

Introduction to the Palm Oil Industry

Palm Oil Processing Special Interest Group

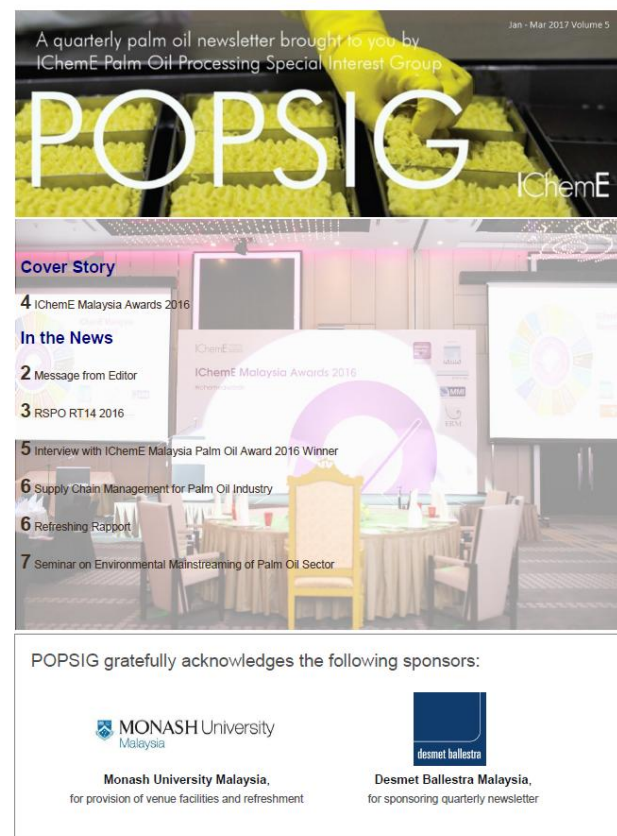


Hong Wai Onn

POPSIG was formed on 3rd August 2015 in Kuala Lumpur, Malaysia to provide a forum for the exchange of ideas, the sharing of experiences and encouraging innovation in the palm oil processing industry.

It is not limited to traditional areas of milling, refining or oleochemicals. It includes new areas such as nutraceuticals, biogas and energy, biomass, biofuels and bio-based chemicals.

Processing in the palm oil industry encompasses all the four key challenges in *Chemical Engineering Matters* viz energy, food & drink, health & well being and water. The approach to improving the quality of life through the use palm oil has to be done safely and sustainably.



<http://www.icheme.org/communities/special-interest-groups/palm-oil-processing/resources/newsletter.aspx>



