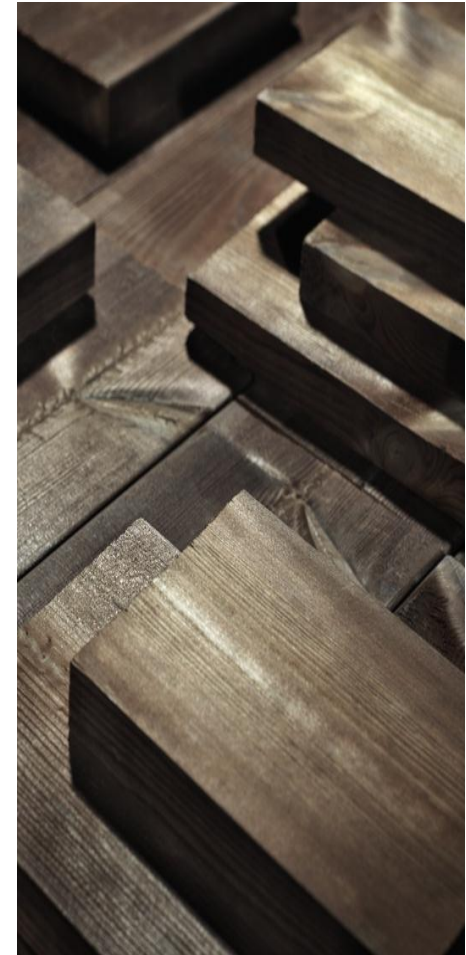


A series of thin, white, curved lines that originate from the top left corner and sweep downwards and to the right, crossing themselves in a decorative pattern.

Kebony
The new wood

Kebony – What we do

- The global demand for tropical hardwood simply cannot be satisfied sustainably - a major environmental issue
- Kebony offers a solution that is;
 - A sustainable and cost efficient alternative to tropical hardwood
 - An alternative to traditional toxic wood protection from impregnation of metal based chemicals
- Kebony's wood modification technology transforms fast growing sustainable wood species into wood which looks, feels and performs like tropical hardwood
- Kebony's mission:
"Kebony shall revolutionize the use of wood by delivering long lasting and environmentally friendly modified wood products high on quality and aesthetics and competitive on price"



The Factory

- Kebony started the construction of a full scale production plant in mid 2007
- Production capacity is approx. 25 000m³ per year
- Plant designed for further expansion
- Previous plant established in 2003



The Kebony process (1/2)

Input

Wood

- Biodegradable
- Mostly soft (European Species)
- Moisture sensitive
- Inconsistent quality

Renewable liquids from biomass

- Processed from plant waste
- Sugar canes
- Corn cobs
- Wood



Technology

Impregnation

- The liquid has the capacity to swell wood cells
- The alcohol polymerizes and the resultant polymer is "grafted" into the cell walls

Curing

- After the impregnation the wood is heat cured to temperatures above 100° C

Drying

- The cured wood is dried and the finished product is ready for shipment



Output

Wood

- Extended lifetime
- Enhanced structural properties
- Consistent quality
- Environmentally friendly



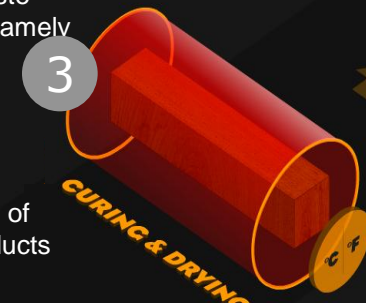
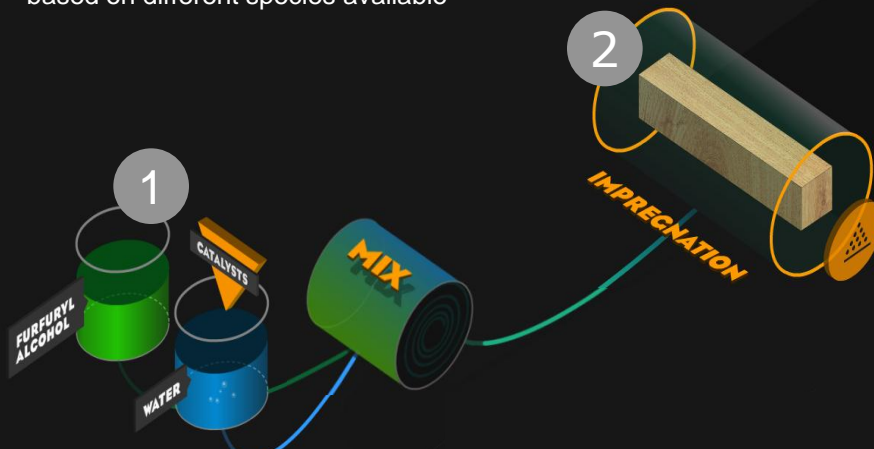
The Kebony process (2/2)

