

Planting the Future

EUCALYPTUS HOLDING LIMITED

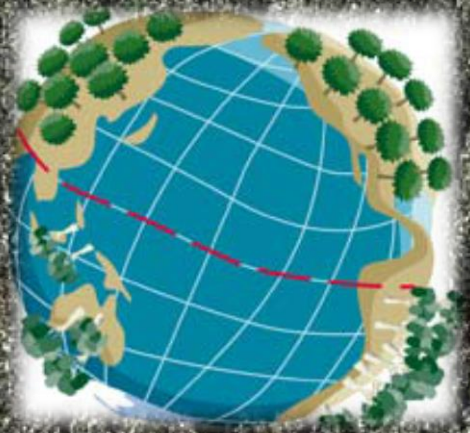
An introduction to eucalyptus



Eucalyptus Holding Ltd
Planting the future

50 million acres of eucalyptus worldwide, have been planted and used commercially, for bio-energy, pulp, pellets etc.

Source: www.treeplantation.com



Eucalyptus is currently present in over 90 countries and is spread over more than 22 million hectares worldwide, although only 13 million hectares have a productivity of interest from an industrial standpoint.

EUCALYPTUS WORLDWIDE



Eucalyptus plant features

- > **EXTREMELY DURABLE AND ADJUSTABLE TO SEVERAL CLIMATE CONDITIONS**
- > **4TH GENERATION HYBRID HAS ADAPTED PERFECTLY TO LESS FAVORABLE CLIMATE AND SOIL CONDITIONS**
- > **HIGH DENSITY OF PLANTING (7,000 / HA) — DRIVES TO MORE EFFICIENT LAND USE**
- > **OPTIMUM PRODUCTIVITY PER HA, DUE TO THE QUICK RATE OF GROWTH (9- 10_M WITHIN 2 YEARS)**
- > **ONE OF THE HIGHEST RATES IN CO₂ ABSORPTION AMONG OTHER PLANTS**
- > **RESISTANT TO FIRE THREATS, MAINLY USED IN FIRE-PROTECTION ZONES**
- > **QUICK RE-GROWTH RATE, AFTER HARVESTED IT GROWS UP AGAIN TO 10_M, WITHIN 2.5 YEARS**