Introduction to the Palm Oil Industry

By

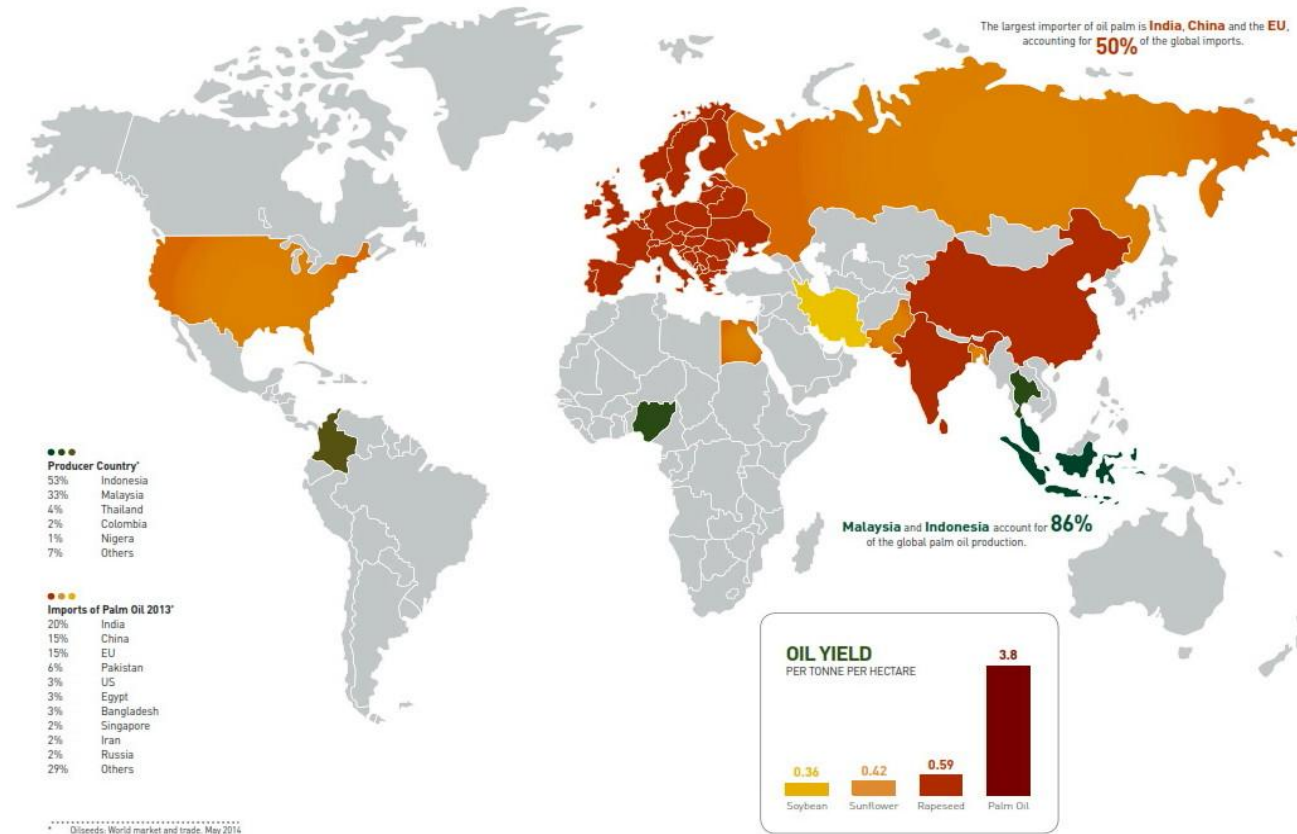
Hong Wai Onn CEng MIChemE

Palm Oil Processing Special Interest Group

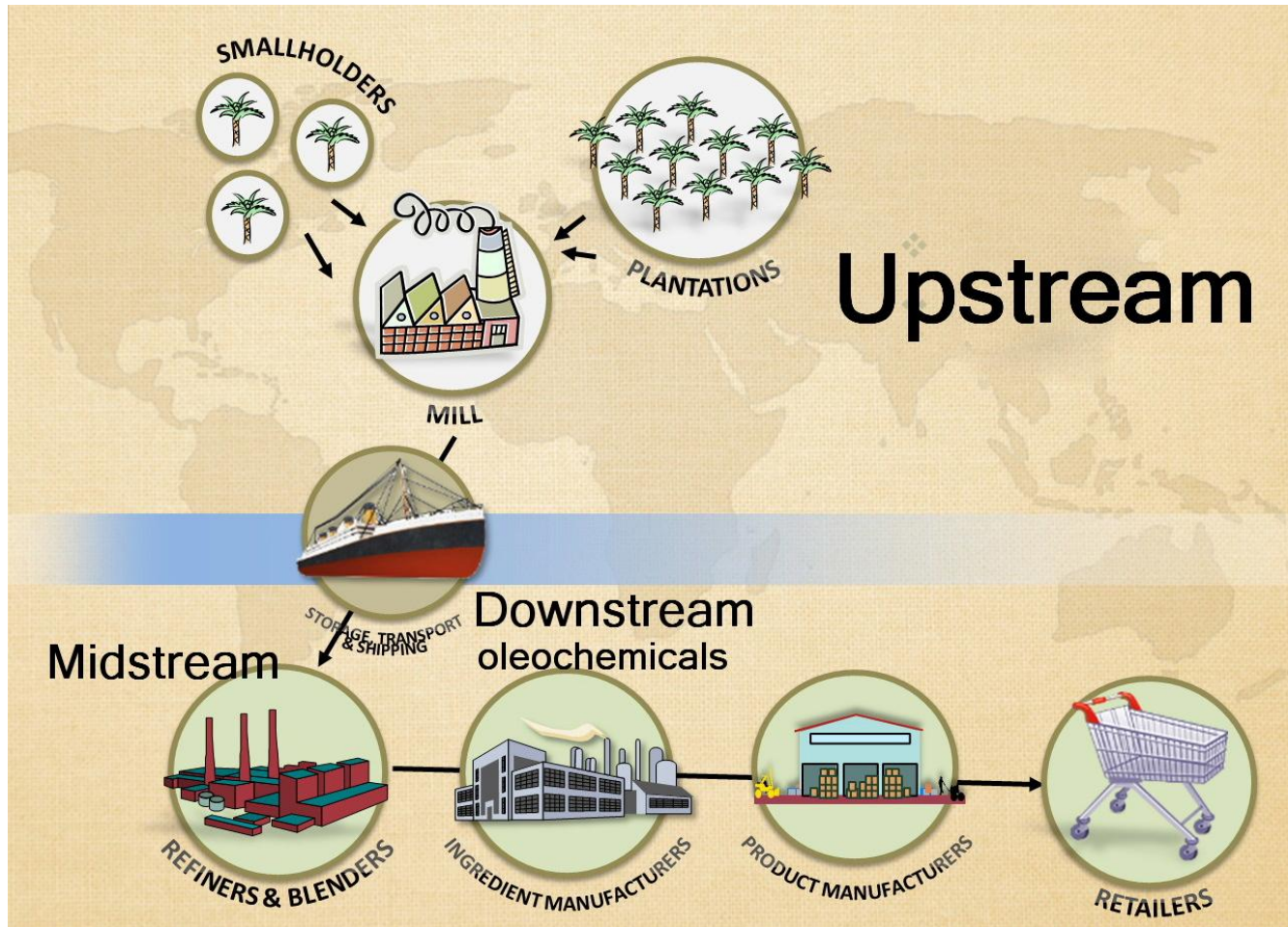


Palm Oil at a Glance

PRODUCERS AND IMPORTERS OF OIL PALM



The Palm Oil Supply Chain



What will be covered ...

- The importance of palm oil
- Milling
- Refining
- Oleochemicals
- Bulking Installations
- Sources of information
- NKEA and the 8 EPPs in Malaysia
- The role of a chemical engineer
- Key players



Malaysia is celebrating **100** years of palm oil this year, as the first oil palm was grown in 1917.



