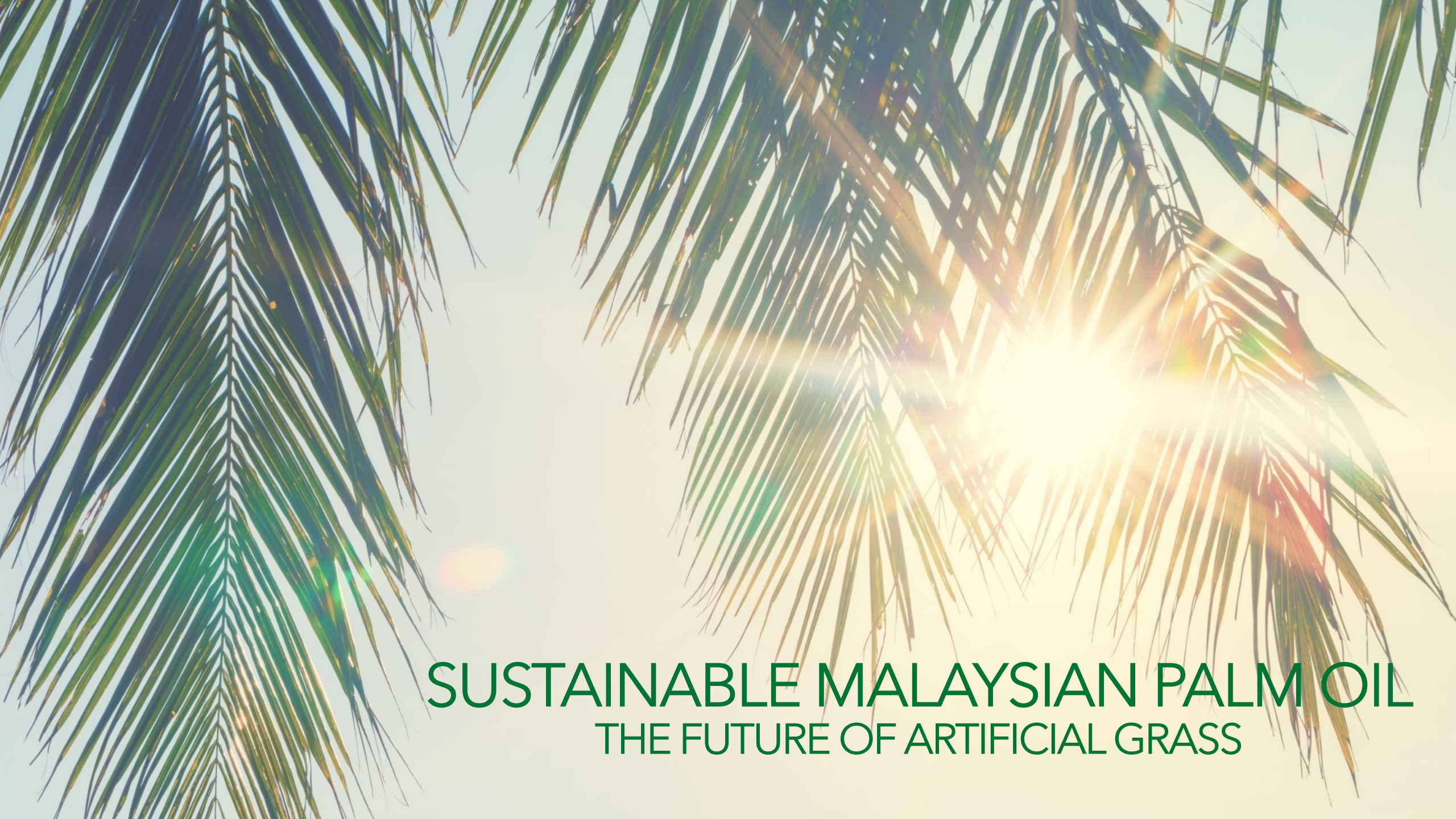
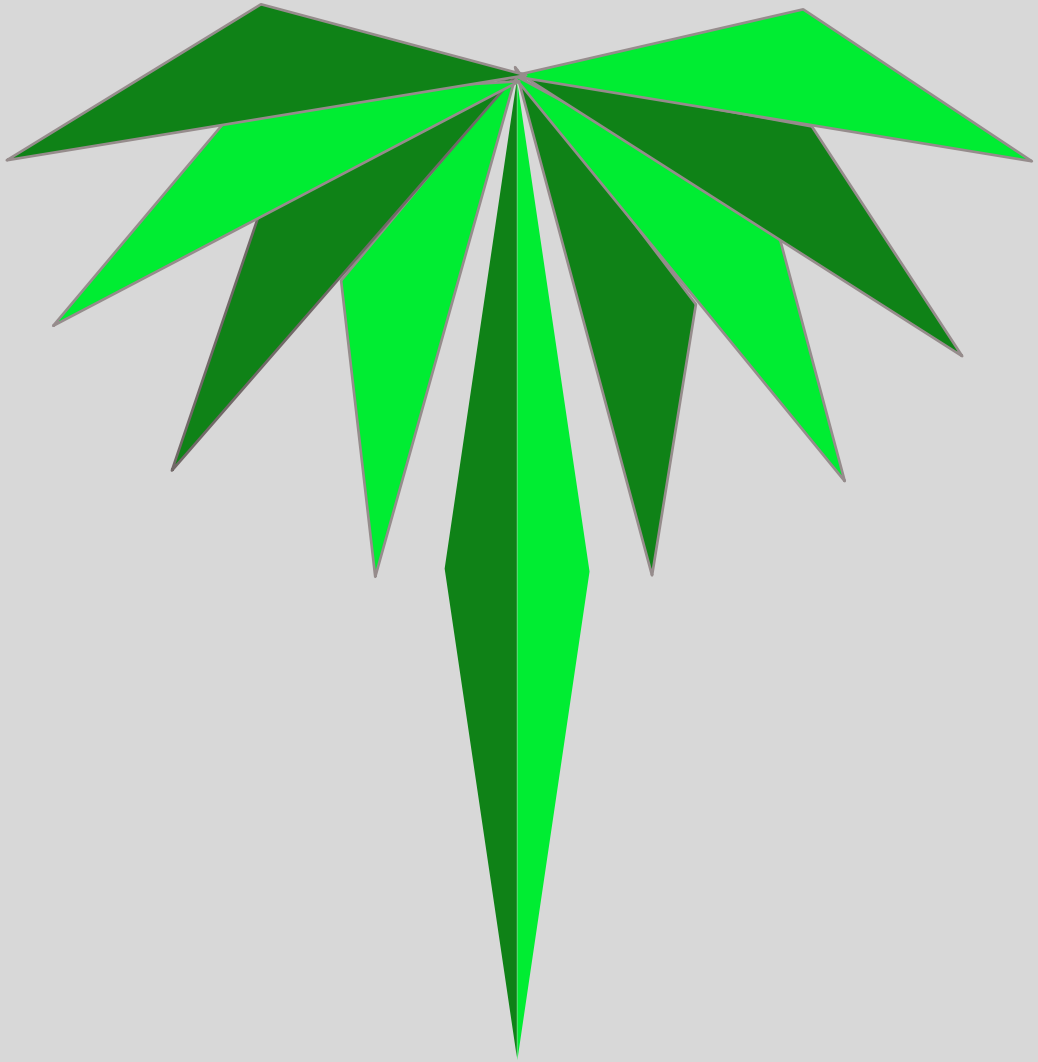