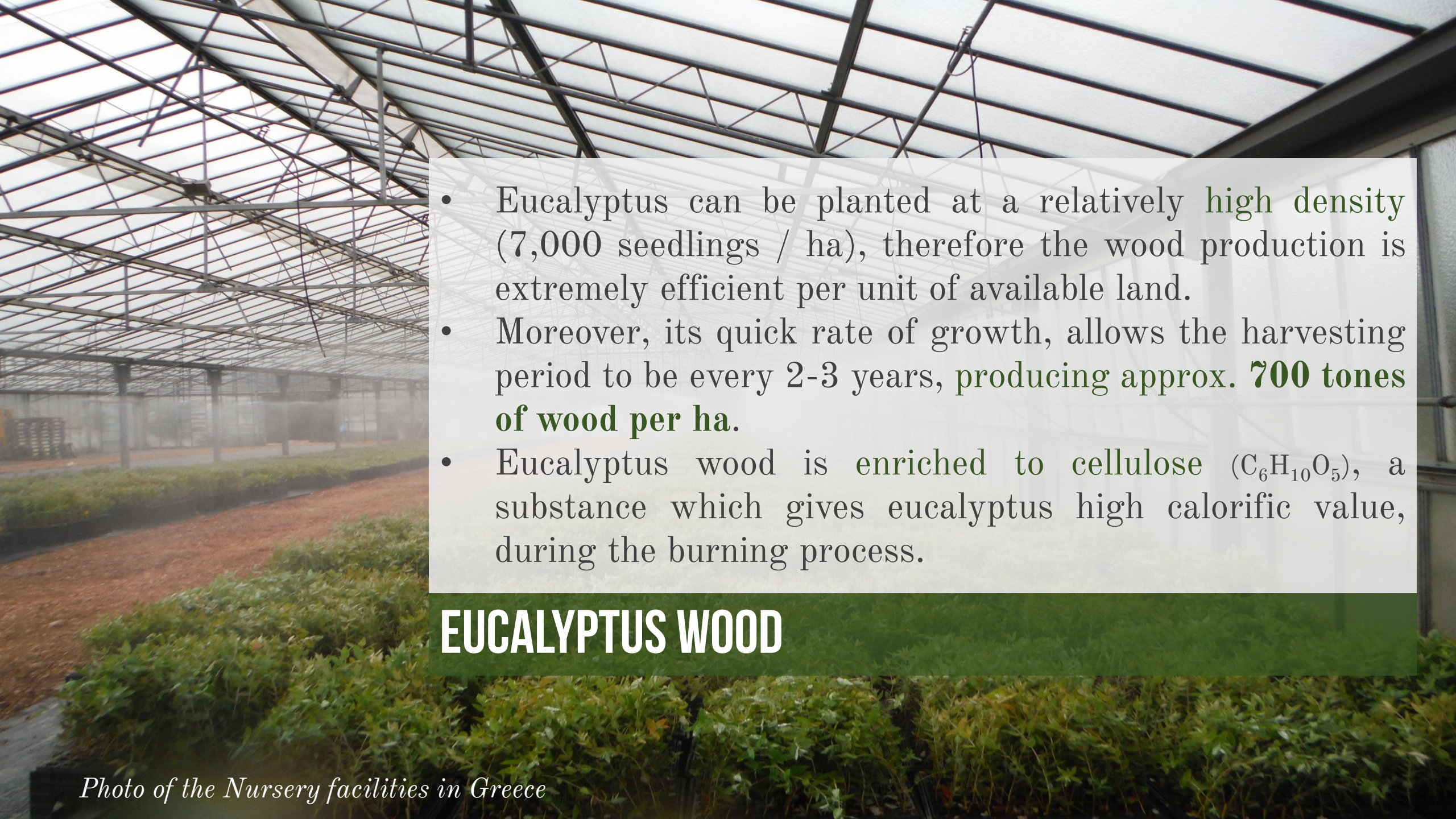


EUCALYPTUS PRODUCTS

Production in commercialized units

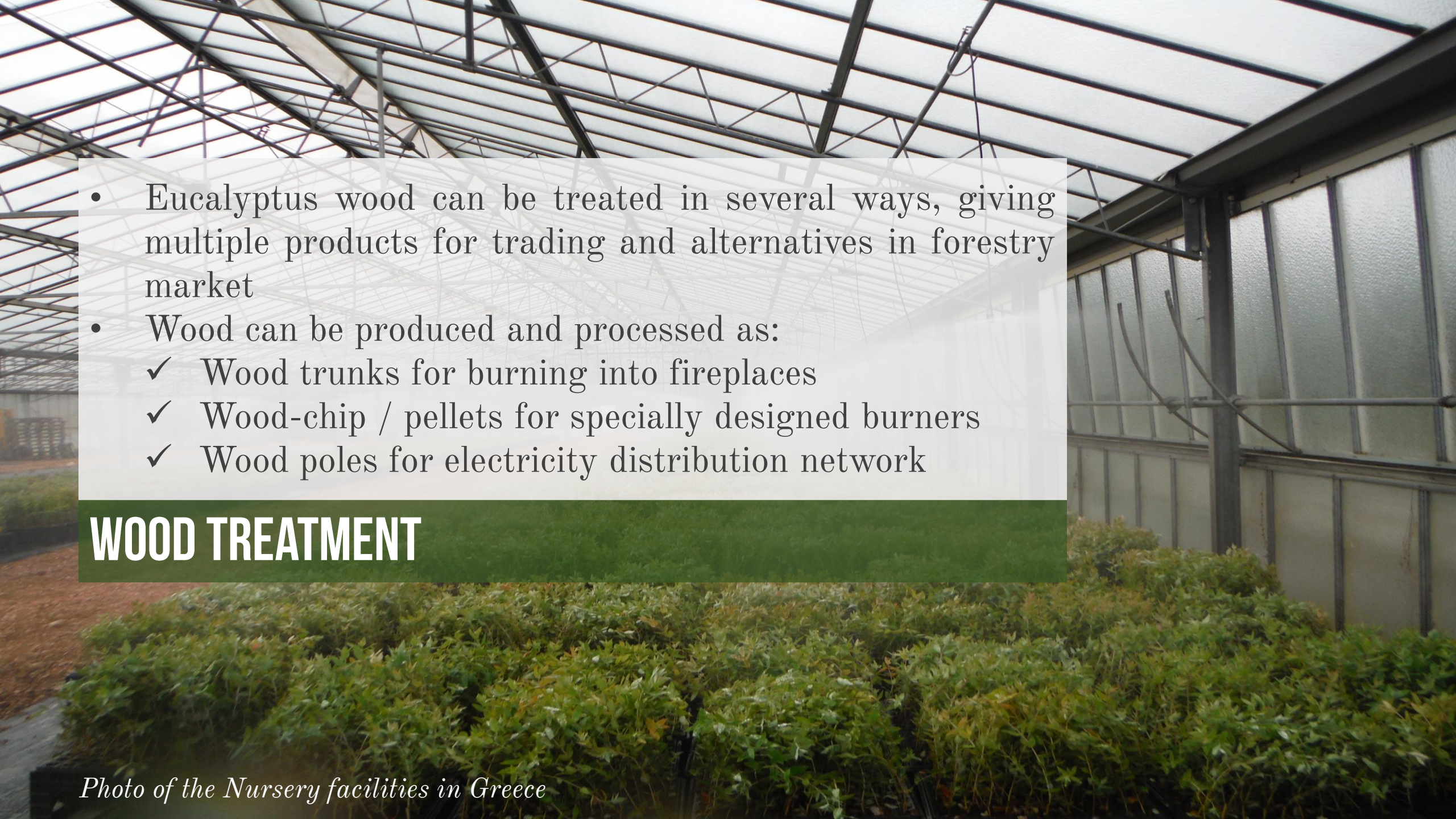
Presented by:

EHL Development Team

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- Eucalyptus can be planted at a relatively **high density** (7,000 seedlings / ha), therefore the wood production is extremely efficient per unit of available land.
 - Moreover, its quick rate of growth, allows the harvesting period to be every 2-3 years, producing approx. **700 tones of wood per ha**.
 - Eucalyptus wood is enriched to cellulose ($C_6H_{10}O_5$), a substance which gives eucalyptus high calorific value, during the burning process.

EUCALYPTUS WOOD

Photo of the Nursery facilities in Greece

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- Eucalyptus wood can be treated in several ways, giving multiple products for trading and alternatives in forestry market
 - Wood can be produced and processed as:
 - ✓ Wood trunks for burning into fireplaces
 - ✓ Wood-chip / pellets for specially designed burners
 - ✓ Wood poles for electricity distribution network

WOOD TREATMENT

Photo of the Nursery facilities in Greece

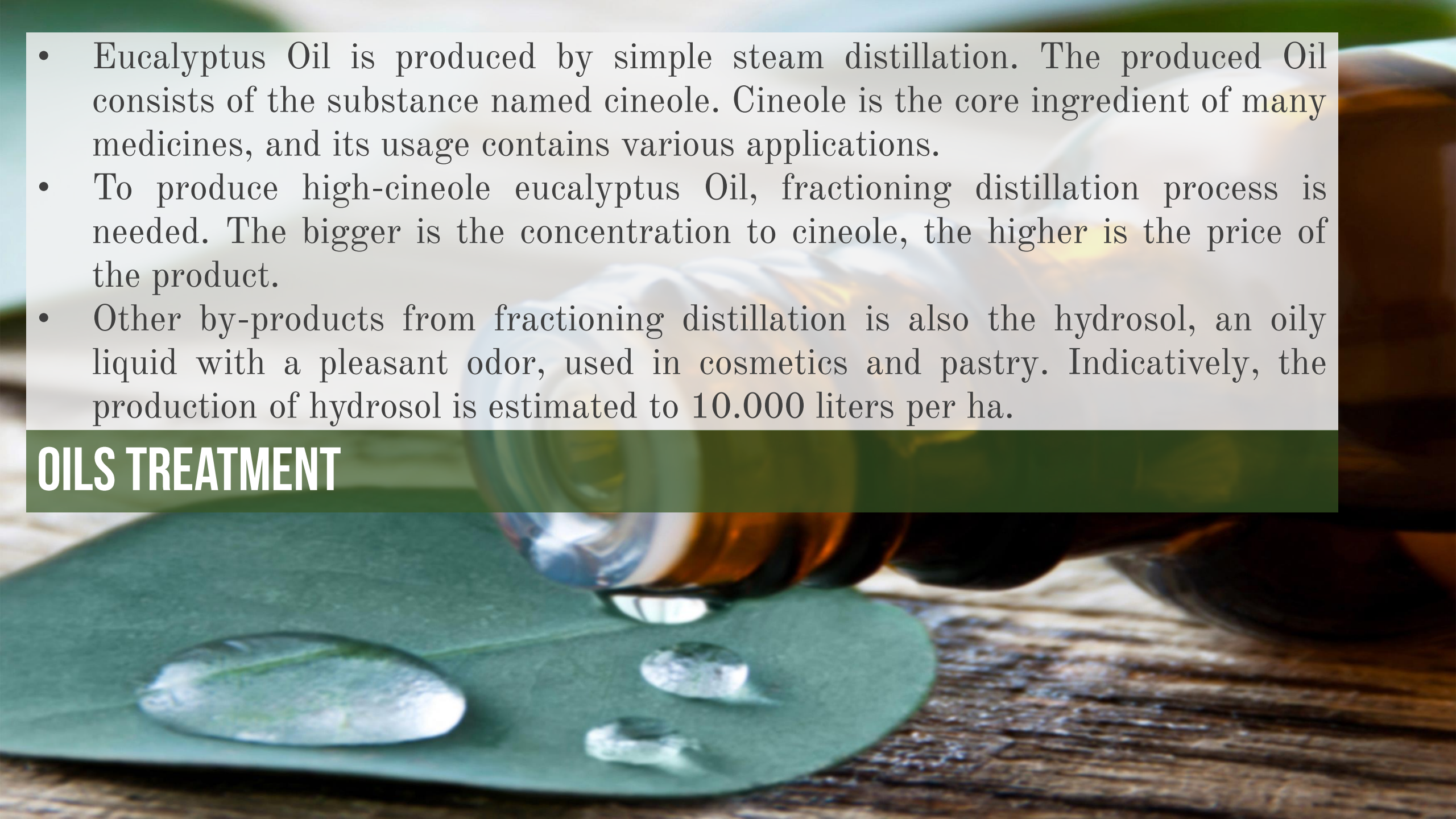
- Eucalyptus foliage is quite oily, so it is used for essential oils production, known as eucalyptus oil or eucalyptol.
- The plant's foliage, stems and branches are collected every 8-10 months, according to the harvesting plan, while the estimated production volume is 100 tones per ha, which yields to 1.500-2.000 liters of Oil.
- Eucalyptus oils are used to pharmacopoeia, cosmetics and chemical industries.