Some Key Numbers 2016 for Malaysia

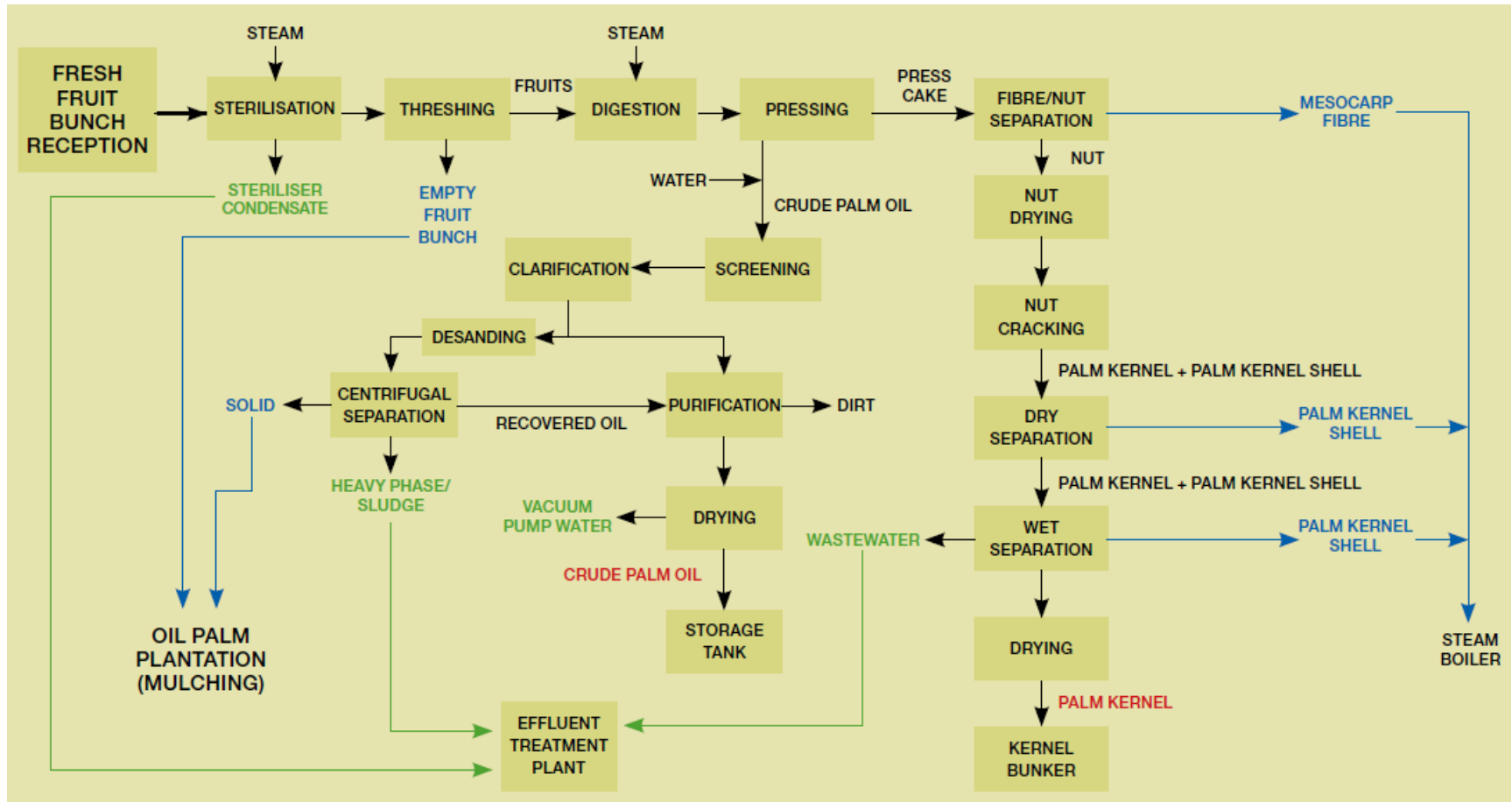
- 5.7 million hectares of land (17% of land mass)
- 17 million tonnes of palm oil & 2 million tonnes of palm kernel oil
- 8% of world's oil & fat production
- Export revenue RM 41 billion (5.3%, #4)
- 600,000 people employed directly