SUSTAINABLE MALAYSIAN PALM OIL

THE FUTURE OF ARTIFICIAL GRASS



PRESENTED BY

MAHESH GANAPATHY

Palmyra Polyurethane Systems Sdn. Bhd.

(1379367-T) (202001023047)

No.18 Jalan Setia Nusantara U13/19K

Bandar Setia Eco, 40170 Shah Alam,

Selangor, Malaysia

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THE PAST

- ARTIFICIAL GRASS or SYNTHETIC TURF was first developed in the 1960's by an American company called ASTROTURF (hence the synonymous name).

- 1st Generation Turf (1G) was introduced in the 1970's but was poorly accepted as it no characteristics of natural turf. It was abrasive, unnatural colour and poor quality.

THE PRESENT

- 2nd Generation Turf (2G) introduced in the 1980's was much improved but still lacked the natural feel and the performance attributes expected to replace natural turf.

- 3rd Generation (3G) Turf has had a much wider acceptance especially in certain major sports. It has a natural grass feel and high performance characteristics to take the punishing rigours of heavy duty sports including Hockey, Football and Rugby. It has dramatically improved playability.

- Developments & improvements in materials and manufacturing has greatly enhanced the quality of artificial turf.

ARTIFICIAL GRASS – GLOBALLY RECOGNISED

- FIFA (International Football Federation) has developed the FIFA Quality Turf to certify and approve artificial football turf to an approved set of standards to be adopted to ensure the turf meets the highest quality.

- IHF (International Hockey Federation) approved the use of synthetic turf since the 80's and certifies artificial turf under it's Preferred Producer Programme.

- IRB (International Rugby Board) similarly has it's own set of standards for the manufacture and use of artificial turf for all board sanctioned games.

- ITF (International Tennis Federation) has adopted standard testing and evaluation procedures for stadiums using artificial turf as the playing surface.

THE INDUSTRY

- Global Market valued at US$ 3.05 billion in 2020 and is expected to reach US$ 4.45 billion by the end of 2026, growing at a CAGR of 5.5% during 2021-2026.
- Main segments are Sports (65%), Landscaping (30%) & Multi-purpose (5%)
- Artificial Turf helps save million gallons of water
- Eliminate use of harmful fertilizers and pesticides used for natural grass
- Easy to maintain and replace, which significantly reduces the maintenance cost
- Contains anti-bacterial properties, which help prevent the spread of bacteria and germs
- Unlike natural grass, it is not exposed to hazardous pesticides
- Marketing strategies adopted by industry players include the production of artificial turfs that have a superior quality and are approved by FIFA, FIH, ITF, etc