1 Principles

Kebony modifies wood by forming stable, locked-in furan polymers in the wood cell walls. These increase the dimensional stability as well as durability and hardness of the wood. The process is based on impregnation with furfuryl alcohol which is produced from agricultural crop waste. Kebony thus uses a plant derived waste product to give enhanced strength and durability to another plant product – namely wood

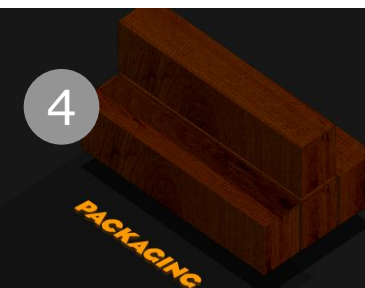
2 Impregnation

In order to reach the required level of polymer in the wood, a traditional impregnation process is used. Although there are constraints in the selection of wood species for a successful impregnation, there is a range of Kebony products based on different species available



3 Curing & Drying

After the impregnation step the wood is heated - whereby the in situ polymerisation of the furfuryl alcohol occurs. This step is referred to as the curing step. The resultant polymer, which is locked into the wood cells, is very stable and will not disintegrate or leak out of the wood



4 Packaging

Finally the cured wood is dried and the finished Kebony product is ready for shipment or further machining

The Key Market Drivers

Tropical wood under pressure

- Traditional tropical hardwood are under pressure and are becoming unacceptable in many contexts for both regulatory and environmental reasons

Preservative treated wood

- A global environmental awakening is pushing for environmentally friendly alternatives to biocides and toxic chemicals for wood impregnation

