



**COMMERCIAL PROSPECTUS**



## Company Background

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### **‘Committed to producing high quality, environmentally friendly Activated Carbon’**

Karbotech Carbon Technologies was originally founded in 2001 with the objective of producing high quality, environmentally friendly Activated Carbon. This is being achieved through the use of industry leading technology and processes.

The Adsorption Industry, established many years ago, until relatively recently neglected the use of organic material such as wood for producing high purity Activated Carbon on a large scale. The main reason being that desired constant quality raw material was unobtainable and the correct technology not available. Karbotech however enjoy exclusive use of world wide patented processes for the production of a highly de-volatised, enriched premium quality charcoal. Wood is an ideal raw material for use in this technology and sustainable supply is achieved via Karbotech’s business partnership with SAPPI forestry in South Africa. Furthermore the Karbotech carbonisation technology can be used in conjunction with coconut shells, macadamia nut shells and other highly sought after raw materials.

Carbonised materials are processed via a standard rotary kiln steam activation unit to produce a high quality Activated Carbon for use in premium grade applications throughout the food, beverage, automobile, natural gas and pharmaceutical industries.

One of the most important aspects of carbon production throughout the world is the environmental concerns over its production. The USA EPA controls are some of the strictest in the world and hundreds of charcoal manufacturers have been closed down over the past few years, due to environmental issues. The Karbotech process is both environmentally friendly and energy efficient in this regard.

Furthermore strict local South African Environmental Laws (Environmental Impact) have been adhered to in full.

The company has its roots very firmly in South Africa and is committed to the development of the local economy by providing jobs and export demand for its products.

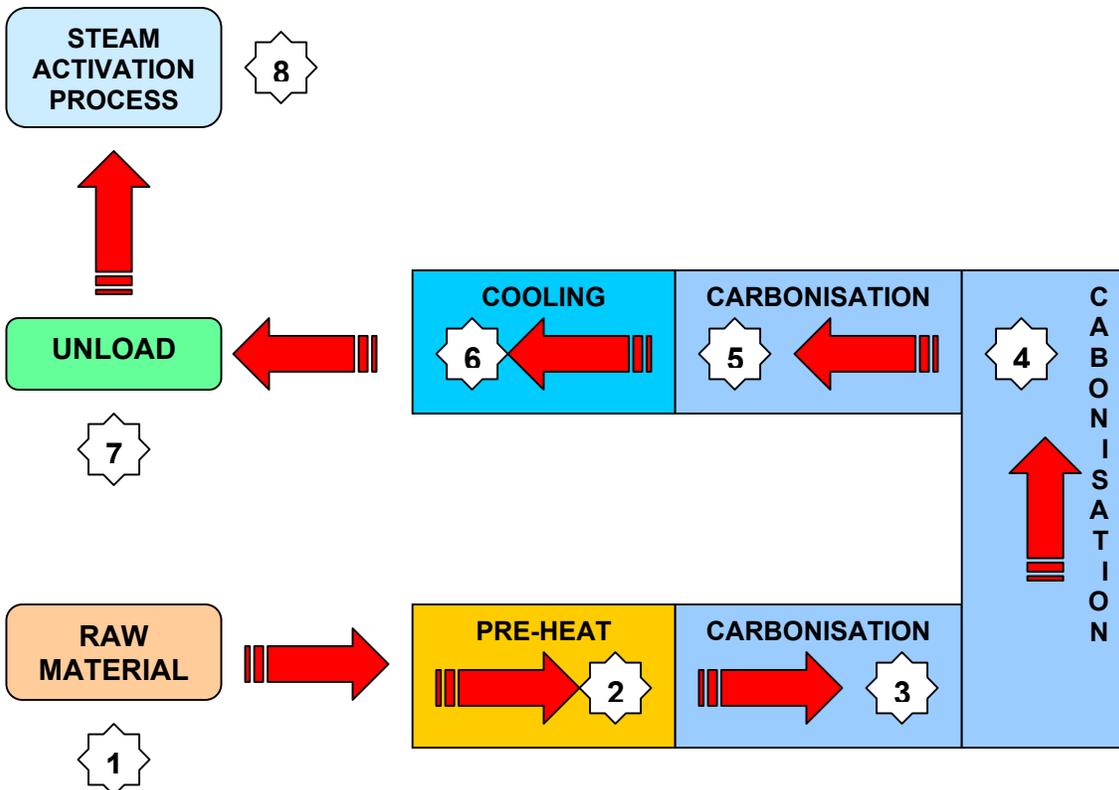
## Karbotek's Patented Carbonisation Process

Carbonisation is the first step in the transformation of [sustainable] wood into high-grade Activated Carbon. This first step takes place in a tunnel system using a continuous self-sustaining process. Proven technology allows for full recovery of all pyrolysis gases of which up to 80% is utilized to provide all energy required for the carbonising process.

Electrical power is limited to requirements of electric motors, electronic instrumentation and lighting.

Production, after an initial start-up period, runs 24 hours a day, on a three-shift basis. Raw material is loaded into steel-framed wagons, which are carried along specially designed tracks within a horizontal U shaped tunnel. This tunnel is configured so that loading of wood and unloading of carbon are made on the same side of the tunnel.

