



**DISCOVER APRIL**



# Fully integrated operations – production capacity\*

A leading, technologically advanced and efficient maker of renewable, bio-based products.

High capacity single-site pulp mill

**2,800,000** tons of pulp capacity/year

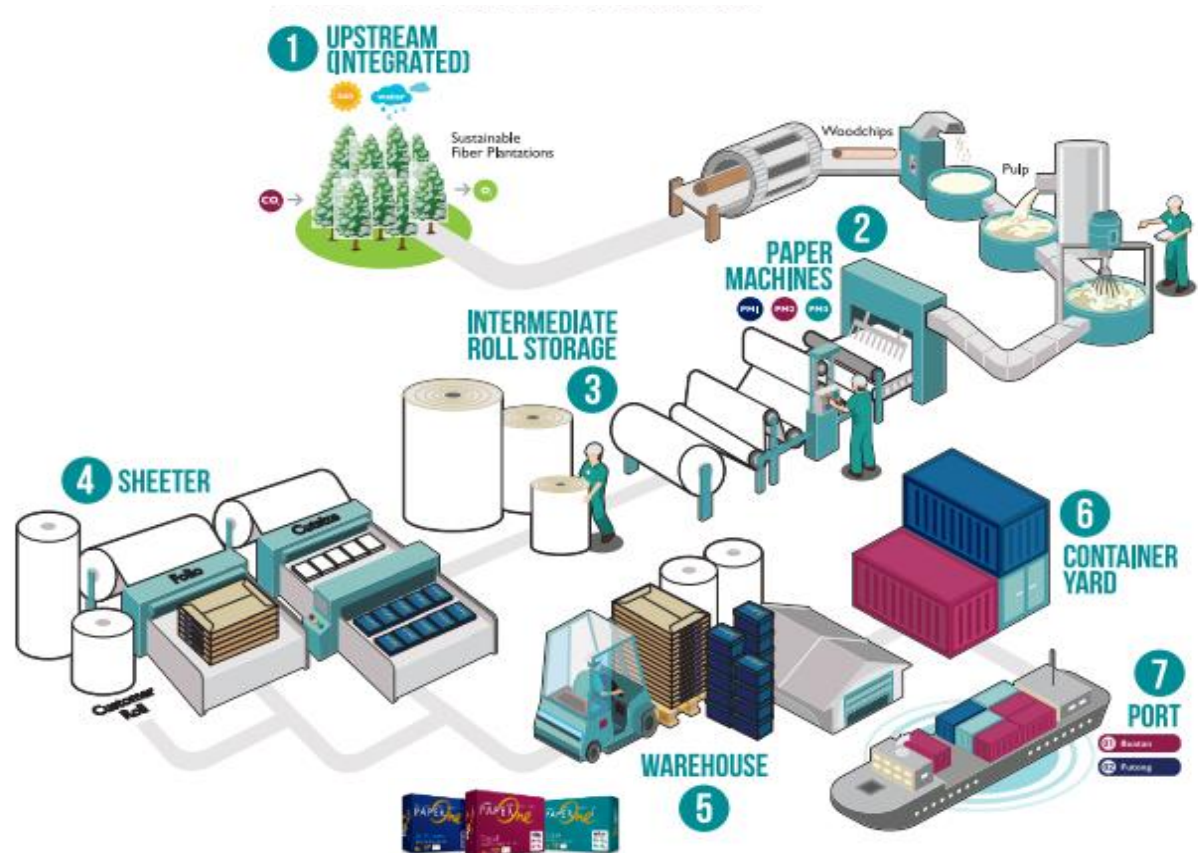
One of the world's fastest fine paper mills