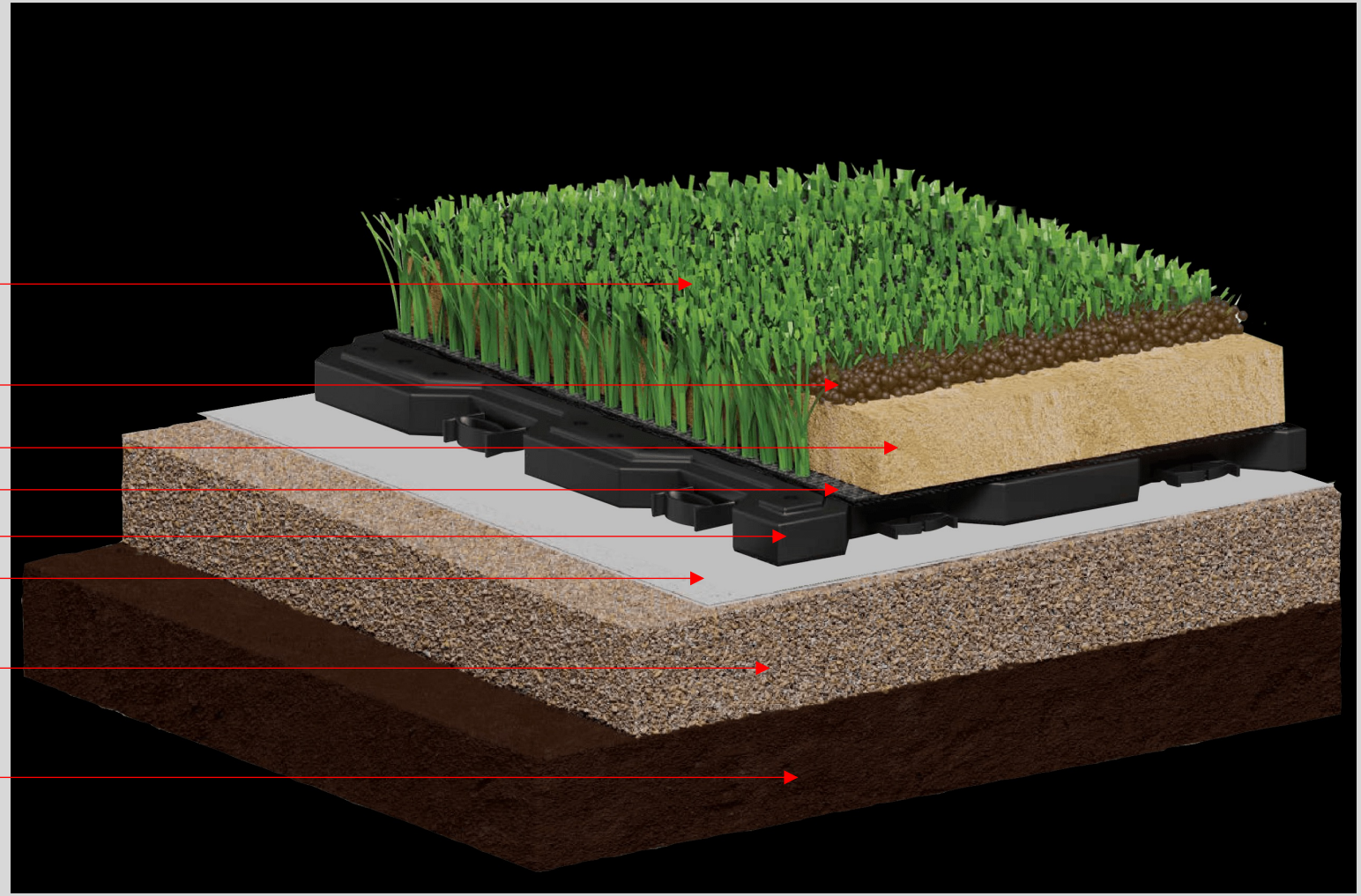
THE INDUSTRY

- Schools and sports clubs are likely to be key consumers for the product as it can sustain wear & tear. Increasing sports activities in Asian countries and increasing investments by the governments in playgrounds and sports programs are likely to have a positive impact on the artificial turf market growth over the projected period.
- Increasing participation in outdoor sports by the young population across the globe has created a scope for the construction of new stadiums and sports fields and, in turn, supported the industry growth.
- Europe accounted for a major share of the market, in terms of revenue, globally in 2018 and is anticipated to grow at a significant rate over the projected period. Presence of a large number of sports fields, switching trends from natural grass to synthetic grass, and increasing popularity of outdoor sports are expected to upkeep the market growth for artificial turf in the region.
- Asia Pacific is projected to register a growth rate of 5.7%, in terms of volume, over the forecast period owing to increasing constructions backed by rising investments from foreign multinationals. Developing tourism and hospitality industries are the major drivers triggering the consumption of the product in commercial applications. Moreover, growing constructions for commercial playgrounds and rapid urbanization are likely to support market growth.

THE FUTURE

- 4th & 5th Generation Turf (4G & 5G) with the emphasis on recyclability and sustainability.
- End Of Life issues of disposals at landfills to be eliminated.
- Single Material source to help recyclability and reuse.
- Reducing environmental impact through better materials, reduced water consumption and elimination of fertilizers & pesticides.

COMPONENTS OF ARTIFICIAL TURF SYSTEM



BIO BASED GRASS : A SUSTAINABLE FUTURE

- Materials are industrially produced from petroleum derivatives.
- Higher demand and consumption of petroleum and its derivatives has led to depletion and escalation in petroleum prices.
- Petroleum is a non-renewable material.
- Sustainable technologies developed to produce raw materials using renewable resources such as vegetable oil as an alternative to petroleum.
- Soybean oil, sunflower oil, safflower oil, and palm kernel oil has been used in many researches to produce eco-friendly raw materials.
- Palm Oil can be a viable source to create a sustainable eco-friendly artificial grass.