Oil Palm Plantation



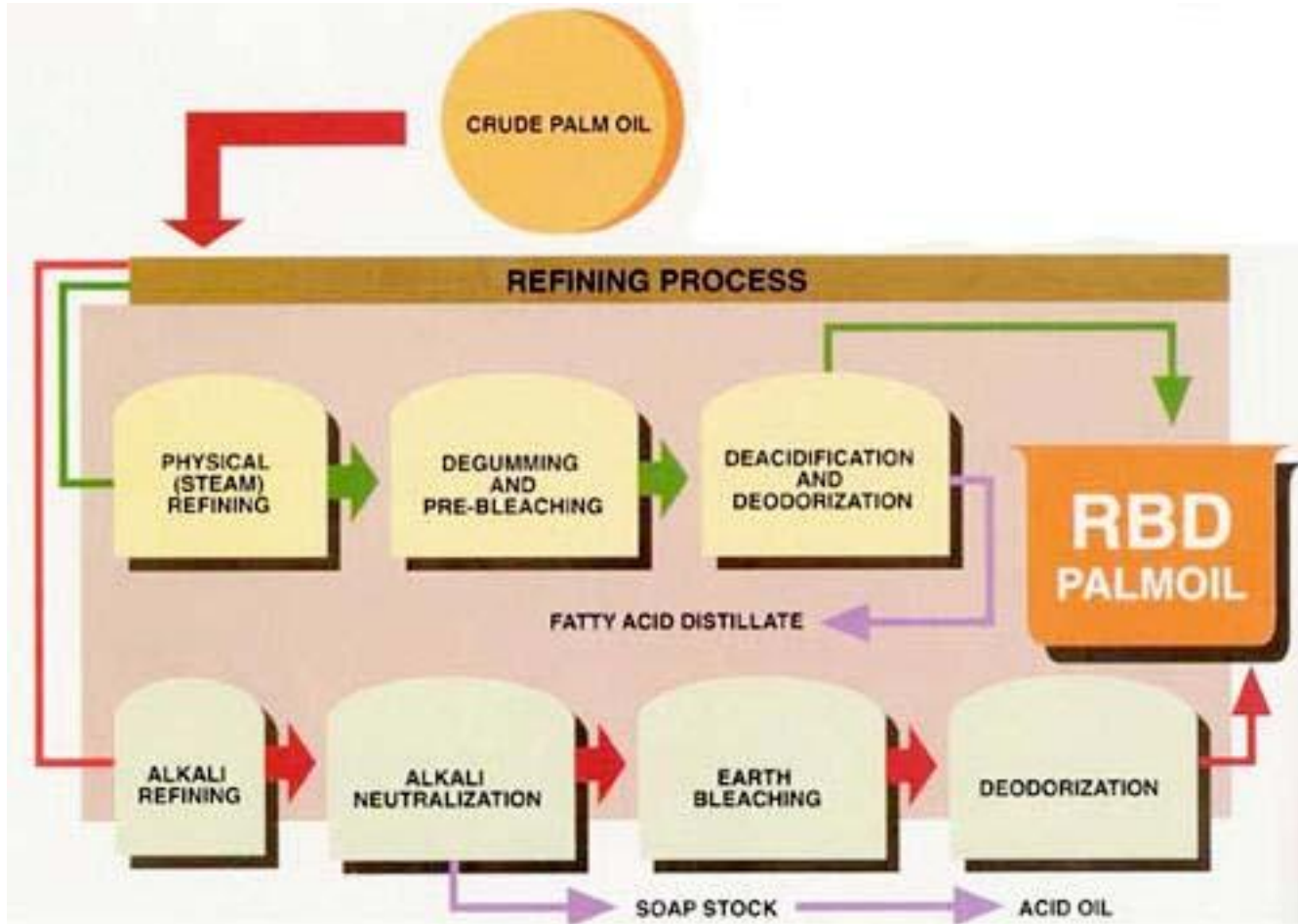
Process Flow for Milling



Palm Oil Mill



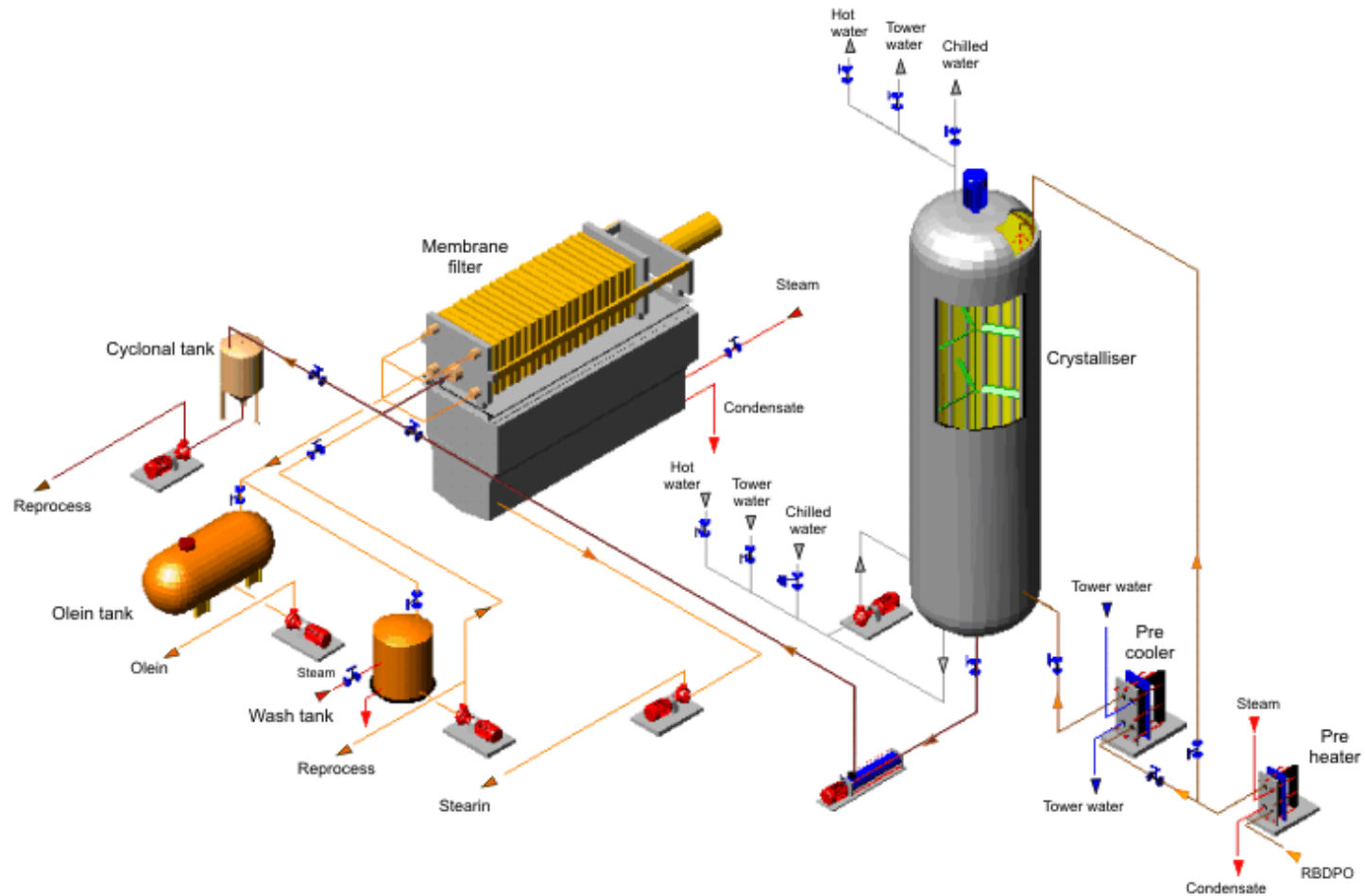