**1,200,000** tons of paper capacity/year

First fully integrated viscose rayon producer in Asia

**300,000** tons of viscose capacity/year

**35,092** workforce



# Land stewardship

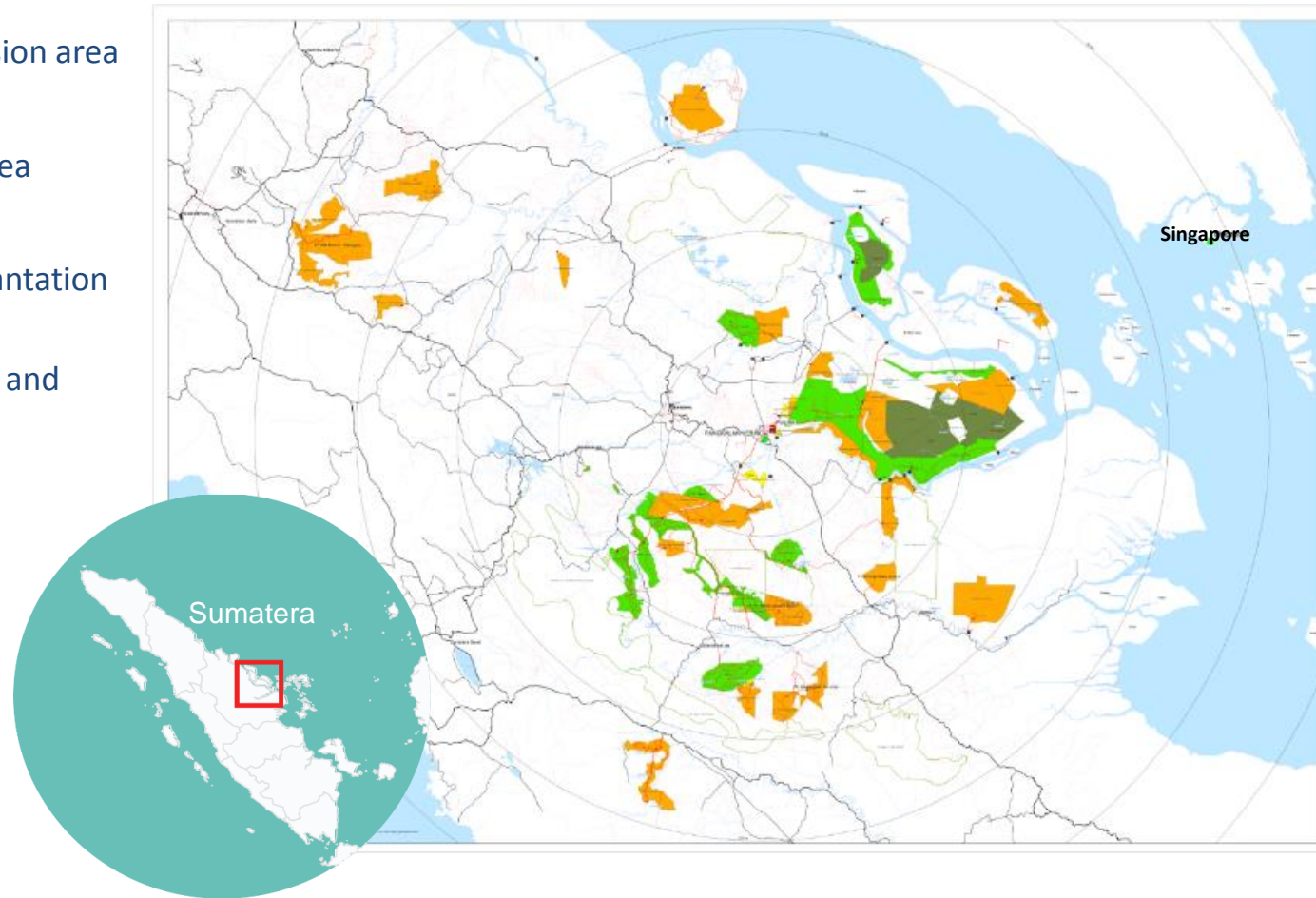
**1,045,557ha** Total concession area

**454,045 ha** plantation area

**42,353 ha** livelihood plantation

**361,231 ha** conservation and restoration

- APRIL manages more area on peatland than on mineral soil;
- APRIL conserves ~1.2 ha intact peatland for every one ha plantation on peat





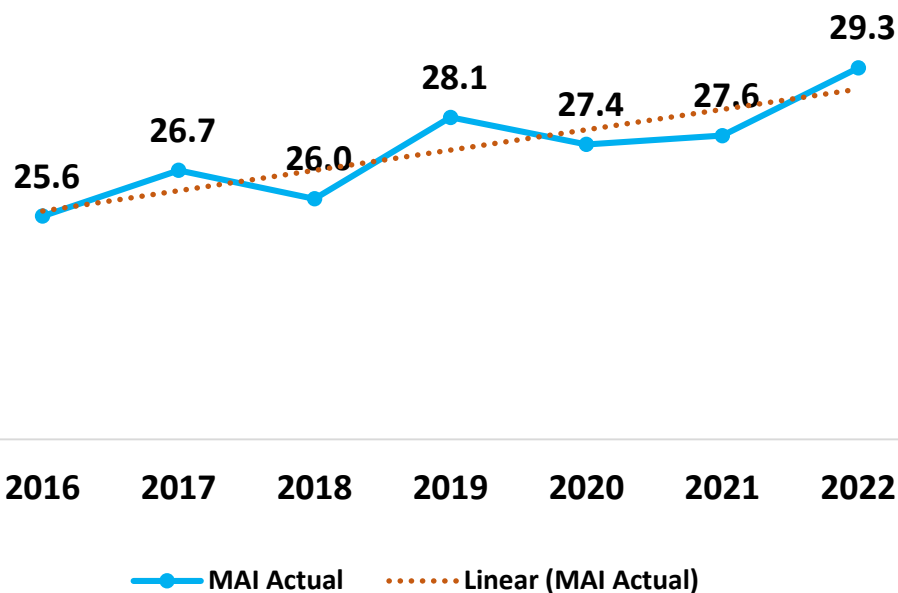
# Plantation MAI Improvement 2016 - 2022

MAI (Mean Annual Increment) - m<sup>3</sup>/ha/year

## Key Focus Area

### Genetic Improvement & Integrated Pest and Disease Management

- Acacia & Eucalyptus genetic improvement
- Genetic screening for pest & diseases
- Improve capacity in identification and monitoring of pest & diseases
- Expansion of bio-controls in pest and diseases



All Species (ACRA, EUCA, AMAN)

# **Fiber Research and Development**

**Alvaro J. Duran S. PhD**

**Head of Fiber Research and Development**

**Sabar T.H Siregar MSc**

**Dy. Head of Fiber Research and Development**





- APRIL R&D consists of a team of more than 250 staffs, including people from 8 nationalities, of which, there are 17 and 31 staffs with PhD and Master degrees respectively.
- State of the Art Research & Development Facility:
  - RGE Technology Center with more than 5,000 m<sup>2</sup>
  - Kerinci Research Nursery (KRN) with area of 53,616 m<sup>2</sup>
  - Kerinci Tissue Culture (KTC) with an area of 3,862 m<sup>2</sup> and capacity to produce up to 50 millions of TC
- More than 90 publications on international peer reviewed journals by R&D staffs in the last 10 years
- More than USD 11 Million Capex investment over 10 years with annual operation budget of more than USD 9 Million