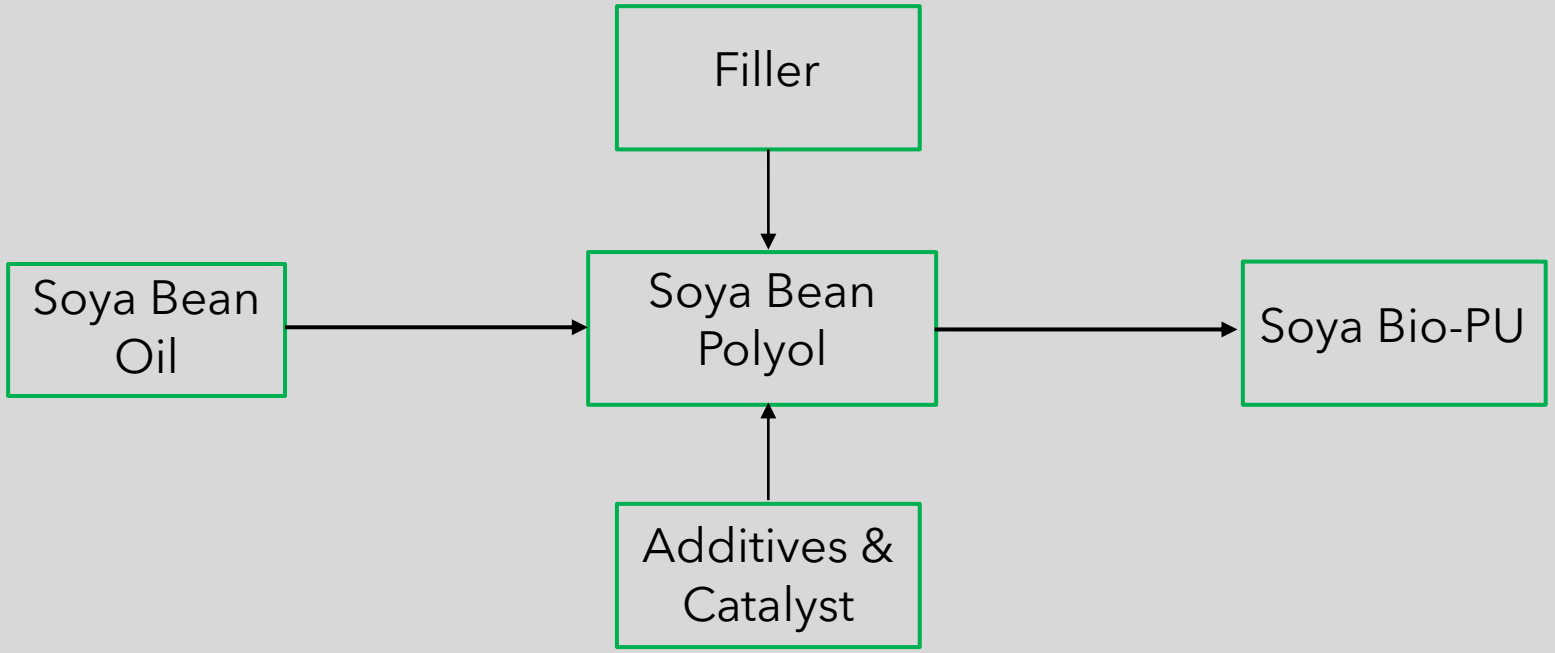
PHASE 1
BIO-POLYURETHANE COATING

POLYURETHANE COATING FOR ARTIFICIAL GRASS

Coating

Coating of Polyurethane (PU) mainly from Petroleum derivatives

CURRENT DEVELOPMENTS
Soya Bio-Polyurethane (PU) Coating



Note : Filler, Additives & Catalyst readily available in the market

CURRENT DEVELOPMENTS – SOY Bio-PU

- The United Soybean Board (USB) is committed to increasing the supply of biobased products that benefit our nation's economy and our rural economy, create green jobs, improve the environmental and health impacts and reduce dependence on foreign oil.
- Soy Bio-PU help reduce greenhouse gas emissions.
- Soy Bio-PU can also offer environmental and health benefits, such as lower VOCs, less exposure to toxic chemicals as well as irritation from odors, and more.
- Soy Bio-PU can replace up to 60 percent of petroleum-based polymers.
- Bio-PU is comparable to Synthetic PU in terms of strength.
- To demonstrate U.S. soybean farmers' sustainability, the **Sustainable Soy Assurance Protocol (SSAP)** was developed.

Source : www.soybiobased.org

PALM OIL Bio-PU : The New Alternative

"Often organic alternatives to plastic based products come with their own problems, for example the growing of non-food crops to produce products can displace food production, and ultimately extend the agricultural frontier, leading to reduced biodiversity. This is why, it may not be feasible to replace all oil-based plastics in the world with bioplastics".

Source : ENVIRONMENTAL IMPACT STUDY ON ARTIFICIAL FOOTBALL TURF - FIFA March 2017

- Palm Oil has highest Yield/Acre of all the Oil Crops
- Palm Oil Yield/Acre almost 10 Times that of Soya Bean Oil
- World's 1st Sustainable Oil Crop (2008)
- One-Fifth (19%) of global supply of Palm Oil is Certified Sustainable Palm Oil (CSPO)

- 29% of Global supply of CSPO is produced in Malaysia
- Global Palm Oil Production – 76.1 Million Tonnes
- Indonesia accounts for 58% & Malaysia accounts for 26%
- 86% of European Palm Oil imports is Certified Sustainable

With Palm Oil having the highest Yield/Acre, it provides an excellent alternative to other oil crops. It will result in less displacement for food production, and ultimately reduce the agricultural frontier, leading to increase in biodiversity.

Palm Oil has an average emission of 0.45 Metric Tonnes of Carbon Dioxide equivalent per tonne (MT CO2eq./MT) oil compared with 2.89 for Soya Bean, 2.47 for Rapeseed and 1.18 for Sunflower.