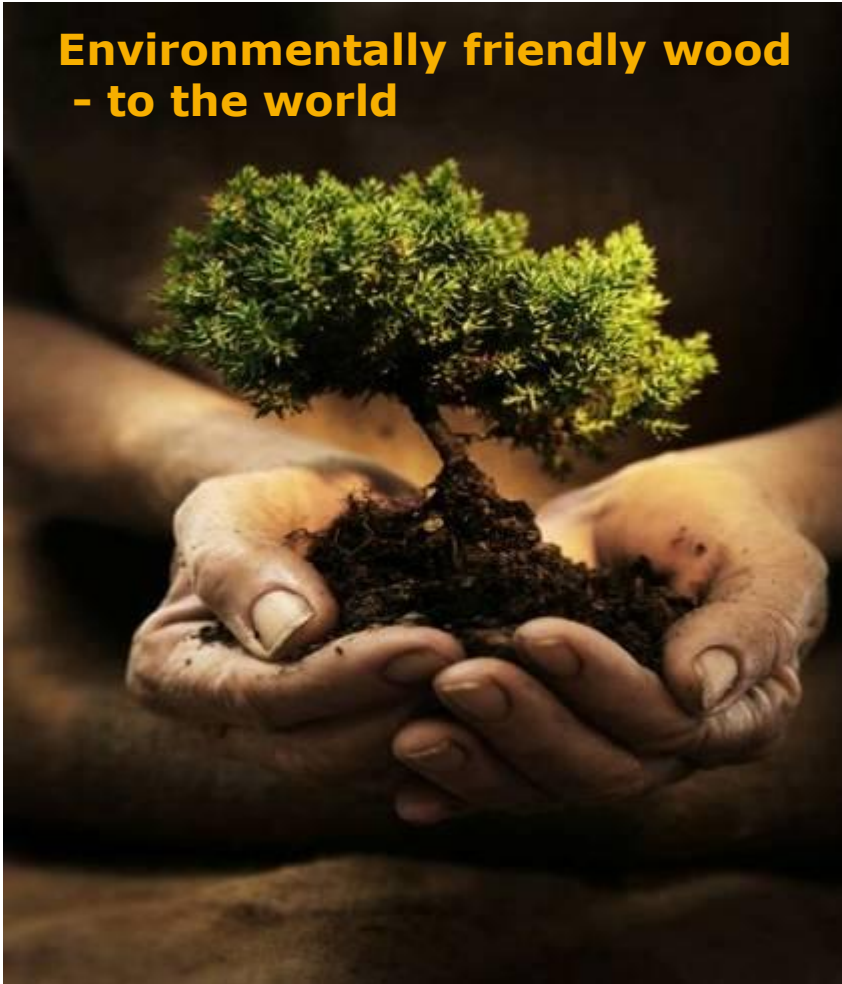
Durability and performance

- There is an increase both in the demand and the need for high performance and low maintenance wooden materials
- Life cycle considerations of both cost and ecological impact is becoming more explicit and transparent as part of building projects and invitations to tenders



The Kebony vision

Environmentally friendly wood - to the world



- Provide beautiful, durable and environmentally sound wood products
- Contribute to a better future by showing social responsibility and awareness for environmental improvements
- Develop profitable technologies, products, installation methods and accessories that revolutionize the use of wood
- Become a strong worldwide brand

Kebony – Public areas



Kebony Cladding

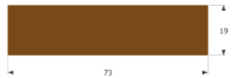
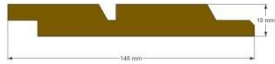

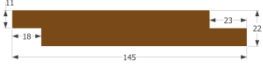
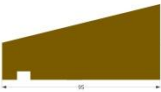
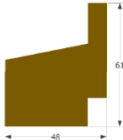
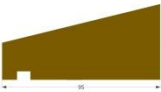


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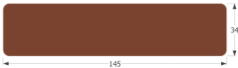
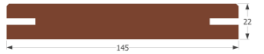



Applications and products

○ Cladding

- Pine Rectangular from 19x73 to 29x148 
- SYP Rectangular in 19x110 and 22x145 
- Pine Shiplap, with or without shadow line - new type, 90° angle 
- SYP Shiplap - 90° angle 
- Pine single half lap 
- Pine 'Melsomslat' 
- Pine Water board 

○ Terrace and Pier Decking

- Pine terrace boards, smooth or comb-faced 
- Pine pier decking 
- SYP Terrace boards smooth or comb-faced, slits both sides 
- Pine hand railing, terrace 
- Terrace screws, rust free, hidden fixing assembly

Note; not all are stock items even if standard product; see price list

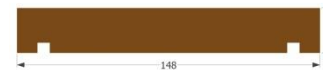
Applications and products

- Kebony Pine Construction timber

- Pine beam C18 from 36x98 to 98x98
- Pine batten from 23x48 to 48x48
- Pine railing from 36x73 to 73x73

- Pine Roof

- Pine roof board, rough 22x148
- Screws rust free



- Package size (wood)

- Width x height: 100 x 50 cm
- Boards delivered in falling lengths
- Package volume is approx. 3m³
- Package content in lists is average running metres

- Delivery times are given as ExWorks Skien-Norway

Note; not all are stock items even if standard product; see price list

Aesthetics – Kebony patinates similar to other hardwoods



Kebony can be left without any surface treatment which means that the only maintenance will be cleaning when required (depending on the local situation). Kebony will over time receive a silver grey patina, as most other hardwoods.

Kebony can be surface treated with oil or stains. However, this means that regular maintenance with oil or stain will be required.