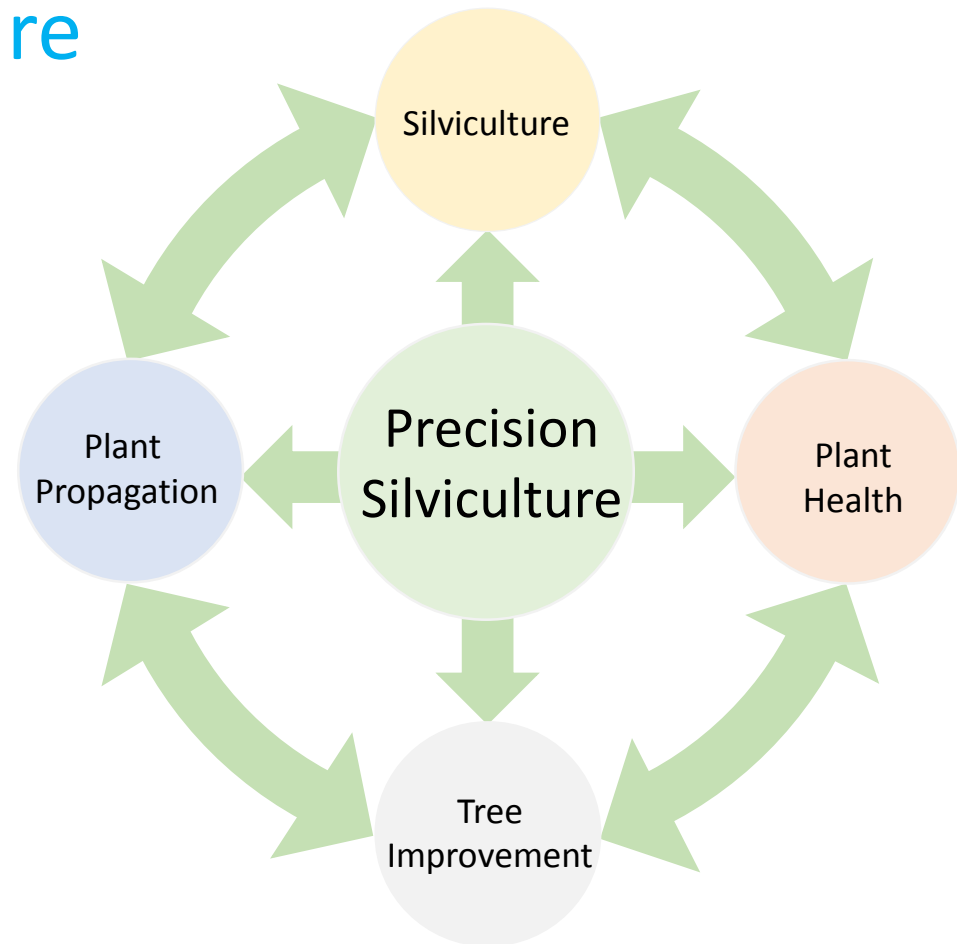
## Goal

Add value to company operations by improving sustainable, cost-effective production of fiber for the mill.

## Objective

- Improve pulp productivity from plantation through improvements in best plantation silviculture practice, tree nutrition, tree genetics, wood properties and plant health.
- Competitive pulp production cost from efficient, sustainable plantation management and environmentally-friendly technologies

## Structure





## Objectives

- Sustainable Wood Production
- Soil conservation
- Circular Economy (Mill waste to Forest value)
- Rational use of Herbicides

## Eucalyptus Silviculture



### Soil Conservation and Management

- Detailed Soil Map (updated 2023)
- **Soil Fertility Monitoring**
- Soil Cultivation Matrix
- **Harvesting Technique to keep soil coverage and avoid soil compaction**



### Industrial Forest Management

- **Clonal Site Interaction Trials**
- Alternative Source of Nutrients (Waste to Value)
- Nutrient-use efficiency by clone
- Spacing and proper allocation per clone



### Weed Science

- **Precision weed control with digital pre-assessment**
- **Use of selective and pre-emergent herbicides**
- Reduced use of glyphosate
- Improvement of application technology:
  - Drones application
  - Planting line weed control.

## Acacia Silviculture



### Peat Management

- Detailed Soil Map (updated 2024)
- Peat Management Unit
- **Species Allocation Matrix**
  - *Acacia crassicaarpa*
  - Acacia hybrids
- Acid Sulfate Soil Risk Map



### Industrial Forest Management

- Waste to Value
- Cost effective fertilizer regime
- Spacing
- **Tree stability and root development**
  - Singling
  - Propagation technique
  - Planting technique



### Weed Science

- **Precision weed control – monitoring based control (digital pre-assessment).**
- Use of safer contact herbicides for *Acacia crassicaarpa*
- Reduced use of glyphosate

## Objectives

- Effective & on-time detection and monitoring of relevant P&D
- Reduction of P&D damage below the economic threshold
- Use tolerant plant materials & develop biological control strategy
- Efficient use of pesticides

## Diagnostic, identification and monitoring



### Diagnostic

- **Accurate identification of major P&D through morphological and molecular analysis**
- Regular quality control for nursery sanitization



### Monitoring

- **On time P&D monitoring in nurseries and plantations**
- Digitalization of P&D monitoring
- Quality check by validation



### Screening Program

- Artificial inoculation in green house followed by field validation
- **Selection of tolerant plant materials used for planting program**

## Integrated pest management

### Biological Control

- Identification and evaluation of biological control agents
- **Scale up of *Trichogramma* sp. release for pest control**
- Endophytic *Trichoderma* application for nursery diseases at 15 ton/year

### Chemical Control

- Using FSC approved pesticides
- Research toward greener molecules
- **Improved pesticide application technology to increase efficacy, safety and reduce chemical consumption, reduction of 23% in nursery and 27% in plantation chemical consumption over the last 5 years**

*All products evaluated and used for pest & disease control follow WHO and FSC guidelines.*

## Eucalyptus Tree Improvement



Euca 1<sup>st</sup> Clone Generation (2013)

MAI 25 t/ha/yr (72 months)



Euca 2<sup>nd</sup> Clone Generation (2018)

MAI 28 t/ha/yr (72 months)



Euca 3<sup>rd</sup> Clone Generation (2023)

MAI 31 t/ha/yr (72 months)

### Main Breeding Species

<i>E. pellita</i>	<i>E. robusta</i>
<i>E. grandis</i>	<i>E. creba</i>
<i>E. urophylla</i>	<i>E. cullenii</i>
<i>E. brassiana</i>	<i>E. melanophloia</i>
<i>E. tereticornis</i>	<i>Corymbia</i> sp.

### Breeding strategies

- Industrial and Conservation Breeding
- Mid and Long Term Breeding using Simple Recurrent Selection Method
- Biotech tools to speed up classical breeding

### Objectives

- Continue productivity improvement
- Resilient plantations to biotic and abiotic stressors
- Improved wood properties
- Proper genetic site matching

## Acacia Tree Improvement Program



Acra 1<sup>st</sup> Generation (2003)

MAI 24 t/ha/yr (42 months)



Acra 2<sup>nd</sup> Generation (2010)

MAI 27 t/ha/yr (42 months)



Acra Clonal Plantation (2020)

MAI 29 t/ha/yr (42 months)

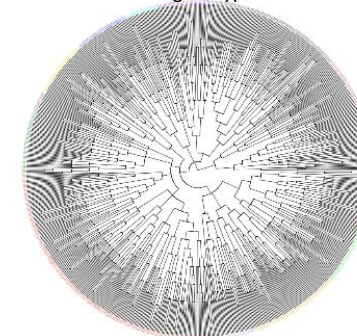
### Main Breeding Species

*A. crassicaarpa*  
*A. auriculiformis*  
*A. aulolocarpa*

### Breeding strategies

- Secure a broad genetic diversity

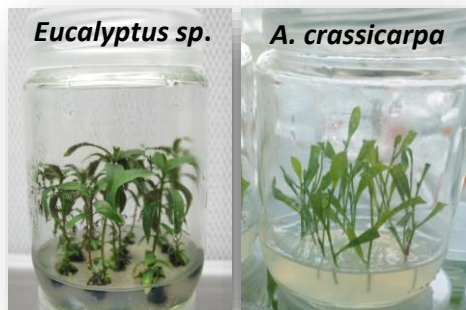
Genetic Diversity Dendrogram  
 800 F1 genotypes



APRIL does not use any genetically modified organisms (GMOs) in any of its research programs and initiatives, or in any areas where research takes place under the company's direct or indirect responsibility.



