood debris is the fuel source for the carbonizing process.

I've read that biochar is produced using a process called pyrolysis, where the biomass is burned in a low oxygen closed environment, preventing complete combustion. How does the carbonator with airflow and an open top produce the same end product? -

In the lower portion of the Carbonator combustion chamber the process is oxygen starved, ie a pyrolysis condition exists. We can only introduce enough air/oxygen to the upper part of the combustion chamber for a complete and efficient combustion process of the released gases but not enough in the lower portion to convert the volume of debris we currently do, into ash. By design we don't want to combust the woody biomass to completion, instead we want to preserve the carbon in the biochar with the result being both Biochar production and throughput.



CARBONATOR™ 500

Mobile Carbonizer

***ROI's Revolutionary Carbon Negative Solution
to Cost Effective Conversion of Wood Debris to...***



...Biochar - Activated Carbon

Char shown in actual size

CARBONATORTM 500

Mobile Carbonizer

The Future of Wood and Vegetative Debris Conversion

The mobile and stationary CARBONATOR is the most advanced, cost-effective and environment- friendly wood debris conversion system ever built. Wood and other suitable biomass is converted into a high-quality biochar at high throughput rates, utilizing the biomass as its own fuel source for Carbonizing. Designed to accept trees, brush, stumps and other wood debris without grinding or chipping.



Large Open Feed Area



Char Conveyor with Metal Separation



Easy Removal Grate



Live Stream Video Monitoring

CARBONATOR Benefits

- The wood and vegetative debris are the fuel supply for the carbonizing process.
- Designed to provide the largest transportable mobile machine for high sustainable processing capacity and superior end product.
- Track mounted to allow for direct re-introduction of high-quality biochar to forest or agricultural land where conversion is taking place.
- Designed to be easily moved on common lowboy trailers.
- Pre-heated under chamber air for maximum conversion efficiency.
- Live stream video monitoring of carbonizing chamber providing operator full visibility for ease of feeding.
- Extremely low operating cost, simple and easy single person operation.
- Eliminates processing, transportation and disposal costs.
- A natural process that converts biomass into a high-quality product.

CARBONATORTM 500

Mobile Carbonizer

ROI's team spent the last few years designing and constructing the carbonizer line of equipment to address the challenges associated with reducing the carbon process footprint from commonly accepted, but in reality, poor management of wood debris.

ROI's patent pending Carbon Negative Process is the only available Single-Step recycling system that reduces the processing carbon footprint to less than neutral, having a net effect of removing CO₂e emissions from the atmosphere. All other available processes add CO₂e emissions, some much more significant than others.

The CARBONATOR 500's carbon negative technology properly reduces volume by approximately 90% while recycling debris into a valuable high grade Activated Carbon or Biochar, based on the customers desired material outcome.

Carbon Process Footprint Comparisons:

When wood and vegetation is converted to biochar utilizing the CARBONATOR 500 the process footprint is **NEGATIVE**, 240-330lb of Atmospheric CO₂e is **reduced** per ton of carbonized debris.
PM: 1-2lb./ton



When wood and vegetation is turned in to compost, the Carbon Process Footprint is **Positive**, 2,000-2300lb of Atmospheric CO₂e is **added** per ton of composted debris.
PM: 15-20lb./ton

When wood and vegetation is turned in to mulch, the Carbon Process Footprint is **Positive**, 2,000-2300lb of Atmospheric CO₂e is **added** per ton of mulch produced.
PM: 30-40lb./ton

When wood and vegetation is turned in to and used for fuel for heat/electric generation, the Carbon Process Footprint is **Positive**, 50-100lb of Atmospheric CO₂e is **added** per ton of combusted fuel.
PM: 15-20lb./ton

When wood and vegetation is landfilled while used as daily cover, the Carbon Process Footprint is **Positive**, 2,000-2100lb of Atmospheric CO₂e is **added** per ton of raw material processed and deposited.
PM: 15-20lb./ton

When wood and vegetation is directly landfilled, the Carbon Process Footprint is **Positive**, 1,900-2050 lb. of Atmospheric CO₂e is **added** per ton of deposited material.
PM: 2-3lb./ton

Biochar Benefits

Biochar is the solid product remaining after the biomass is carbonized. Biochar is characterized by high porosity and a high-specific surface area. The porosity and surface area give biochar very favorable properties for adsorption of toxic substances and soil rehabilitation. Biochar sequesters carbon for thousands of years and is resistant to the microbial breakdown that is common with other types of organic matter.