EUCALYPTUS OIL



- Eucalyptus Oil is produced by simple steam distillation. The produced Oil consists of the substance named cineole. Cineole is the core ingredient of many medicines, and its usage contains various applications.
- To produce high-cineole eucalyptus Oil, fractioning distillation process is needed. The bigger is the concentration to cineole, the higher is the price of the product.
- Other by-products from fractioning distillation is also the hydrosol, an oily liquid with a pleasant odor, used in cosmetics and pastry. Indicatively, the production of hydrosol is estimated to 10.000 liters per ha.

OILS TREATMENT



Nursery:
Seedlings germination stage

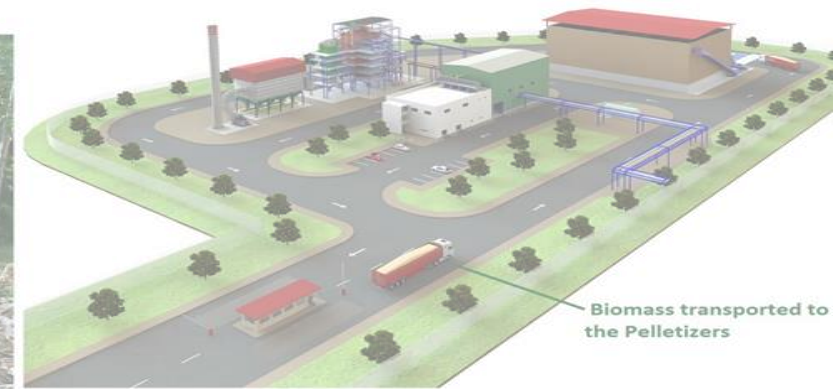


Nursery:
Pot/discs Creation

Land Mapping / G.I.S. based tools



Planting / Maintenance and Harvesting
(2-year Harvesting Cycle)