The process flow can be schematically represented as follows:



-  1 Stage one involves the introduction of raw material (wood, coconut shell, Macadamia nuts) into the tunnel system. The raw material is loaded into wagons capacity 4 tons which are then hooked to a continual conveyor system that will take the wagon through each of the tunnel's chambers.
-  2 Stage two involves the gradual heating of the raw material which primarily dries and pre-heats the product.
-  3 Stage three heats (initially via LPG) the raw material to the desired temperature. Pyrolysis will release various gases which are then re-introduced to replace the LPG and create a self sustaining process.
-  4 Stage four continues the pyrolysis process in a temperature controlled environment.
-  5 Stage five continues the pyrolysis process in a temperature controlled environment.
-  6 The cooling chamber at stage six enables the now carbonised product to cool in a controlled manner.
-  7 Stage seven involves the collection of the carbonised product (char), unloading, milling to granular specification in readiness for the steam activation stage.
-  8 The newly produced char granules are steam activated to produce activated carbon.

The time taken for each wagon to pass through the carbonization tunnel varies according to the type of wood being processed (wood properties, size and moisture content) and the quality of the product as required. Total process times for each wagonload vary between 24 and 28 hours, thus it is possible to extract one wagonload of product (approximately 1 ton) about every 60 to 65 minutes.

The production operation is conducted according to the requirements of ISO9002 and all operations from tree planting to final despatch are carried out under an ISO 14001 Environmental Management System\*. The timber is grown applying the FSC principles and criteria and the whole carbon operation will be FSC chain of custody certified.

\* Note at the time of writing Karbotek had yet to complete 6 months commercial operation, a requirement for ISO certification.



## Karbotech Activated Carbon

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Karbotech's Activated Carbon is granular by design. The production process maintains the inherent characteristics of the raw material and is therefore, in the case of wood, high in macro and mesopore structures.

A general outline of the typical properties for Karbotech granular carbon is shown below:

Parameter	Units	Value*
Form		Granular and Powder
N <sub>2</sub> BET area	m <sup>2</sup> per gram	900 / 1200
pore volume	cc/g to 3000 A	0.7 / 1.0
Micropore volume	cc/gram	0.35 / 0.45
Average pore size	Angstroms	40 / 50
Iodine value	mg per gram	1100 / 1300
Volatiles ASTM 5832	%	<5
Ash	%	<2 / <3
pH	pH units	8 - 10
moisture	% as packed	3
Apparent density	g/cm <sup>3</sup>	0.2 - 0.15
Total free space	cm <sup>3</sup> /gram	3 / 4
hardness	%	90
size ranges	mesh	4 x 12 ; 12 X 40



## Applications

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There are many suitable applications for Karbotech's Activated Carbon. We would recommend Karbotech's Activated Carbon be initially considered for:

- Food and beverage decolorisation
- Solvent recovery
- Waste water treatment
- Automotive gas filtration
- Air purification
- Solvent recovery

Furthermore, Kinetic, PSA and Isotherm testing suggests Karbotech's Activated Carbon could also be used in the removal of hydrocarbons in natural gas extraction.

Where part Activated Carbon is purchased then further treatment may gain access to other markets and applications.

Low ash and above average hardness make Karbotech's Activated Carbon durable, highly efficient and suitable for further modification for specialist applications.

Samples are available for additional testing as required.



## **Partner Value Added Services**

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Karbotech have identified the importance of distribution partners in taking its range of Activated Carbon solutions to market. Some of the initiatives we are keen to offer and discuss are outlined below.

### **Joint Marketing**

Whether targeting specific applications or markets Karbotech are keen to pursue joint marketing opportunities as and when they arise. Where joint marketing arrangements involve OEM's then revenue-share agreements may be considered.

### **Exclusive product access**

Karbotech can develop, often in conjunction with a specific partner, products with a unique set of characteristics that are suitable for certain markets and applications. Any products of this nature may be offered under exclusive marketing and royalty arrangements.

### **Standby Stocking**

Standby stock may be made available and be stored at a location agreed by both parties.

### **Bagging**

Karbotech may 'bag, badge and ship' according to agreed terms with a particular partner(s)

### **On-site testing facilities**

All laboratory testing and sampling facilities will be made available to partners upon request.



## **Flexible Business Products**

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We have built our business around three core products.

### **Part Activated Carbon**

Due to the nature of our carbonisation process we are able to produce premium grade carbon that is partly activated. This product is ideal for those organisations wishing to activate and modify the product to suit a specific requirement.

### **Activated Carbon**

Our premium Granular and Powdered Activated Carbon product has been described earlier in this document. This product made to order based on the achievable specifications provided by our customers.

### **Product Integration**

Working with Original Equipment Manufacturers (OEM's) we are able to provide an integrated service whereby base products such as filters can be packed by Karbotech with the required Activated Carbon for immediate shipping as an end-product. Alternatively product can be shipped to the OEM directly.

**This tailored approach is designed to ensure that the right solution is provided consistently, on time and to specification.**



## Further Information

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For all further enquiries regarding Karbotek's products and services please contact:

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