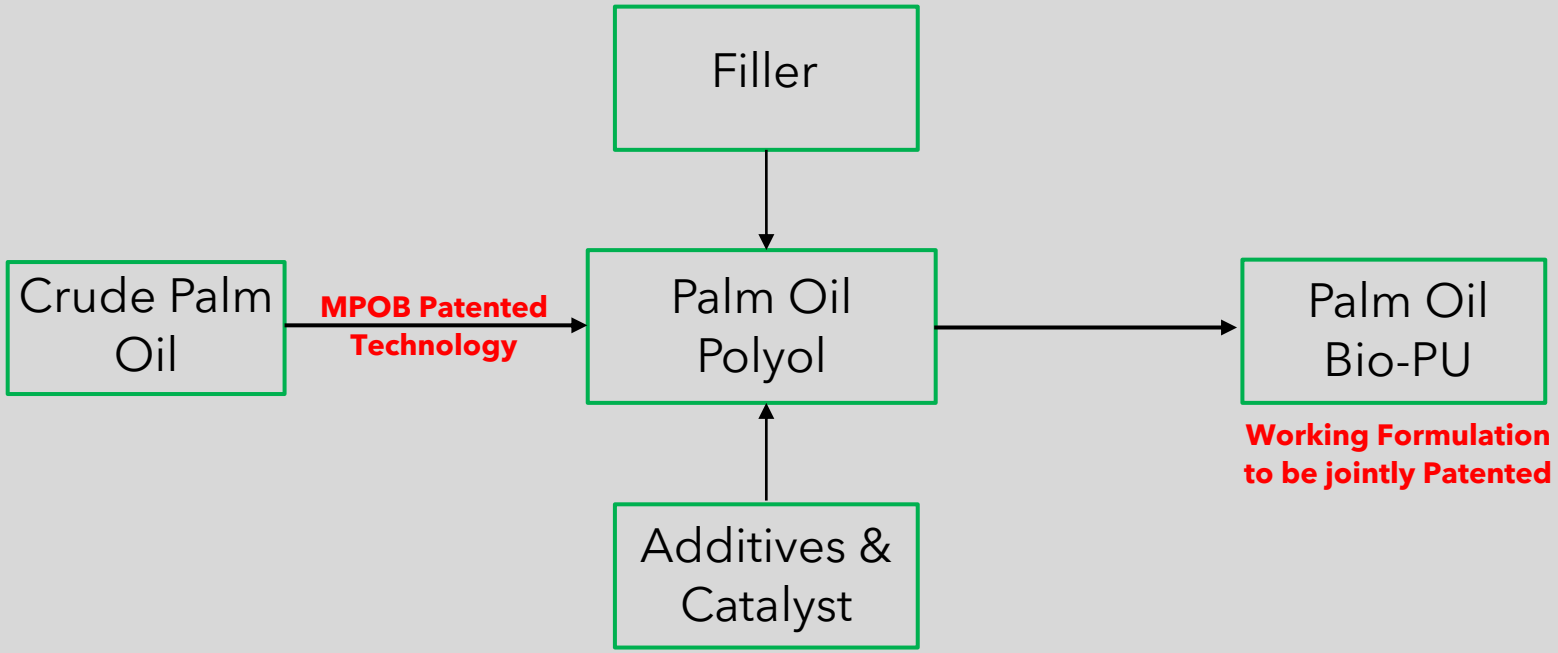
A study has shown that oil palm requires about 19.2 GJ of energy per hectare per year to produce one tonne of oil which in turn gives back 182.1 GJ of energy per hectare per year through its products. (Note: GJ = Giga joules). This gives oil palm a very favorable input-output energy ratio of 9.5 as compared to 2.5 for soybean and 3.0 for oilseed ripe.

Source: http://mpoc.org.my/

CURRENT DEVELOPMENTS – Palm Bio-PU

- Malaysian Palm Oil Board (MPOB) has patented technology to convert Crude Palm Oil (CPO) to Palm Oil Polyol.
- Palmyra PU Systems and MPOB will collaborate to derive a Working Formulation (WF) to produce a commercially viable product for the coating for Artificial Grass.
- The WF will be jointly patented by MPOB & Palmyra PU Systems.

WORKING FORMULATION
Palm Oil Bio-Polyurethane (PU) Coating



Note : Filler, Additives & Catalyst readily available in the market

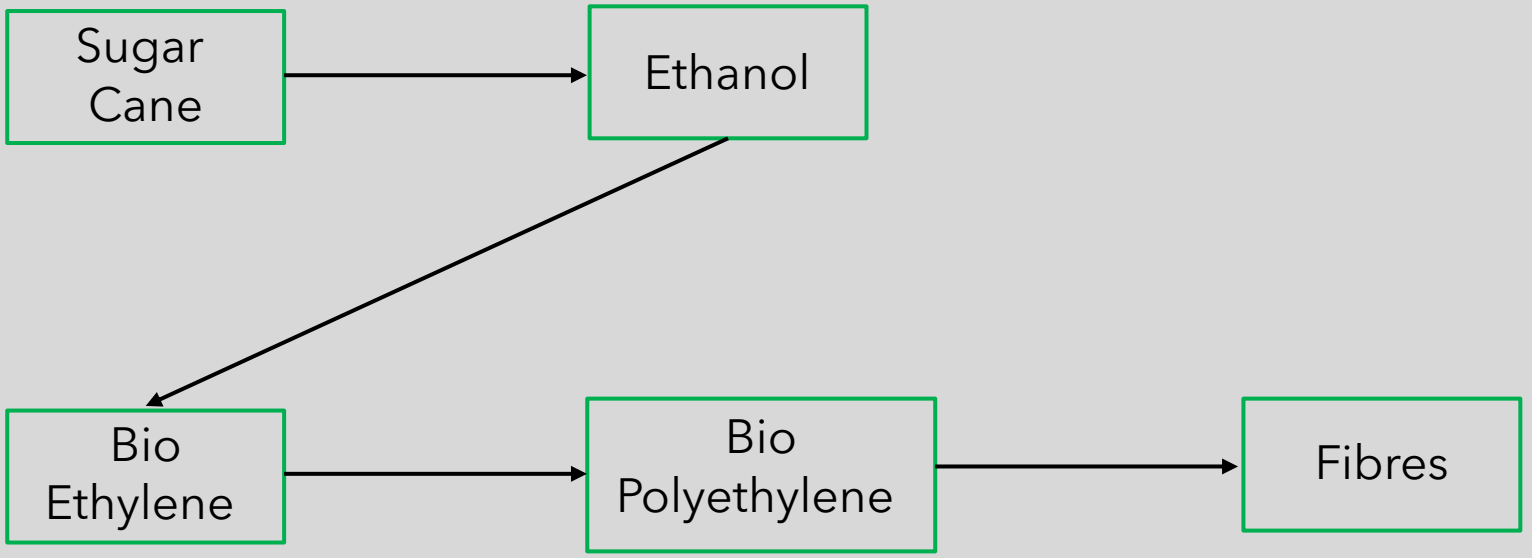
PHASE 2
BIO-POLYETHYLENE FIBRES

ARTIFICIAL GRASS FIBRES

Synthetic Fibre

Consisting mainly of either
Polyethylene, Polypropylene & Nylon
All derived from Petroleum