## Tissue Culture



### Mother plants production

- Fast multiplication of high valuable genetic materials
- Genetic integrity and archive of selected genotypes
- **Pest and disease - free initiation of mother plants**
- Rejuvenate genetic materials for efficient multiplication

### Strategic multiplication

- Movement of genetic materials national and internationally
- Cloning difficult plant material
- **Use state of the art technologies for massive production of high valuable genetic material**



## Objectives

- Produce high quality plants for mother plants
- Fast production of high valuable genetic materials
- Rejuvenate genetic material for efficient multiplication
- Multiply genetic materials for trials

## Nursery Research



### Nutrition and environmental management

- Clone or family specific multiplication protocol
- **Develop protocols for optimized use of fertilizer, water, light and temperature**
- Rejuvenate genetic material for efficient multiplication

### Production of plant material for genetic trials

- Production of plant material for trials
- **Rescue high valuable clones and families**



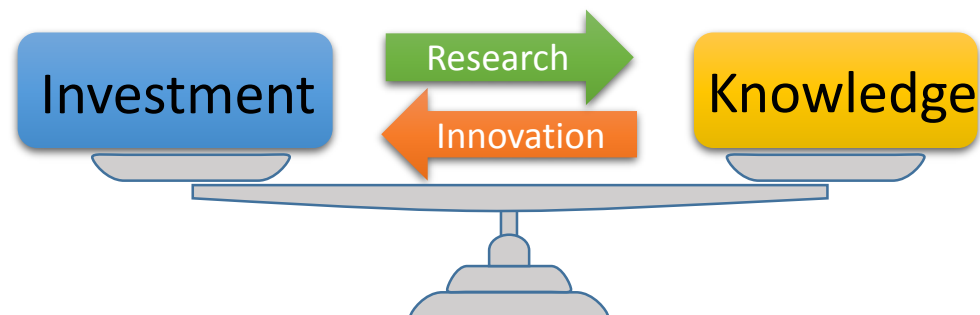
R&D provides science-based knowledge to increase plantation productivity and efficiencies. For that, having a highly qualified team of researchers is important



The main focus of research are Tree Improvement, Plant Health, Silviculture and Plant Propagation with specific objectives aligned with company's targets and commitments



R&D activities have resulted in a sustainable increase of plantation productivity and aim to keep doing so to achieve the company's target to increase plantation productivity by 50% by 2030









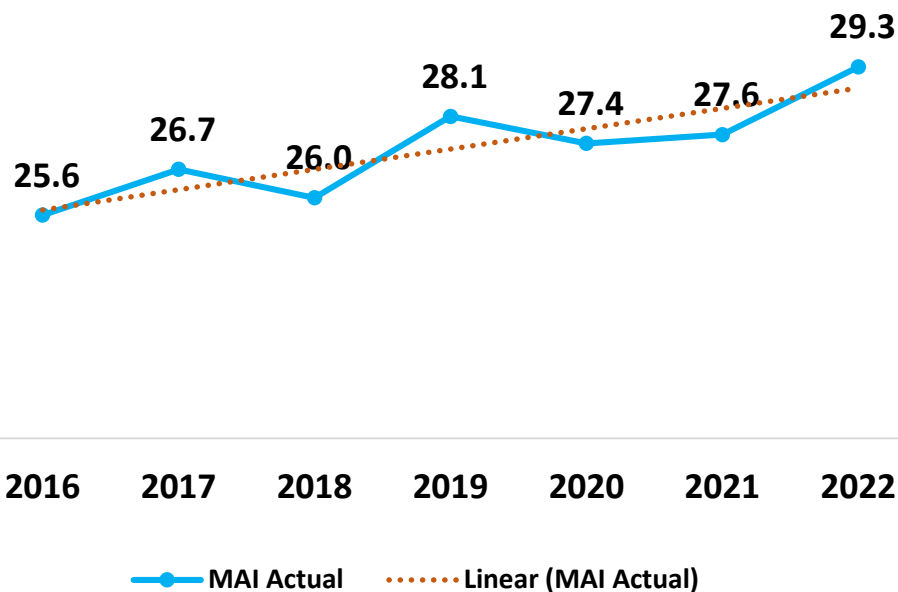
# Plantation MAI Improvement 2016 - 2022

MAI (Mean Annual Increment) - m<sup>3</sup>/ha/year

## Key Focus Area

### Site Specific Management Regimes

- Enhance and refine site quality characterisation at compartment level
- Site species genotype matching with silvicultural best practices
- Site specific silvicultural prescriptions



All Species (ACRA, EUCA, AMAN)