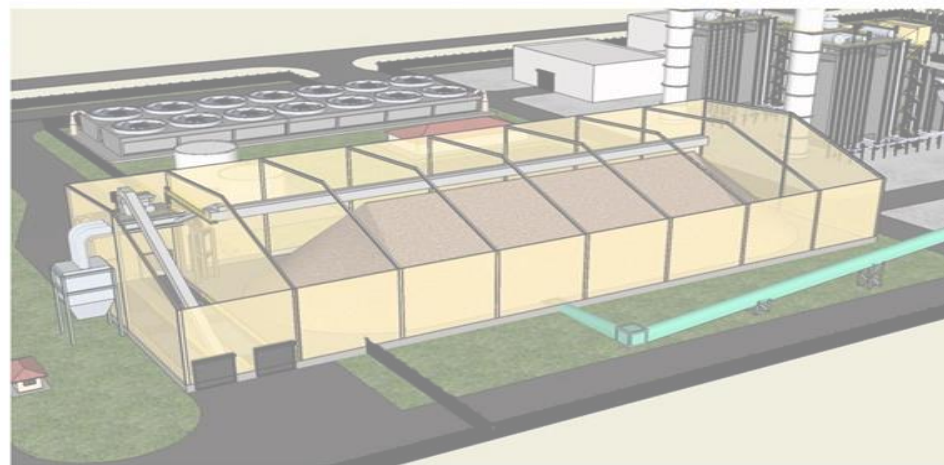
Biomass transported to the Pelletizers

Overview of Power Plant

Gasification Unit



Power Generation Plant



Raw biomass Silo



Pelletizing the biomass, as raw material for Power Plant

Power Distribution Network

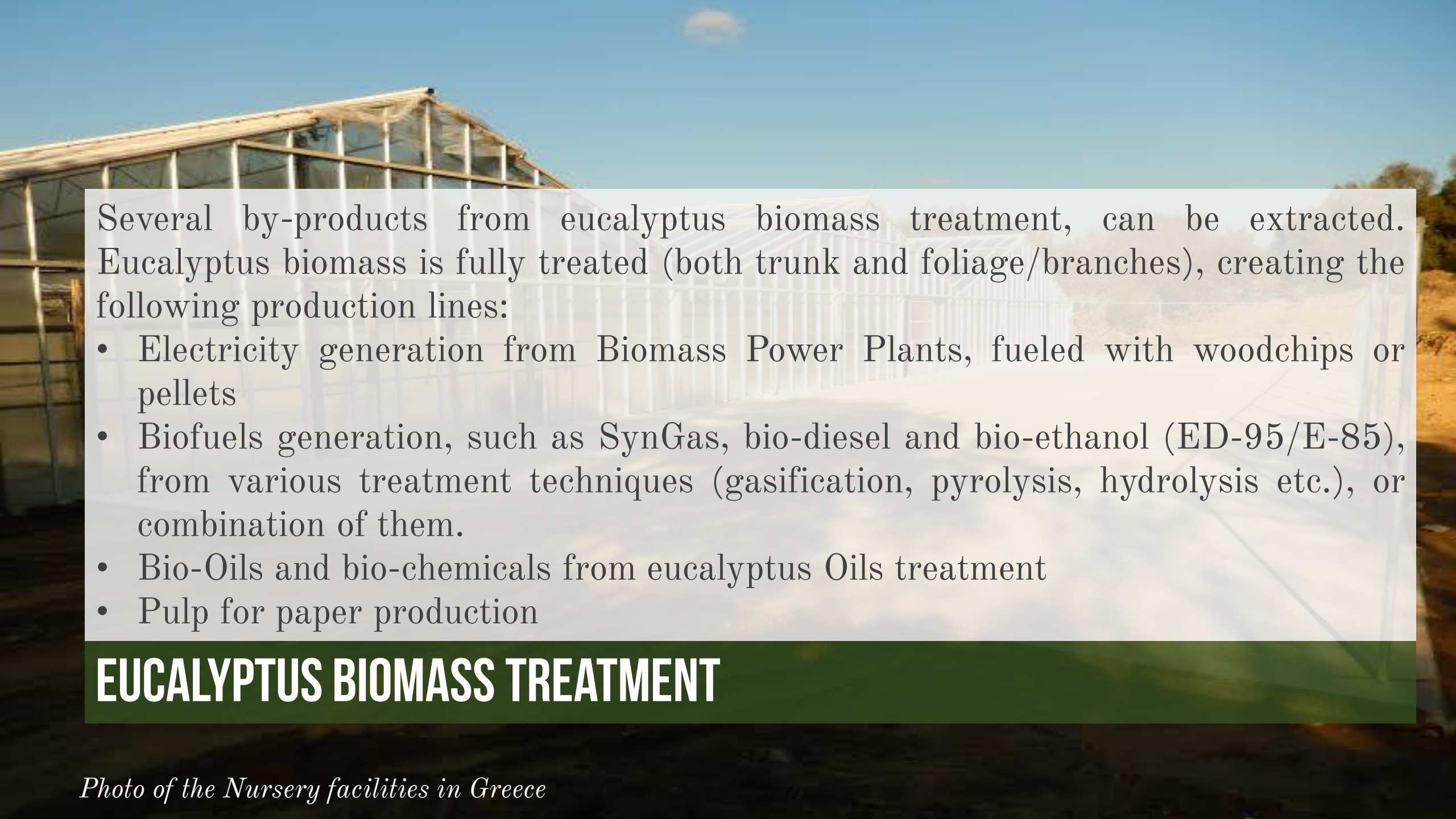


OTHER BY-PRODUCTS FROM EUCALYPTUS

Multiple market alternatives

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Several by-products from eucalyptus biomass treatment, can be extracted. Eucalyptus biomass is fully treated (both trunk and foliage/branches), creating the following production lines:

- Electricity generation from Biomass Power Plants, fueled with woodchips or pellets
- Biofuels generation, such as SynGas, bio-diesel and bio-ethanol (ED-95/E-85), from various treatment techniques (gasification, pyrolysis, hydrolysis etc.), or combination of them.
- Bio-Oils and bio-chemicals from eucalyptus Oils treatment
- Pulp for paper production

EUCALYPTUS BIOMASS TREATMENT

EUCALYPTUS PRODUCT TREE

WOOD

Woodchip / pellet
/ wood poles



PULP MILLS



ELECTRICITY GENERATION

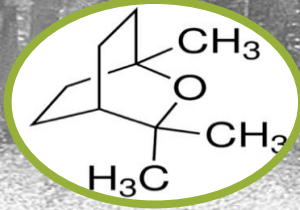


BIO-FUELS



OILS

Eucalyptol /
hydrosol



CO₂

Allowances
trading





EUCALYPTUS MARKET REVIEW

Product pricing & by-products value

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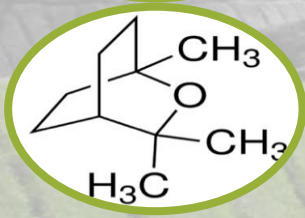


Wood/Lumber is commodity, traded globally in specific pricing. Pure wood (green mass) pricing is ranging from \$90-\$160 / tone. Wood pricing is also dependent on the energy content. North European hardwood used for construction, is usually more expensive, while eucalyptus softwood approaches \$120/tone.