CURRENT DEVELOPMENTS
Bio-Polyethylene (PE) Fibres



CURRENT DEVELOPMENTS – Bio-PE

- Brazil has some of the world's lowest-cost sugar, giving it a cost advantage against other countries.

- Bio-Polyethylene (also known as renewable polyethylene) is polyethylene made out of ethanol, which becomes ethylene after a dehydration process. It can be made from various feedstocks including sugar cane, sugar beet, and wheat grain.

- One of the main environmental benefits of Green PE is the sequestration of roughly 2.15 tons of CO2 per ton of Green Polyethylene produced, which comes from the CO2 absorbed by the sugar cane while growing, minus the CO2 emitted through the production process.

- Producing feedstock for biobased plastics relies upon intensive agriculture, potentially contributing to deforestation in order to clear land for agricultural use. Large-scale production of feedstock also requires inputs such as fossil fuels, fertilizers, and pesticides.

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PALM OIL Bio-Diesel : The New Alternative

- Oil Palm produces much more oil per area unit than other oil crops.
- Palm Oil requires less area than alternative crops to produce bio-diesel.
- Replacing Palm Oil would be environmentally beneficial only if the carbon footprint per litre oil is lower for alternative crops.
- Oil Palm has the lowest average carbon footprint per unit of oil produced among 7 major oil crops.
- Palmyra PU Systems will be looking to collaborate with Malaysian & Overseas companies involved in Bio-Diesel production to develop Bio-Polyethylene materials to produce Artificial Grass Fibres.

SPORTS, THE ENVIRONMENT & SUSTAINABILITY

- FIFA Environmental Pillar (Qatar 2022 World Cup)

- International Olympic Committee Sustainability Initiative &

The Tokyo 2020 Olympics

- UN Sustainable Development Goals 2030

- World Federation Sporting Goods Industry (WFSGI) Sustainability Goals

ENVIRONMENTAL PILLAR

- Sustainable procurement: ethical sourcing of green materials that maximise resource efficiency and reduce emissions, waste and impacts on biodiversity.
- Free or low in toxic substances that may affect human health.
- Sustainable procurement policy and sourcing code to ensure suppliers apply sustainability practices in their supply chain.

International Olympic Committee (IOC) Sustainability Factors

INFRASTRUCTURE AND NATURAL SITES

Development and operation of indoor and outdoor sites[4] wherever sports activities take place, including support and administrative infrastructure such as non-competition venues[5] at the Olympic Games and offices of the Olympic Movement's organisations

SOURCING AND RESOURCE MANAGEMENT

Sourcing of products and services by organisations within the Olympic Movement, and management of material resources over their lifecycle

MOBILITY

Mobility of people and goods associated with the Olympic Movement's activities, at the local and global scale

WORKFORCE

Working conditions and opportunities offered to employees, volunteers and contractors of the Olympic Movement

CLIMATE

Management of direct and indirect greenhouse gas emissions associated with the Olympic Movement's activities, and adaptation to the consequences of climate change[6]

IOC - Sourcing & Resource Management

- Sourcing of products and services by organisations within the Olympic Movement, and management of material resources over their lifecycle.
- Integrate sustainability in the sourcing of goods and services, including those from all partners and official licensees.
- Sourcing of products and services takes account of environmental and social impacts.
- Products and materials are treated as valuable resources and their lifecycle is optimized.

THE TOKYO 2020 OLYMPICS

- Sustainable Sourcing Code for the Promotion of Sustainable Palm Oil provides a framework for sustainable procurement of palm oil (including palm kernel oil) used for products, services, etc. procured by the Tokyo 2020 Olympic Organising Committee (hereinafter “Tokyo 2020”).

- Suppliers shall procure the above-mentioned processed food and others made with the use of palm oil as a raw material that complies with this Sourcing Code as preferentially as possible, considering the amount of palm oil used for each product.

- *Poligras Tokyo GT Hockey Turf : 60 percent of this material is now replaced with the bio-based* ***I´m Green™*** *Polyethylene, made from the renewable resource of sugarcane.*

Source : Sourcing Code for the Promotion of Sustainable Palm Oil – Tokyo 2020

Sustainable Palm Oil In Numbers

RSPO
Roundtable on Sustainable Palm Oil

1 SUSTAINABLE PALM OIL

World's First Certified sustainable vegetable oil awarded in 2008 to Malaysian Palm Oil through RSPO.

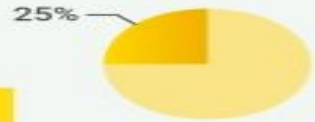
MSPO

2 MANDATORY FOR ALL

It is mandatory for the entire Malaysian Palm industry to be MSPO certified.

3 ONE-FIFTH OF GLOBAL SUPPLY

19% or about one fifth of the world's palm oil is certified sustainable palm oil (CSPO).



4 ALMOST 1/4 FROM MALAYSIA

25%, of the world's certified sustainable palm oil (CSPO) is produced in Malaysia as of August 2021.

5 CERTIFIED AREA

88% of Malaysia's total planted area has been MSPO certified as of October 2021.