Kebony is durable and stable

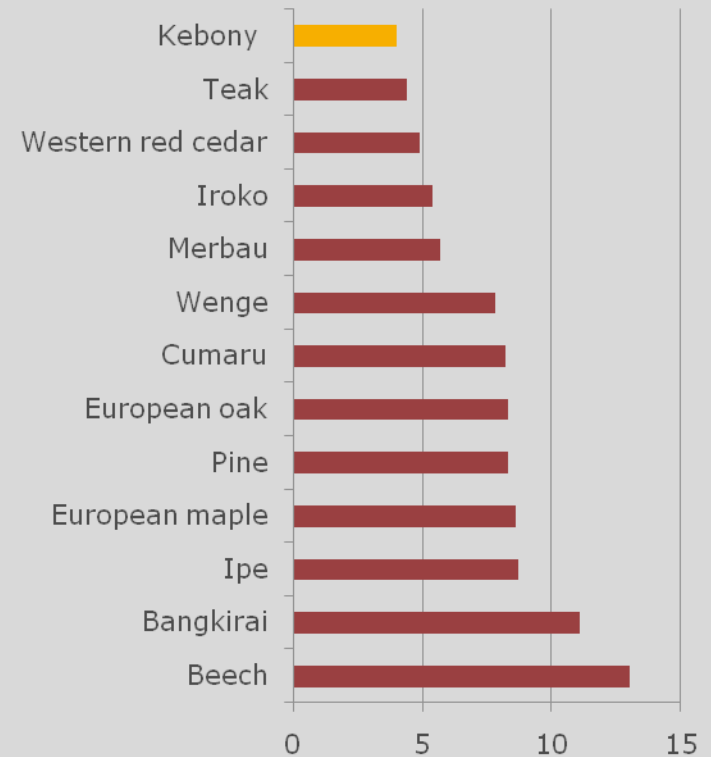
Durability

Durability class

Highly durable	Durable	Moderately durable	Somewhat durable	Not durable
Teak	European oak	Siberian larch	European larch	Ash
Merbau	Azobe	Redwood	Spruce	Birch
Iroko	Western red cedar	European red oak	American maple	Pine
Ipe				Maple
Afselia				Beech
Kebony				

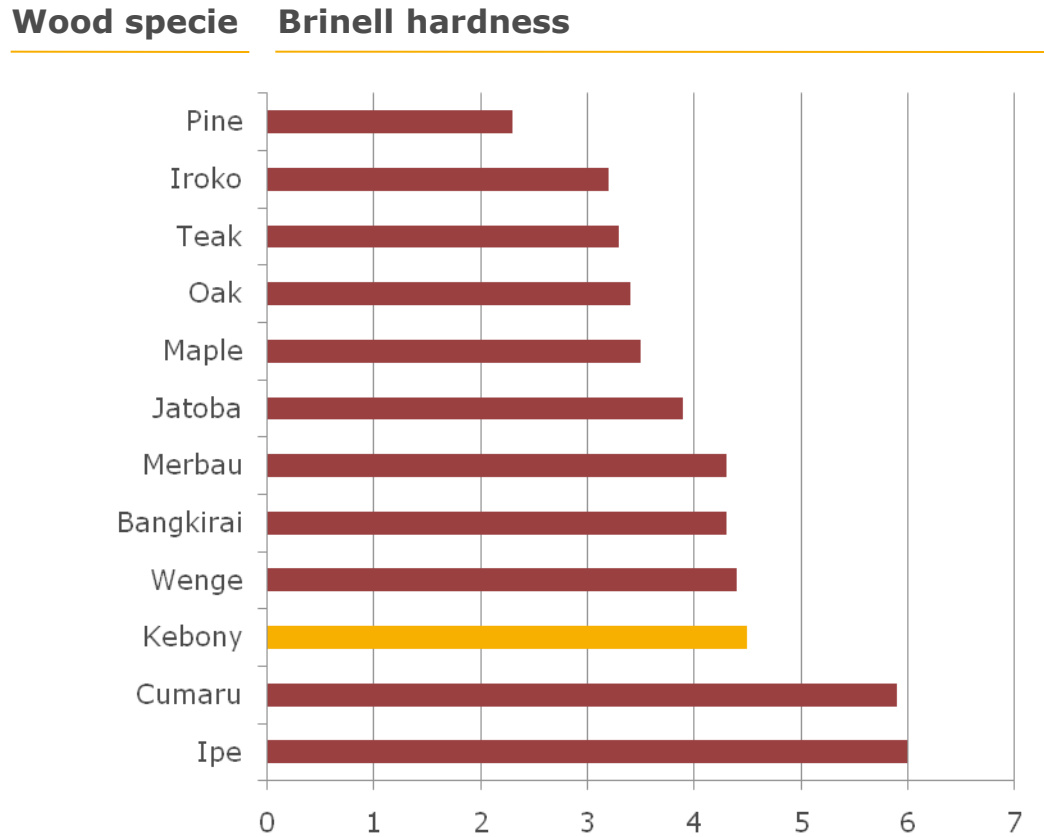
Stability

Wood specie Maximum movement* (%)



* Defined as maximum swelling in tangential direction when moisture content increases from 0 % to fiber saturation point