Pellet is wood byproduct, mostly used for energy generation plants. Due to the production process, pricing depends on the moisture content. The lower moisture %, the higher the price. Low moisture pellets price ranges from \$180-\$260 / tone, depending also on energy content. Eucalyptus pellet pricing ranges from \$220-\$250.



Eucalyptus Oils industry consists of many players worldwide. China produces about 75% of the world trade, but most of this is derived from the cineole fractions of camphor laurel rather than being true eucalyptus oil. Significant producers of true eucalyptus oil include South Africa, Portugal, Spain, Brazil, Australia, Chile and Swaziland. The above reflect also in the pricing. Chinese Oils are cheaper than Australians and Brazilians, while South African is in the average. The pricing depends on the purity and the concentration in cineole. Middle-cineole oils value ranges from \$10-\$13/liter, while high-cineole pure eucalyptus oils (>90%) are above \$25/liter.



pulp mill is a manufacturing facility that converts wood chips or other plant fiber source into a thick fiber board which can be shipped to a paper mill for further processing. Pulp can be manufactured using mechanical, semi-chemical or fully chemical methods (Kraft and sulfite processes). Price depends on the raw material quality and ranges from \$700-\$950/ metric tone.





Electricity generation from Biomass plants considered as a RES-based technology, and is promoted or subsidized – in some cases extensively – through financial incentives. Electricity pricing varies according to national energy policy and tariffs set by Power Regulator. In Zambia, ZESCO buys power through PPA contracts for \$0.10-\$0.18/kWh. Pricing outlook is increasing, due to the lack of supply and the increasing electricity needs.

Bio-fuels produced from cellulosic materials, such as eucalyptus, are basically biodiesel and bioethanol. State of the art technologies are applied to north European countries and especially Finland and Sweden. Bioethanol is already used in Zambia, from a pilot production unit installed from Scania. Both biodiesel and bioethanol are used for replacing the fossil fuels diesel and gasoline respectively. The technology is highly emerging and African region is attracting great interest in energy-related investments.



Carbon Markets are operating worldwide, during the effort of setting limits in industrial CO₂ emissions and forcing the industries to be compliant, against serious fines if not. Currently, carbon pricing is \$6/tonne-right. Apart from compliance markets, volunteer markets are also existing, with many nations, organizations, public companies to be part of those markets and to buy credits from CDM project owners. Potential buyers come from aviation, power generation and shipping industry.



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COMPANY'S INVESTMENT ON EUCALYPTUS

Facilities, exclusivities and partnerships

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EHL Development Team



Mother Company initiatives and achievements:

- > **CREATE POWERFUL SCIENTIFIC BACKGROUND, DRILLED BY PARTNERSHIP WITH AUSTRALIAN AND SPANISH UNIONS**
- > **4TH GENERATION HYBRID EXCLUSIVELY USED FOR SUB-SAHARAN AFRICA**
- > **SETUP OF STATE OF THE ART NURSERY FACILITIES IN GREECE, IN 10,000^{SQ.}METERS**
- > **HIGH-TECH SOLUTIONS IN FORESTRY MANAGEMENT AND OPERATIONS**
- > **PLANTATION PROJECT OF 4,000^{HA} IN GREECE, FOR 32^{MW} POWER GENERATION PLANTS**
- > **ESTABLISHMENT OF 2 SUBSIDIARIES IN ZAMBIA, AFTER GRANTING THE \$52^M INVESTMENT LICENCE FROM ZDA**
- > **AGREEMENT WITH LOCAL STAKEHOLDERS FOR 10,000^{HA} PROJECT DEVELOPMENT IN ZAMBIA**

CONTRACTED FARMING MODEL

Mother Company initiated the model of contracted farming in Greece, a year ago, for boosting up the volume of cultured area and create adequate capacity of biomass for the forthcoming energy projects.

GREECE

“Contracted Farming” is a specific and defined 20-year agreement between an investor willing to fund a eucalyptus culture, and the company, by which EHL develops and operates the plantation on behalf of the investor so that it grants the produced biomass, and on the other hand the investor, who has initially funded the culture installation and the maintenance costs, is being compensated with a fix yield on wood production, every 2 years.

The same model will be applied also in Zambia, giving to Company the necessary liquidity for further development of planted areas and creating serious capacity of biomass, for the projected energy projects and additional revenue generation. In Zambia, the target for contracted farming is 600ha to be planted, or else to attract \$6M contracts.