1.16mil

6 CERTIFIED SMALLHOLDERS*

1.16 mil hectares total certified planted area for Malaysia smallholders as of October 2021.

*Organised & independent

| MPOCHQ www.mpoc.org.my

Malaysian Sustainable Palm Oil (MSPO)

Inclusiveness
Covers all stakeholders in the oil palm industry, including smallholders.

Government Funded
Financial assistance provided by the Government of Malaysia avoids additional costs being transferred to the end-users or consumers, promoting the stability of economies between exporting and importing countries.

Environmental protection
Is in line with the UN Sustainable Development Goals that ensure environmental protection.

Dynamic standard
Standard reviews from time to time for continuous improvement.

Assistances to Smallholders
Technical and financial assistances provided to bring 600,000 smallholders onboard the sustainability bandwagon.

Wildlife Protections
Protects wildlife in Malaysia.

Workers' Welfare Protection
Protects the welfares and rights of workers in the oil palm industry.

Equality
Equal opportunities are given to those who comply with sustainability requirements. No membership fee is required.

Accreditation
The Certification Bodies are authorized under Standards Malaysia & International Accreditation Forum (IAF)

“Sport is also an important enabler of sustainable development. We recognise the growing contribution of sport to the realisation of development and peace in its promotion of tolerance and respect and the contributions it makes to the empowerment of women and of young people, individuals and communities as well as to health, education and social inclusion objectives.”

Source : Paragraph 37, UN 2030 Agenda for Sustainable Development

WFSGI SUSTAINABILITY GOALS

- With few exceptions, sporting goods are currently designed, manufactured, sold, used, and then go to landfill – a linear and ultimately unsustainable, model.
- Shifting to more sustainable raw material sources makes sound business sense and mitigates risk due to environmental changes and/or related regulatory action.
- Improving the environmental footprint of raw materials and reducing waste across the whole sporting goods supply chain.

Source : WFSGI (World Federation Of Sporting Goods Industry) – A Better Game Plan (2016)


HELPING REDUCE OUR
CARBON FOOTPRINT

PALM OIL PLANTATIONS – CAPTURING CO2

- Palm Oil Plantation on average capture around 64 Tonnes of CO2 per hectare and release around 18 Tonnes of Oxygen.

  Source Henson (1999), PPKS (2004,2005)

- Promoting biodiversity in these plantations helps reduce the need for pesticides and promote more sustainable agriculture.

- Reduction of pesticide use further reduces the carbon footprint through decreased pesticide manufacturing, distribution and application. Further, it reduces the environmental effects associated with toxic releases into the atmosphere, soil and water.

PALM OIL - Bio-PE / Bio-PU / Bio-PLA

- Bio-materials reduce the reliance on Petroleum based materials.
- Extracting & Producing Bio materials is much more energy efficient than Petroleum based materials

WATER – An Invisible Carbon Footprint

- The energy needed to move, treat, and use water accounts for between 4% - 8% of a nation's overall carbon emissions.

- Nations that use desalinated water will have an even higher carbon emission.

ARTIFICIAL GRASS – Helping Reduce CO2 Footprint

- Eliminate the use of water to maintain the field

A typical natural grass sports field requires between 1.6 – 3.8 Million Litres of Water every year. Every Sq,Mtr. Of Natural Grass replaced with Artificial Grass saves 8,500 Litres of water per year.

- Incorporate rainwater harvesting systems in Artificial Turf sports fields, the rainwater can be filtered and collected for other uses, e.g. for cleaning systems at the venue

- Eliminate the use of pesticides & chemicals to maintain the field.

This will prevent water pollution which can lead to algal bloom, depleted oxygen levels and damage to wildlife.

- Reduce Air Pollution

It is estimated that a push lawn mower emits as much pollution in 1 hour as 11 cars and a riding lawn mower as much as 34 cars. (Source : US EPA)

- Use of electric or solar powered maintenance equipment

MPOB & PALMYRA

COLLABORATION AGREEMENT

SALIENT POINTS

COLLABORATION AGREEMENT

BETWEEN

MALAYSIAN PALM OIL BOARD

AND

PALMYRA POLYURETHANE SYSTEMS SDN. BHD.
(Company No.: 202001023047 [1379367-T])

ON

TECHNOLOGY LICENSING OF PALM OIL BASED POLYOL FOR FLOORCOVERINGS AND SPORTS FLOORING MARKETS

THIS AGREEMENT is entered into the ..... day of ...16 FEB 2021.....2021

16.02.2021
N2
NILAI

BETWEEN

MALAYSIAN PALM OIL BOARD, a body corporate established under the Malaysian Palm Oil Board Act (Act 582) and having its address at No.6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor Darul Ehsan (hereinafter referred to as '**MPOB**') of the one part;

AND

PALMYRA POLYURETHANE SYSTEMS SDN. BHD. (Company No.:202001023047 [1379367-T]), a company established under the Companies Act 1965 (which has been repealed and superseded by the Companies Act 2016) and remains validly incorporated under the Companies Act 2016 and having its business address at No.18, Jalan Setia Nusantara U13/19K, Bandar Setia Eco, 40170 Shah Alam, Selangor Darul Ehsan (hereinafter referred to as the **'Company'**) of the other part.

MPOB and the Company wherever appropriate may hereinafter be referred to singularly as a "Party" and collectively as the "Parties".

WHEREAS:

A. MPOB is involved in conducting research and development (R&D), and has the technical expertise and the know-how and technology on a process to produce polyols (hereinafter referred to as the 'Technology') and has filed and/or registered a patent in respect of the know-how as described in Schedule I (hereinafter referred to as the **'Existing Patent'**).