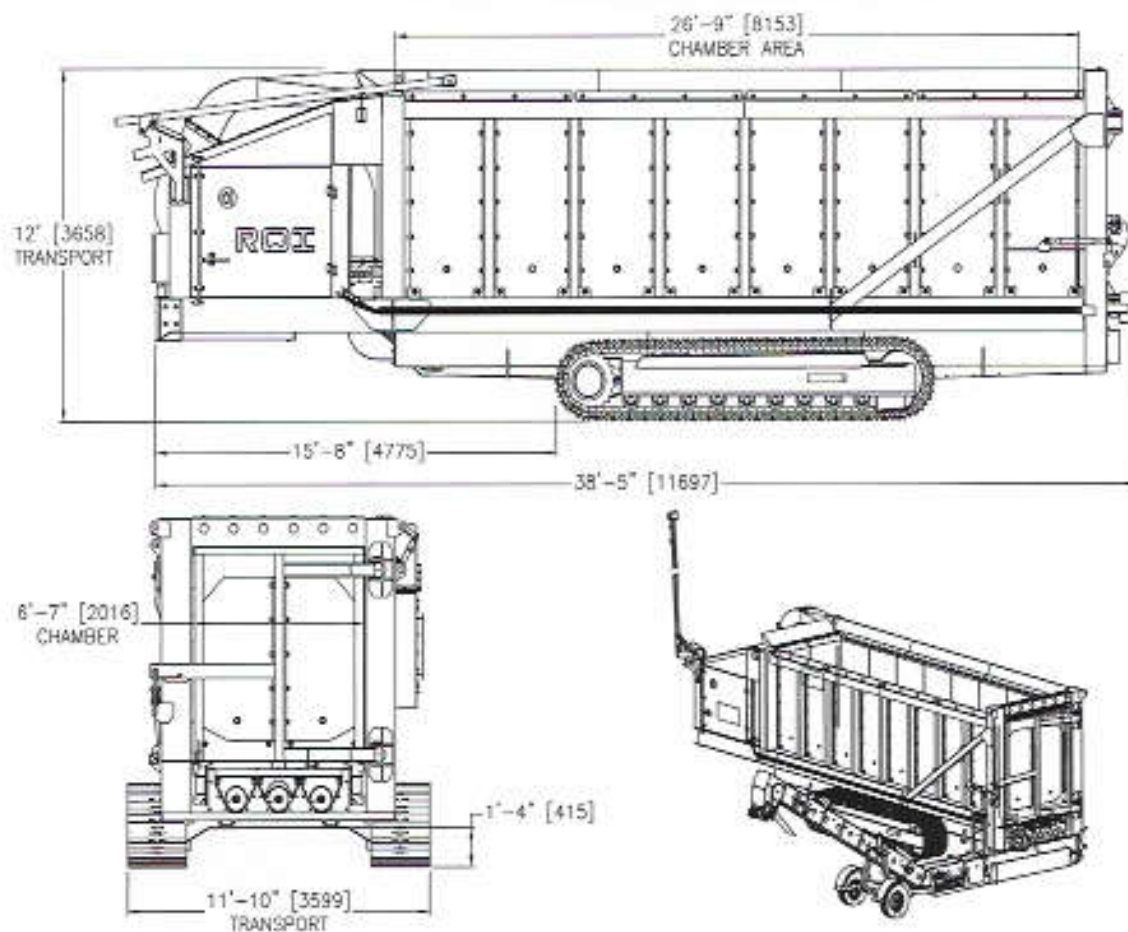
Biochar has many uses, a few notable applications include, Micro-filters, Carbon fertilizer, Compost additive, Substitute for peat in potting soil, Plant protection, and a process to reduce particulate, Carbon Dioxide (CO₂), Methane (CH₄) and Nitrous Oxides (NO_x) emissions from other biomass processes.



*The above emissions values were calculated using published data from the US EPA and other sources.

CARBONATOR™ 500

Mobile Carbonizer



Patent Pending

CARBONATOR 500 Specifications:

Thermo-Ceramic Panels:

Bolt in easily replaceable panels rated to 1650 degrees C. (3000 degrees F.)

Blower:

Two hydrostatic driven blowers for maximum carbonizing control and efficiency

Engine:

Caterpillar tier 2 / tier 4 (124-148hp.)

Tracks:

Berco B5 with two speed motors, 700mm (27.5") wide track pads.

Hydraulic System:

High pressure hydrostatic and open loop piston pumps for blowers and all other functions. 250 liter (55gallon) oil reservoir, oil cooler.

Char Handling System:

One rear carbonizing chamber access door. Three horizontal biochar augers that discharge out the rear of machine. Air cooled char troughs with water injection nozzles for instant quenching of char. Quick interchangeable grates for various size biochar and easy clean out of non-combustibles.

Electrical System:

IOAN PLC with radio remote control for all functions. Camera mounted on hydraulically operated arm to stream video to monitor in cab of machine feeding.

Total Weight:

39643-41500Kg (87400-91300lbs.)

Fuel Tank:

465 Liters (123 gallons)

Optional:

Heat exchanger for water or oil, ORC electric generating module, Automatic propane ignition system, available stationary with electric drives.

ROEI
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