Kebony is ranked among the hardest wood species

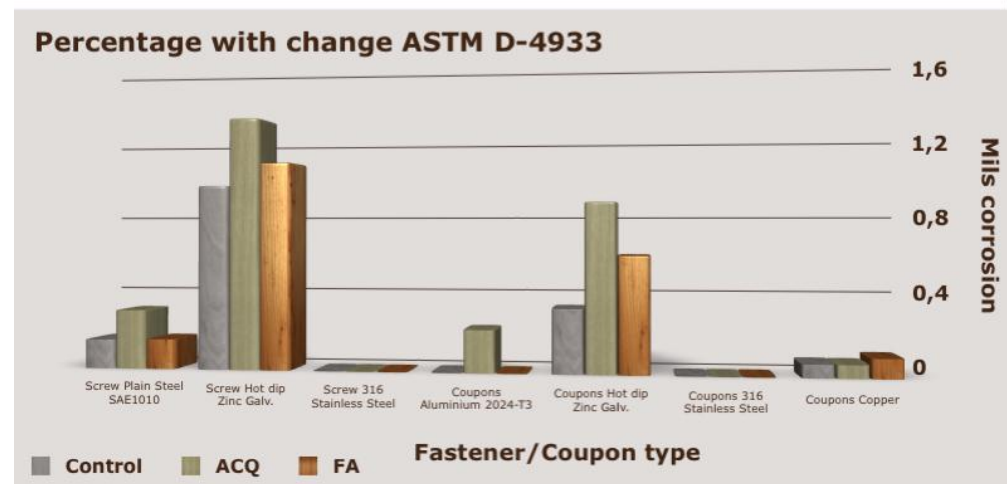
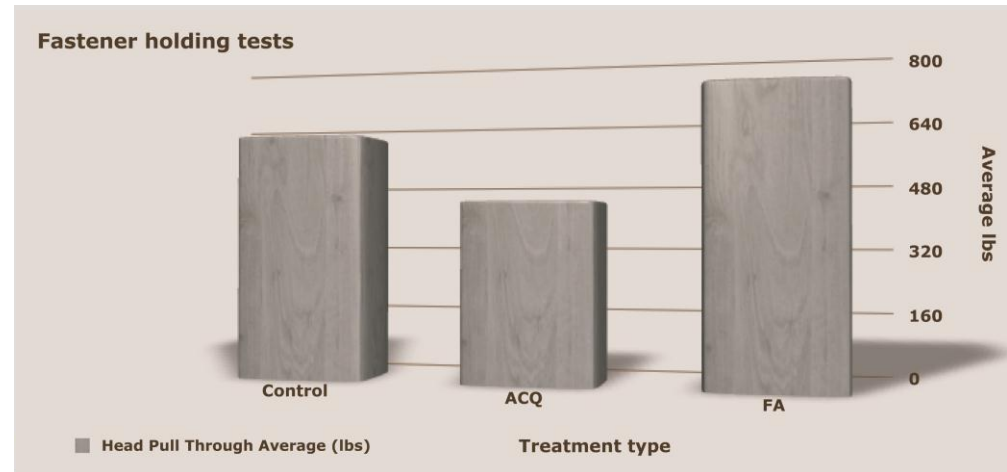


Fastener properties

Fastener holding ASTM D-1761 and fastener corrosion AWPA E12

- Kebonized SYP performed significantly better than untreated and copper treated SYP in the Head Pull through tests
This means Furfurlated SYP will hold tighter and better in the field
- Kebonized SYP is overall less corrosive than ACQ treated wood

Source: Virginia Tech, Department of Wood Science and Forest Products



Kebony vs. selected competitors

Parameter

Modification principle

Appearance

Strength parameters

Hardness

Dimensional Stability

Fastener holding strength

Durability

Kebony

Furan polymer

Brown, greying on weathering

Improved stiffness

**



ThermoWood

Heat treatment

Brown, greying on weathering

Reduced bending strength

*

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*

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Accoya

Acetylation

Pale, good colour stability on weathering but vulnerable to staining fungi

Bending strength unchanged from parent wood

**

**



Strong environmental friendly profile



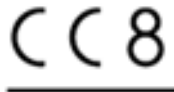
- Kebony is FSC Controlled Woods certified