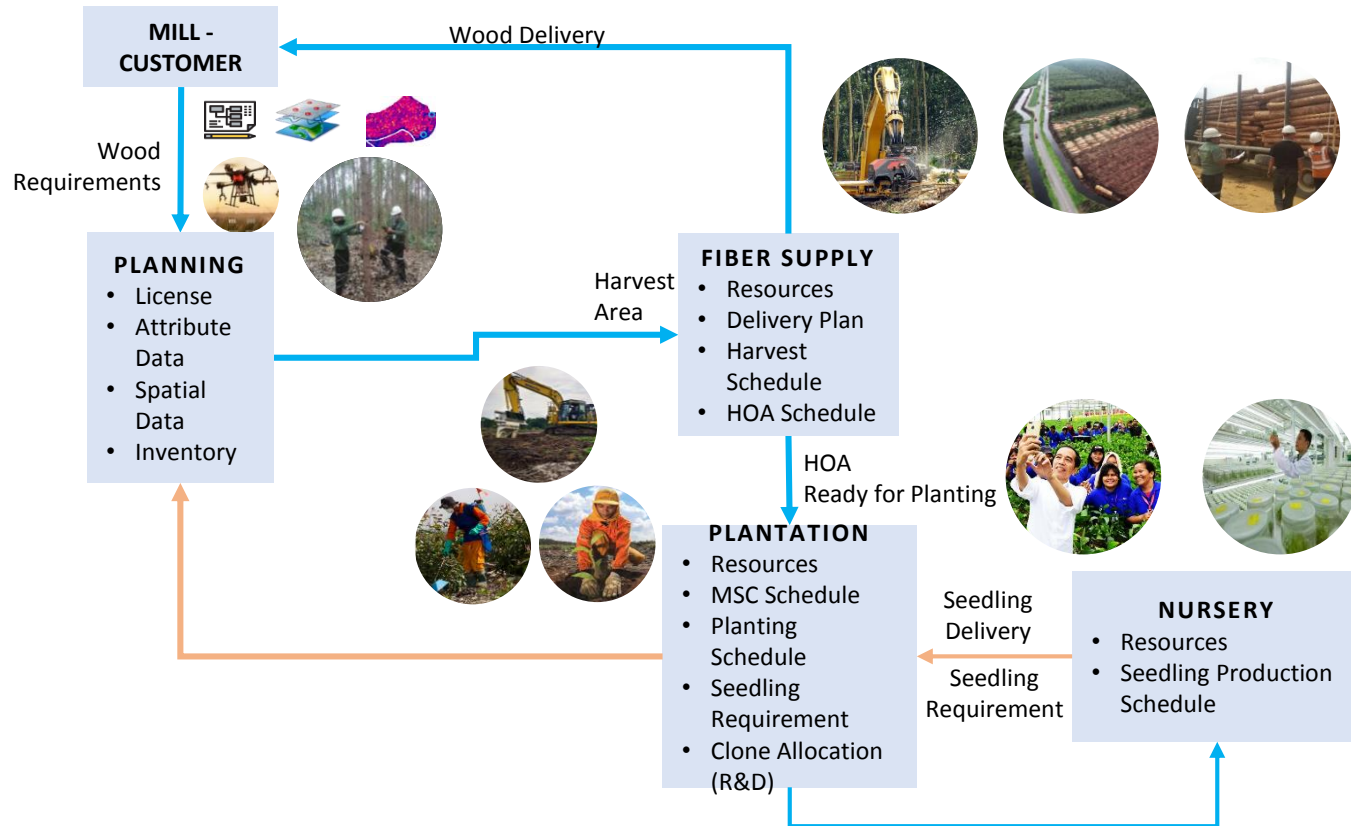
# Fiber Productivity Improvement

**Mark Holmes**  
**Plantation Head**

**Jelo Singh**  
**Dy. Fiber Director**

## FOREST PLANNING- Implementation for Precision Forestry

### INTEGRATED OPERATIONAL PLAN



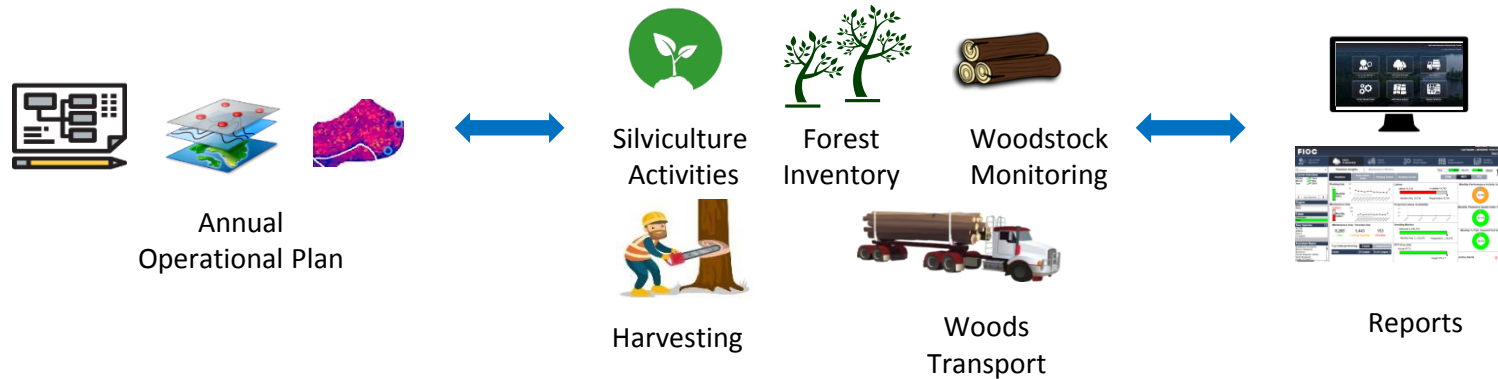
- **Integration** across business value chain
- **Phasing & scheduling of requirements**, to ensure right activities are done on-time and at the right time
- Ensure that R&D recommendations and SOP are followed, including Clone / Family, soil cultivation, spacing, fertilizer regimes





## FOREST PLANNING

### DIGITAL TRANSFORMATION TOWARD PRECISION FORESTRY



#### TRADITIONAL FORESTRY MANAGEMENT

- Manual data capture
- Reactive decision making
- Multiple silo systems
- Lots of data, less information, less insights!



#### NEXT GENERATION

- **Connected** – Intelligent – Scalable- Rapid
- **Data Accuracy** & Data Availability
- Near **real time** to access data
- **Proactive** decision making
- **Single source** of data



# Mechanized Silviculture

## Objective

- Introduce appropriate technology to develop and scale up to improve quality of plantation activities.

## Drone Based



- **Diverse applications:**
  - Pre-emergent Chemical application
  - Herbicide Spraying application
  - Pesticide Spraying application
- Improvement in quality of results due to
  - Increased on-time application
  - **Consistent application quality** since flight speed, height and application are set at time of operation
- More **resource efficient** (lower application rate)
- 40% **Reduced labour** requirement, however maintenance and support required

## Ground Based



- Herbicide application in later weeding rounds
- **Reduced** labour requirement, however maintenance and support required
- Best suited to work in flatter areas

# Peatland Water Management

## Hydrological water balance, Water Table (WT) management, and Plantation Productivity

- WT management across an elevation range (5masl to 20masl) is achieved using **water zones** (similar elevation)
  - 1,593 units established Dams
  - 2,685 units of Water Control structures
  - Managed by 140 dedicated staff
- Production area WT is managed between -40 and -60cm
- **Achievement of Plantation productivity (Achieved target MAI=29.3 m<sup>3</sup>/ha in 2022)**

## Fire Prevention

- Minimize fire risk when WT is in the range -40 and -60cm
- Canal functions as fire breaks, patrol access & water storage

## Transportation

- Canal functions as transportation for logistics and wood





More than **USD 9 Million** invested in fire equipment

**No-burn** policy since **1994**

Focused on **fire prevention** in and around concession areas

**Monitor, detect and suppress fire** threats in and around concession areas



More than USD 2 Mio annual budget for fire team



Support local and national government in fire suppression activities



Monitor fire threats via two NASA based system hotspot monitoring, CCTV, UAVs



989 firefighters / rapid response team



Provides training to 724 volunteers



# Fire Prevention and Suppression

## Objectives

- Zero Fire within concessions
- Prevention rather than suppression
- Increased awareness amongst communities