Process Flow for Refining



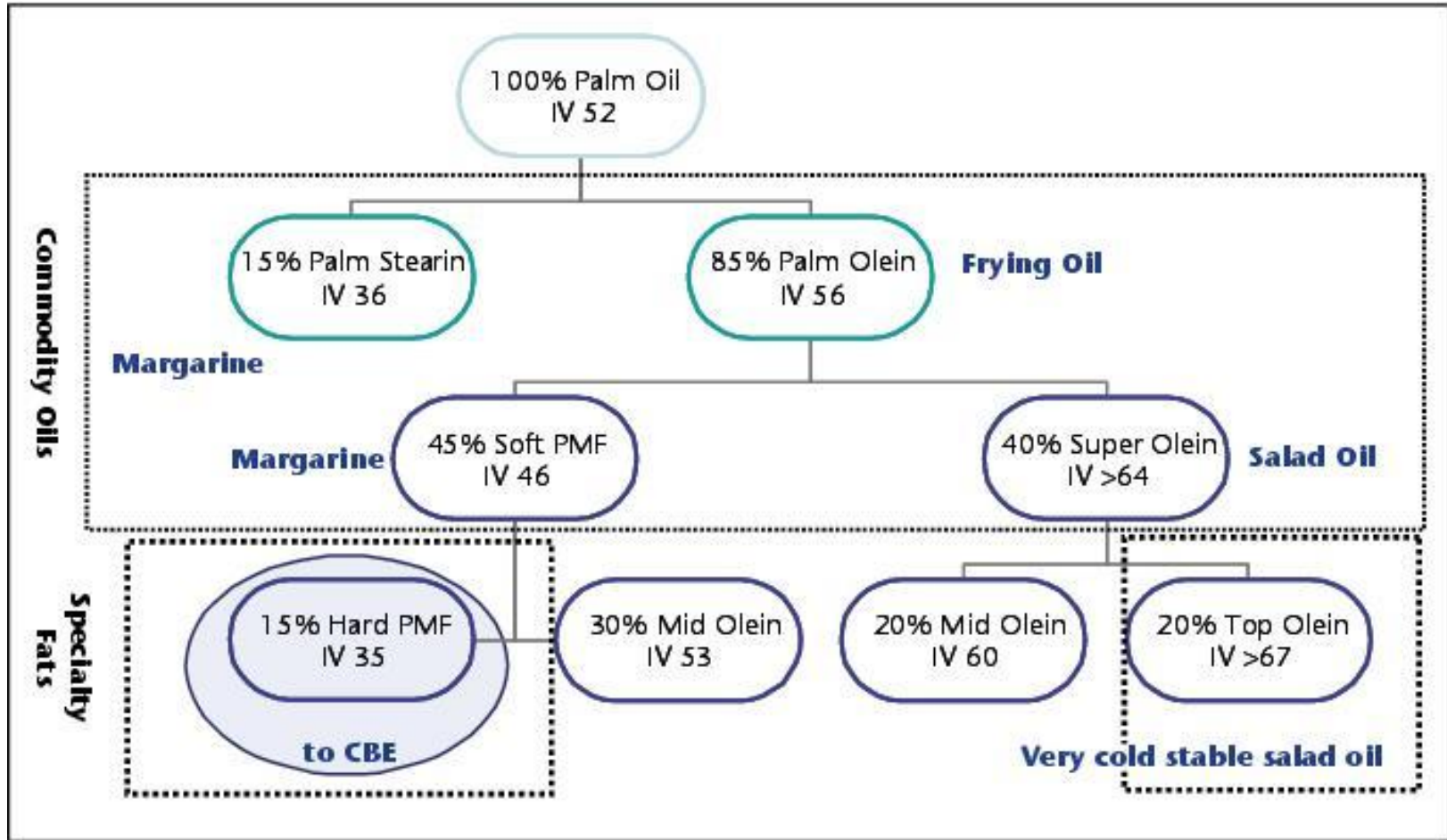
Palm Oil Refinery



Process Flow for Fractionation



Fractionated Palm Oil Products