- The only material that has achieved the Nordic ecolabel the “Swan” within the category Durable wood

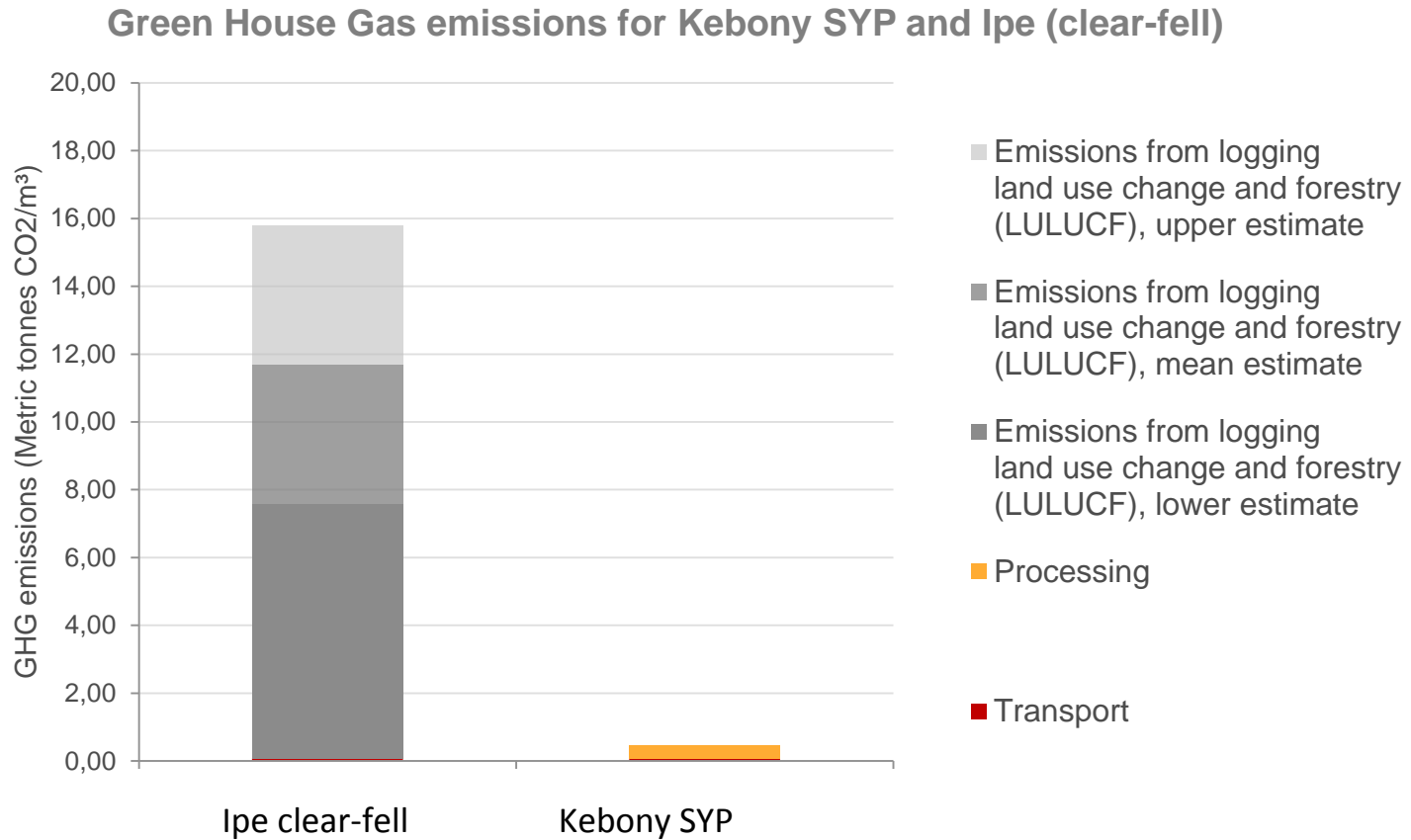


- Kebony has received two national prizes, “Glassbjørnen” for sustainable consumption and production, from GRIP (foundation founded by the Ministry of Environment and the Confederation of Norwegian Business and Industry (NHO))



- Selected as one of four Norwegian companies to make a speech on the CC8 Climate Conference 2008

Kebony - A Big Environmental Impact



Source: Bergfald & Co, a leading Norwegian environmental advisory company