## Fire Prevention and Monitoring



- No Burn policy since 1994
- **CCTV**, Fire Towers & Command Center
- UAV, Vehicle and Foot Patrols
- **Educating communities**
- Fire Free Village Program



## Detection and Suppression



- **Training** firefighters
- Rapid Response team at each estate & FERT team in HO
- Perform regular drills
- **Equipment** as per Govt regulation
- Support local and national government in fire suppression activities







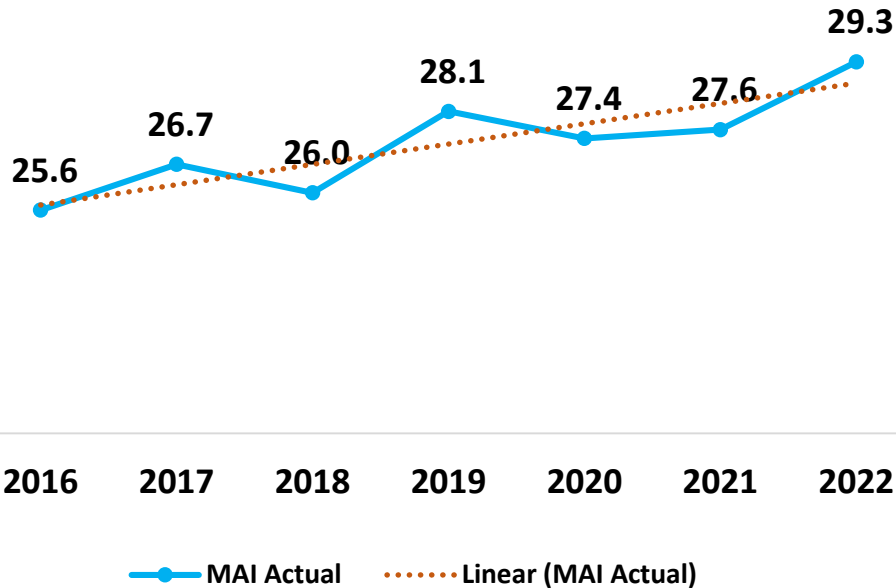
**EUCALYPTUS PLANTATION**



- **High productivity**
- **Uniform growth and stocking**
- **Good soil conservation for future rotations**

# Plantation MAI Improvement 2016 - 2022

MAI (Mean Annual Increment) - m<sup>3</sup>/ha/year



All Species (ACRA, EUCA, AMAN)

## Key Focus Area

### Contractor Development & Mechanization

- Professional contractor development
- Plantation mechanisation to support precision forestry

### Improving log quality & reducing fiber losses from Plantation to Mill



## Mechanized Harvesting

**Harvesting Mechanization** enables APRIL to increase productivity via greater efficiency and reduced reliance on manual labour

Harvesting mechanization benefits

- Ensuring safety and more sustainable practices with specialized manpower
- Optimizing efficiency (including fuel) and productivity
- Providing consistent wood delivery to mill all year round
- Cut-to-length: Even spreading of harvest residues improving sustainable operations and soil conservation



**Sustainable Spreads of Harvesting Debris**



**Excavators Driving on Top of Processing Line**



**Harvester Machine**

Responsible for felling, delimbing-topping, debarking, bucking, bunching



**Extraction Machine**

Responsible for extracting wood from infield to road side.