ZAMBIA

A BRIEF VIEW AT BUSINESS MODEL IN GREECE

Business model, adopted and applied since 7 years ago in Greece, is the following:

- Beginning of design and licensing for **32MW portfolio of Biomass Power Plants**, through gasification process (raw biomass can be any forestry/agricultural residues)
- Meanwhile, Mother Company focused on eucalyptus, due to its energy content (19.3MJ/kg), its high productivity rates per ha and quick rate of growth, indicating a great potentiality on such a project.
- Basic operational needs were drafted, according to which a volume of 11k tones of eucalyptus dry biomass, is annually needed for Plant's operation.
- Consequently, plantation development started, both by own means/funds and contracted farming model
- Within the next two years, a serious volume of biomass will be eventually collected for energy-related utilization.

Nursery:
Seedlings germination stage

Land Mapping / G.I.S. based tools



Biomass transported to
the Pelletizers

Power Plant

Power

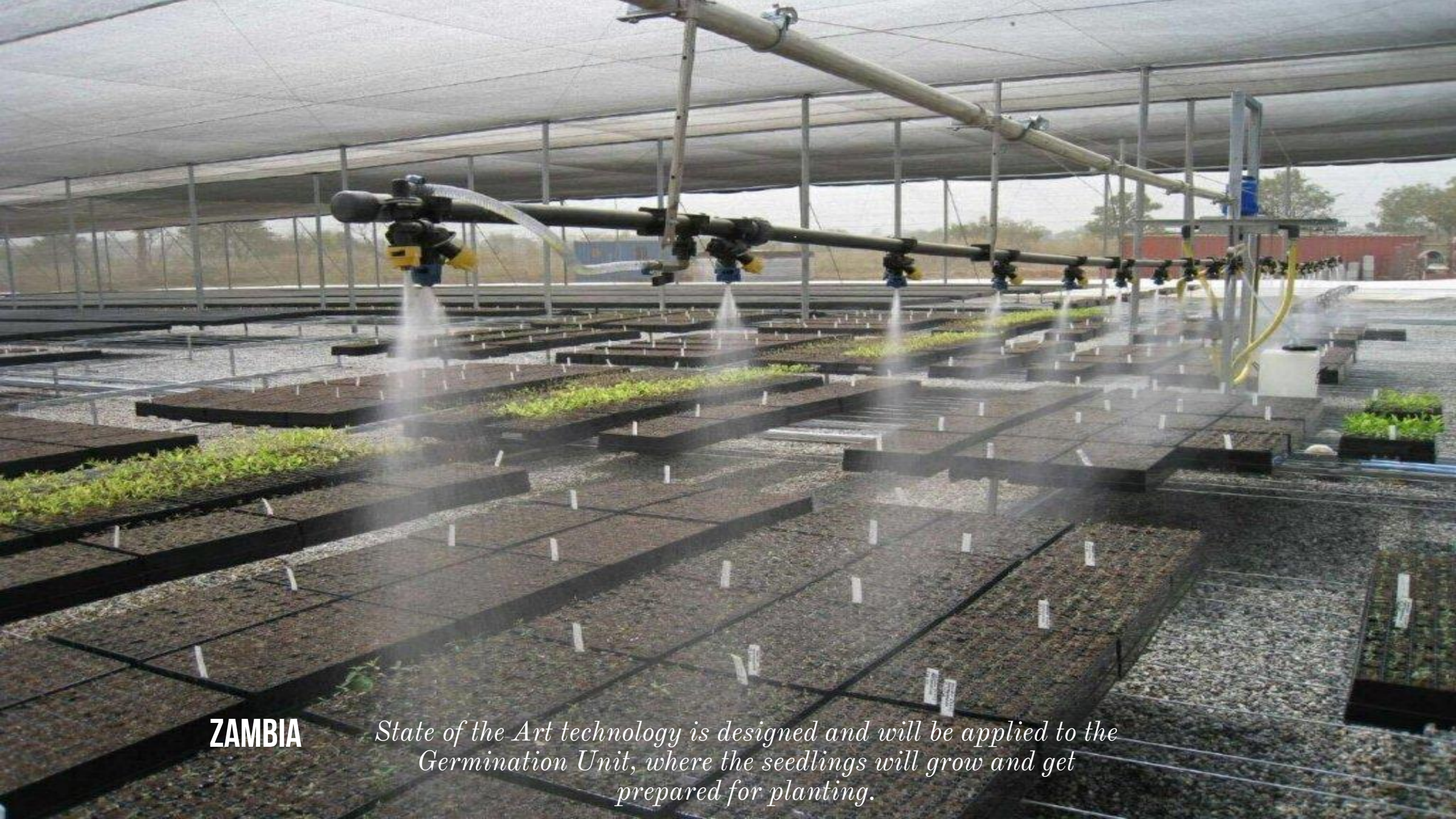
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Biomass, as raw
material for Power Plant

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Raw biomass Silo



ZAMBIA

State of the Art technology is designed and will be applied to the Germination Unit, where the seedlings will grow and get prepared for planting.



GREECE

View of the basic unit inside the Nursery, 20 days before the beginning of the planting period.