Activity 1

2 minutes

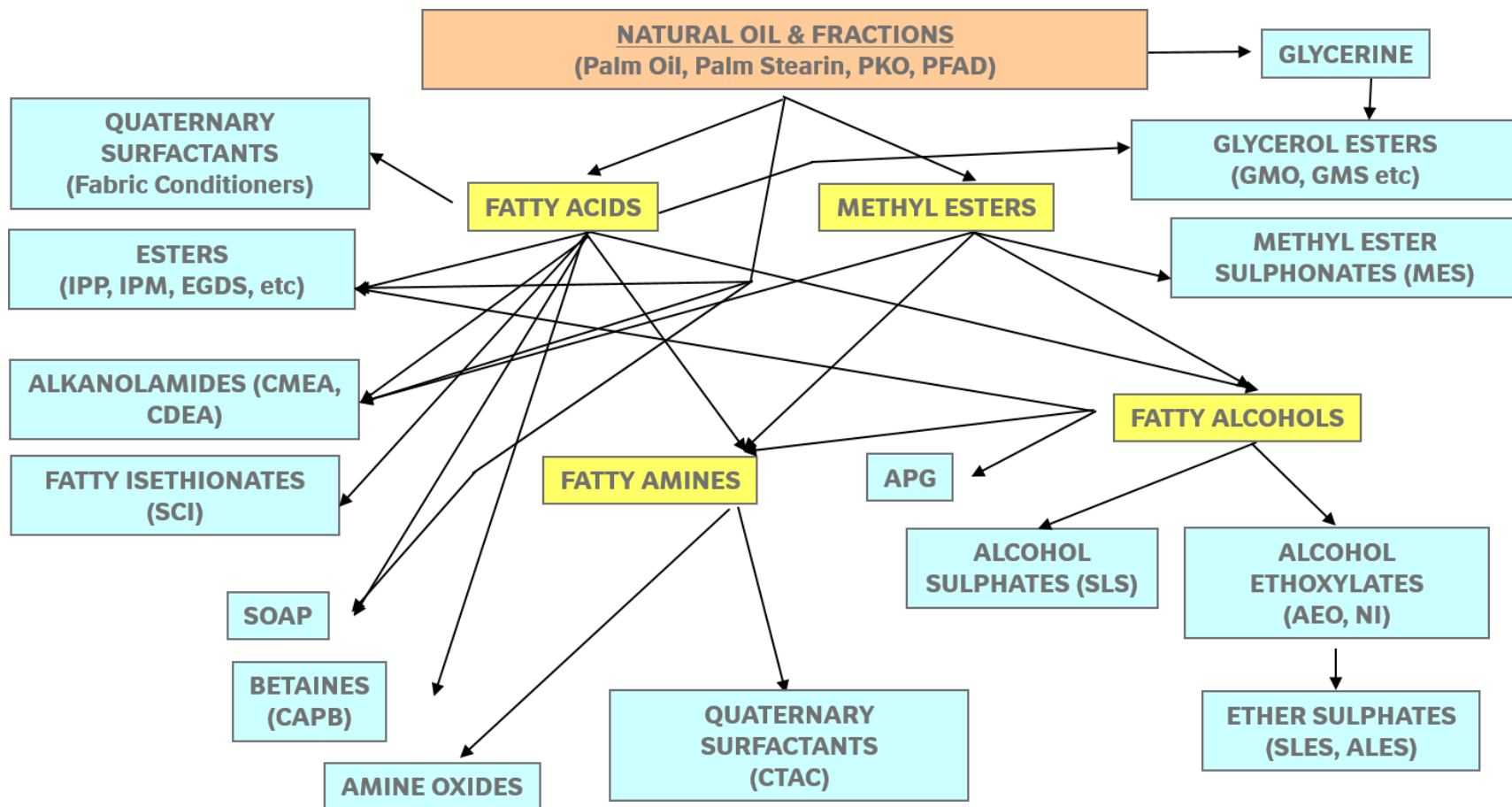
Enter into the question section
some **edible products**
made from palm oil