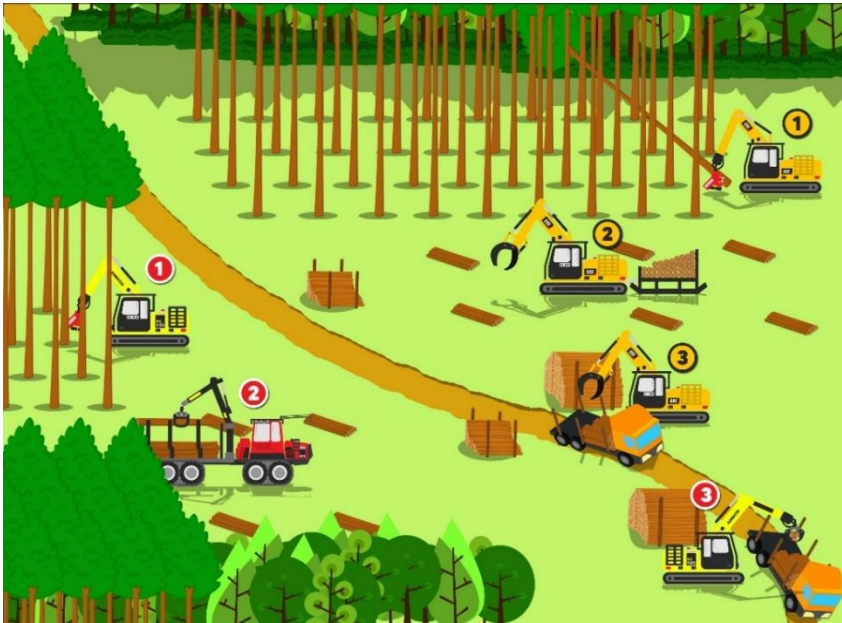
**Loader Machine**

Loading the wood from compartment roadside to Trucks

**35% of all our fuel comes from renewable sources**



## Progression to Full Mechanization



**Mineral Soil: Full Mechanized Harvesting**

1. Felling
2. Extraction with Forwarder or Sleigh
3. Truck loading

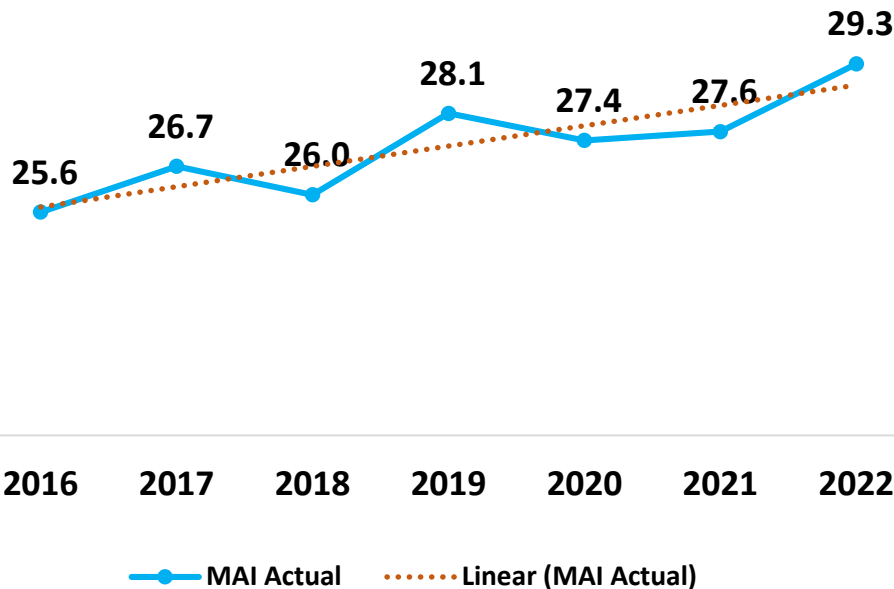


**Lowland: Full Mechanized Harvesting**

# Plantation MAI Improvement 2016 - 2022

MAI (Mean Annual Increment) - m<sup>3</sup>/ha/year

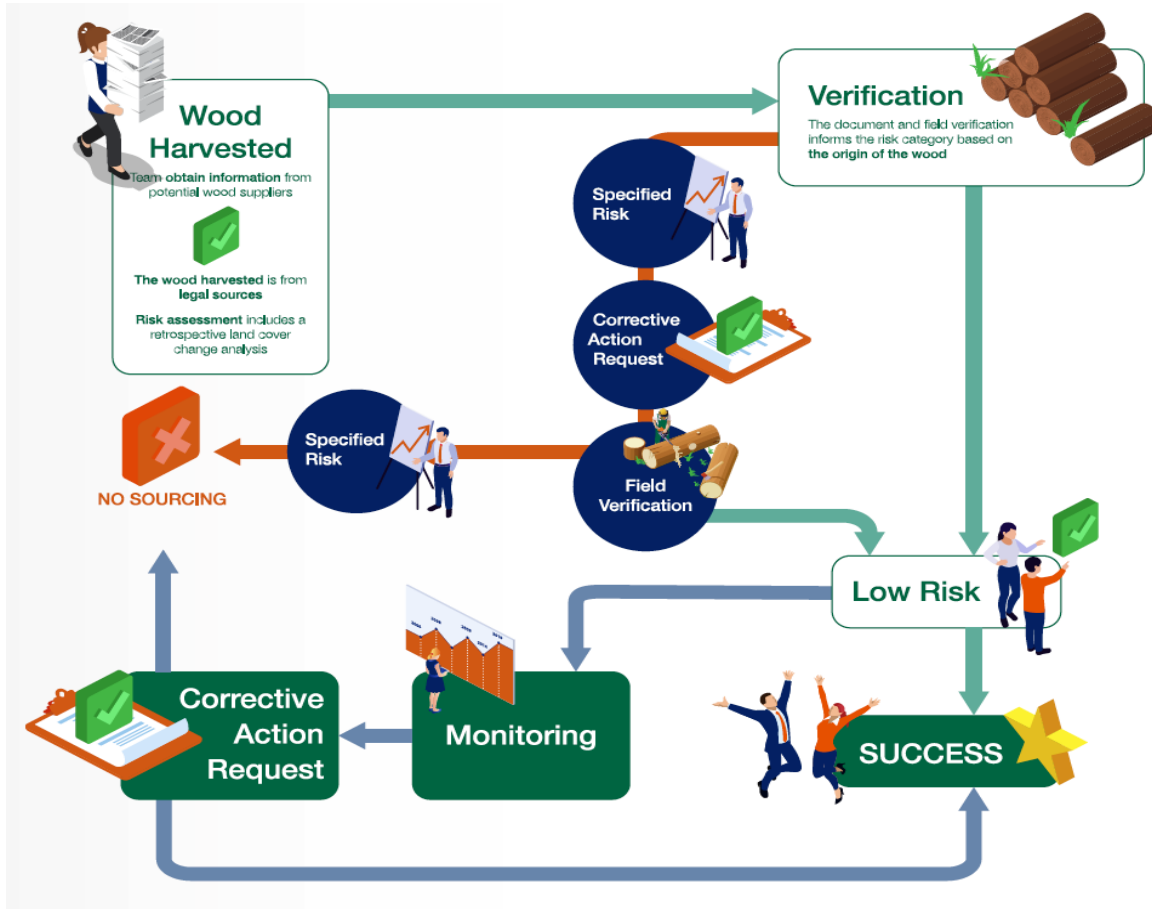
## Key Focus Areas



All Species (ACRA, EUCA, AMAN)

- Genetic Improvement & Integrated Pest and Disease Management
- Site Specific Management Regimes
- Contractor Development & Mechanization
- Improving log quality & reducing fiber losses from Plantation to Mill