GREECE

10.000 square meter own Nursery Facilities

GREECE

First seedling order from Spain, May 2013





GREECE

Seedlings grow inside a biodegradable film, for easier, quicker and environmentally friendly planting technique.



GREECE

Seedlings in outdoor facilities, in a plant-hypnosis conditioning, for adjusting the beginning of the planting period



EUCALYPTUS GLOBULUS (BLUE GUM)

Powered by Eucalyptus Holding Limited



COMPANY'S VISION

Vertically Integrated Production unit

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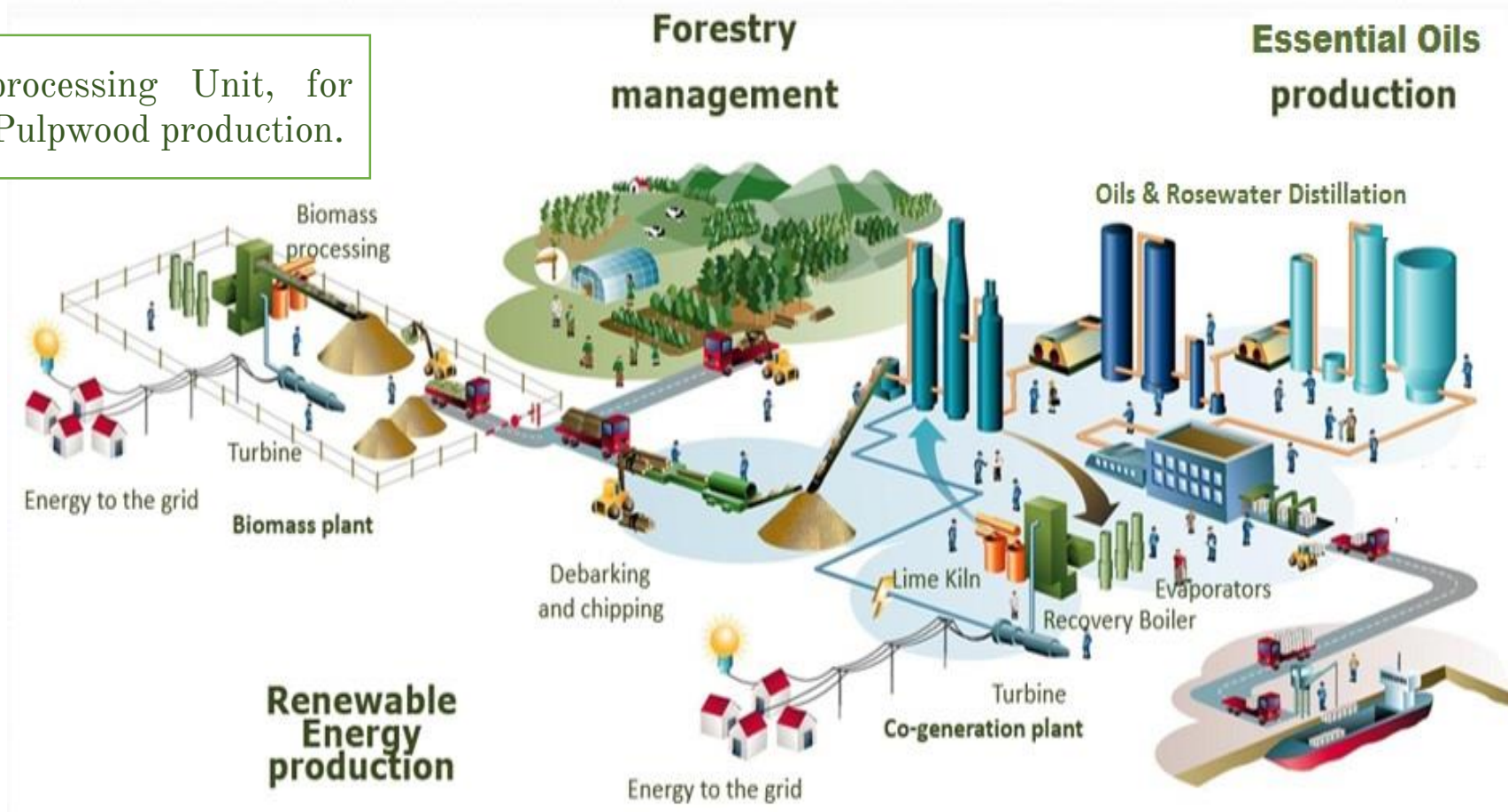
EHL Development Team

A VERTICALLY INTEGRATED PRODUCTION MODEL

Plantation development with multi-species seeds, enriching the local biodiversity

High-tech Fractional Distillation Unit (operating under hyperbaric Oxygen) for high quality Oils / fractions

Wood multi processing Unit, for Pellet / Chip / Pulpwood production.



RES-based Power generation and 2nd Gen Bio-fuel production, for an environmentally positive impact.

THANK YOU

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