B. The Company is a privately owned Malaysian company primarily involved in the trading, manufacturing, marketing and distribution of floorcoverings (indoor & outdoor) and sports floorings for both the local and export markets.

C. The Parties wish to utilise the Technology to collaborate with each other to develop a Workable Formulation (as defined herein) to be incorporated as one of the various components of the Company's floorcoverings and sports flooring markets with palm oil based polyol (**'End Product'**) (hereinafter referred to as the **'Project'**).

D. For the purposes of the collaboration between the Parties, MPOB has agreed to license the Technology to the Company on a non-exclusive basis subject to the terms and conditions of this Agreement.

- Agreement signed on 16 February 2021.

- MPOB patented Palm Oil Polyol technology to be licenced to Palmyra to jointly develop Working Formulation (WF) for floorcovering & sports flooring markets.

- MPOB & Palmyra will jointly patent WF with ownership at 70% : 30% respectively. If either party does not wish to own patent in any particular country, 100% ownership will automatically be transferred to the other party.

- MPOB Licencing & Royalty Fees : RM 100,000.00 & 3% Gross Sales

PALMYRA POLYURETHANE SYSTEMS SDN. BHD.

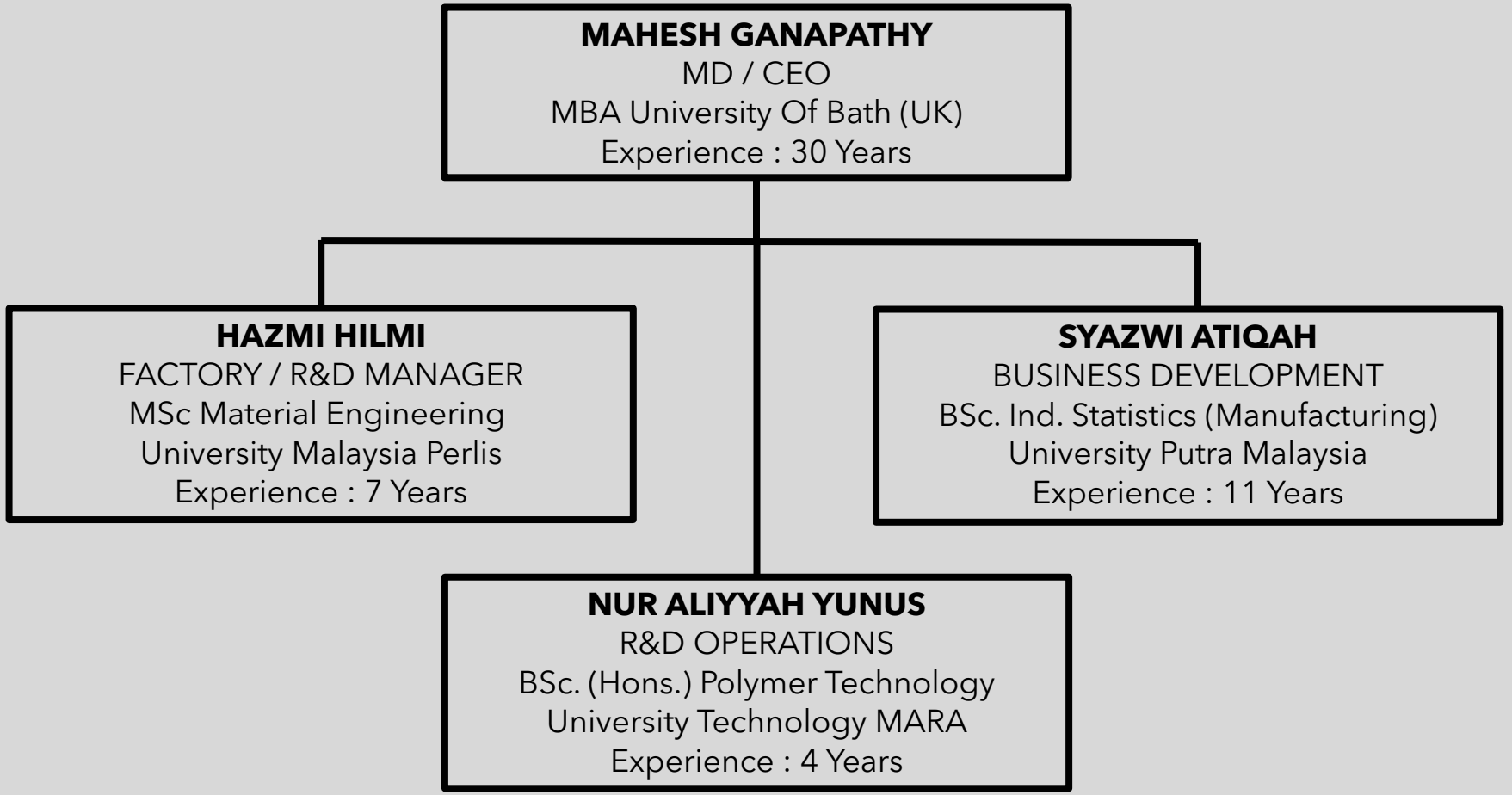
(1379367-T)

- Company registered 11 August 2020
- Company is 100% Malaysian Owned
- No. Of Shareholders : 2
- No. Of Staff : 4

- MPOB Consulting Team – Advanced Oleochemical Technology Division
  - Dr. Tuan Noor Maznee Tuan Ismail
  - Dr. Kosheela Devi Poo Palam

- International Business Consultants :
  - ❖Mr. Peter Mackey, PU Consulting Assoc., UK (Over 45 Years in International PU Consulting)
  - ❖Mr. Lamar Brown, Textile Urethanes, USA (Over 55 Years in International PU Consulting)

THE MANAGEMENT TEAM




THANK YOU
TAKE CARE & STAY SAFE