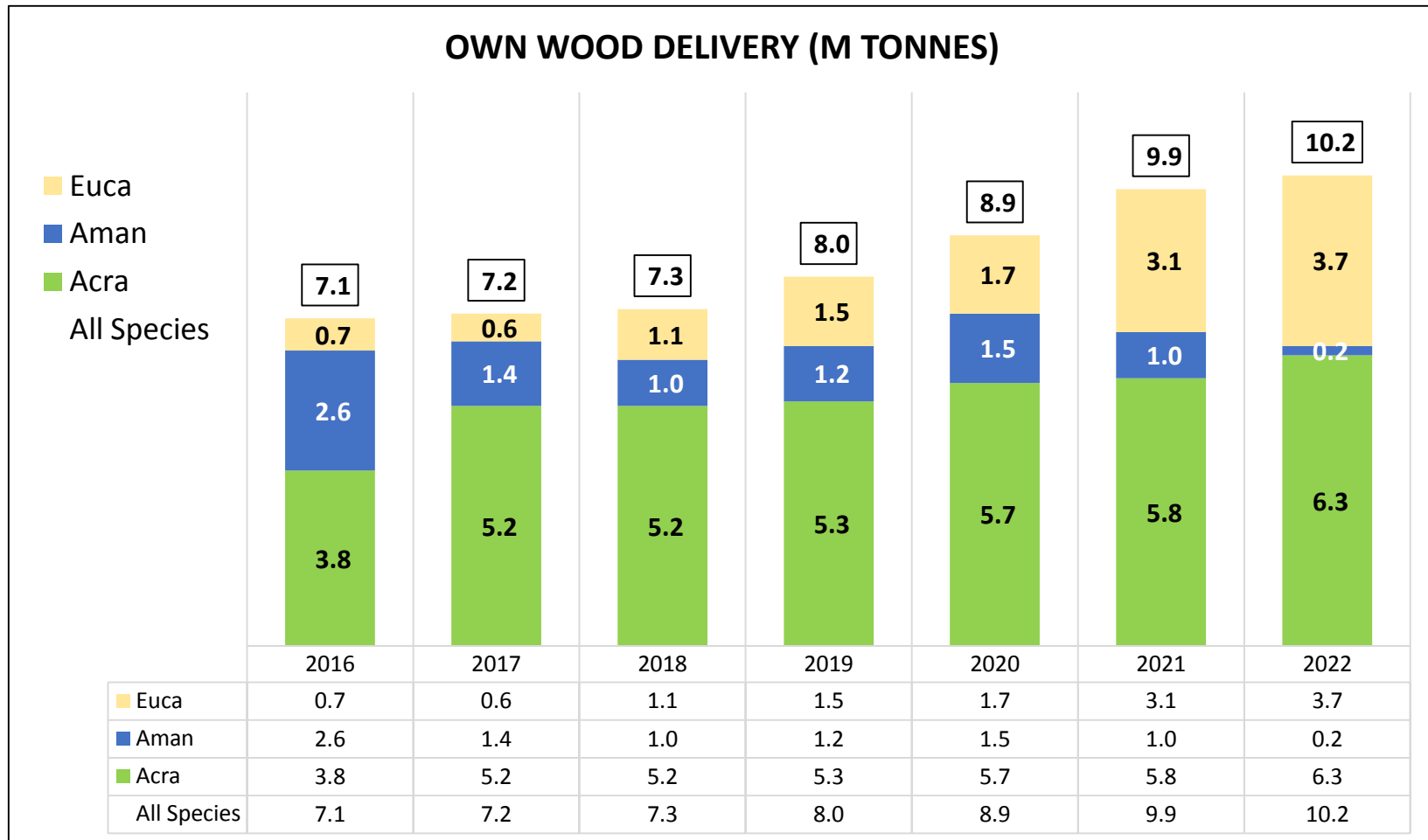
# Wood Supply Sourcing Due Diligence and Verification Process



## Meets SFMP2.0 criteria

- No deforestation
- Legally compliant
- Traceable
- Subject to due diligence check and Sustainability sign off prior to contract
- Internal audit
- External audit
- Land cover change monitoring
- Ground verification

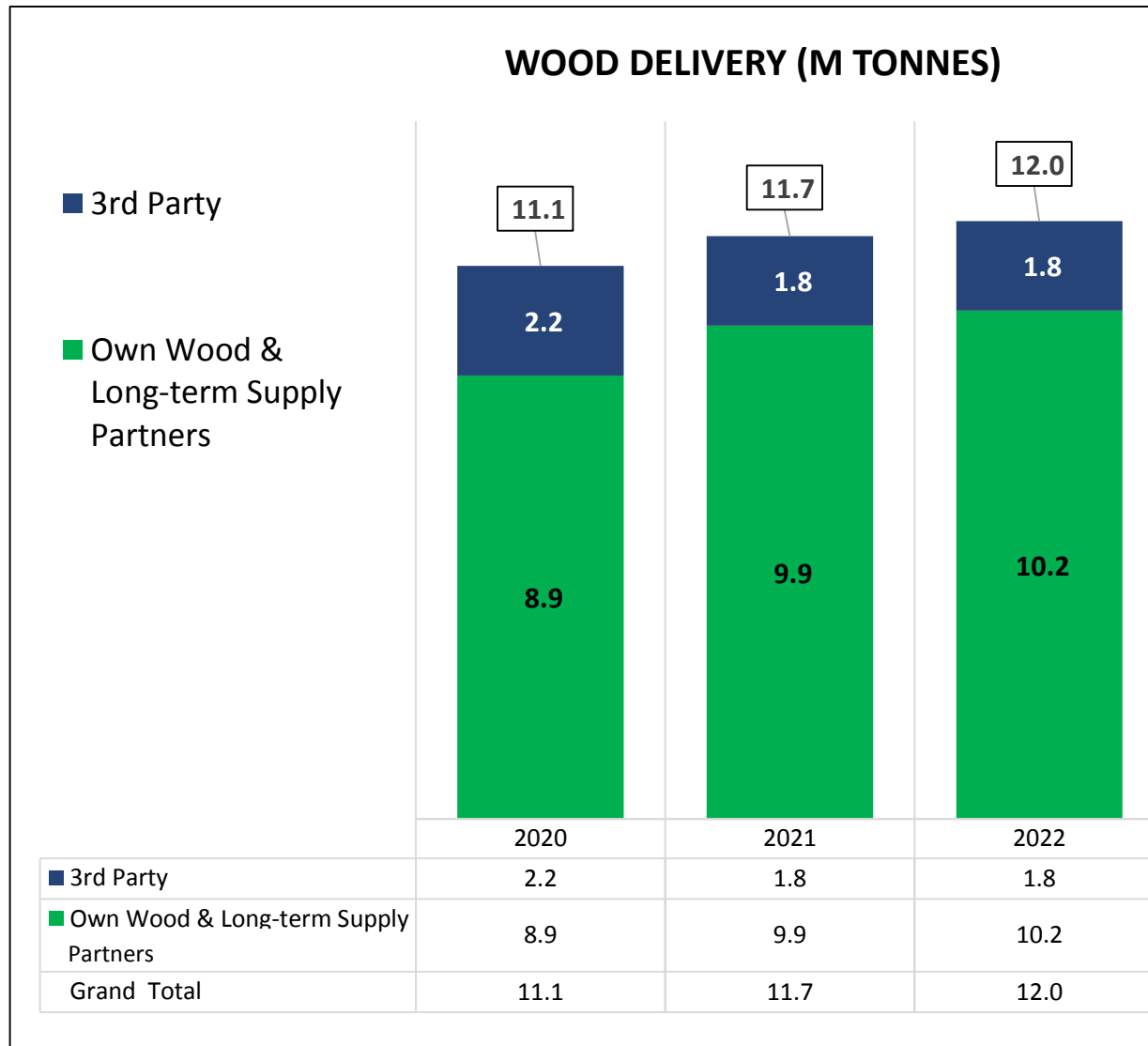
# RAPP Own + SPs Wood Delivery 2016 - 2022



Baseline 7MT → 10MT (+40%)  
From same plantation footprint (450KHa)



# Wood Delivery 2020-2022



In 2022, Own & LT Supply Partner = **10.2 MT** or 85% of the Wood Delivery