Edible Palm Oil Products ...



Palm Oil Derivatives Flowchart



Fatty Acids & Fatty Alcohol Plants



Activity 2

2 minutes

Enter into the question section
some end consumer products containing
oleochemicals and their derivatives



End Consumer products ...



Soap noodles



Sodium lauryl sulfate



Stearic Acid



Esters



Glycerin, Isopropyl Myristate



Methyl Ester Sulfonate



Cetyl palmitate, isopropyl myristate, sorbitan monostearate, stearyl alcohol



Amide as slip agent



Tocotrienols



Bulking Installations – Key for Exports



Key Organizations

Name	Full name
MPOA	Malaysian Palm Oil Association (Growers)
MPOB	Malaysian Palm Oil Board (Licensing/R&D)
MPOC	Malaysian Palm Oil Council (Promotion)
PORAM	Palm Oil Refiners Association of Malaysia
AOMG	ASEAN Oleochemical Manufacturers Group
MEOMA	Malaysian Edible Oil Manufacturers Association
MBA	Malaysian Biodiesel Association
RSPO	Roundtable on Sustainable Palm Oil
MPOCC	Malaysian Palm Oil Certification Council
CPOPC	Council of Palm Oil Producing Countries



NKEA in Malaysia

National Key Economic Areas (NKEA)

2) Palm oil and related products



EPP in Malaysia

Entry Point Project (EPP)

Upstream productivity

- EPP 4: Increasing the oil extraction rate
- EPP 5: Developing biogas at palm oil mills

Downstream expansion and sustainability

- EPP 6: Developing oleo derivatives
- EPP 7: Commercializing second generation biofuels
- EPP 8: Expediting growth in food- and health-based downstream segments



List of companies under EPP 6 Q1 2014

List of companies/projects under EPP 6 (Commercialisation)

EPP 6 Product commercialisation projects

Companies/Projects - Products	Total investment	Total grant committed*
ICM Specialty - Surfactant & Glycerol Derivatives	134.40	19.01
IOI Esterchem - Glycerol Derivatives and Bio-lubricants	130.00	43.60
KLK - Palm Oleo Klang - Specialty Esters	16.40	5.25
KLK - Oleomas - Fatty Alcohols/Acids & MES Integrated Complex	480.10	107.90
Ancom - MSMA Herbicides Manufacturing Plant Expansion	9.77	0.09
Emery P1 - Plastic Additives and Bio-Lubricants	136.50	7.72
Emery P2 - Surfactant (Specialty Esters)	86.7	11.20
Emery P3 - Surfactant (Sulphates)	187.52	12.80
Emery P4 - Expansion of ME Fractionation & Tank Farms	69.89	3.89
Carotino - Expansion of MCT Plant	10.00	0.80
Unioleon - Oleo Derivatives for Food Application	91.85	11.21
Company A - Production of Methyl Ester, Glycerine, and crude Carotene	100.00	1.10
Company B - Short Path Distillation Extension for Glycerol Derivatives	17.00	5.59

Source: PEMANDU



Chemical Engineering Matters

The role of chemical engineers
in the palm oil industry
and society

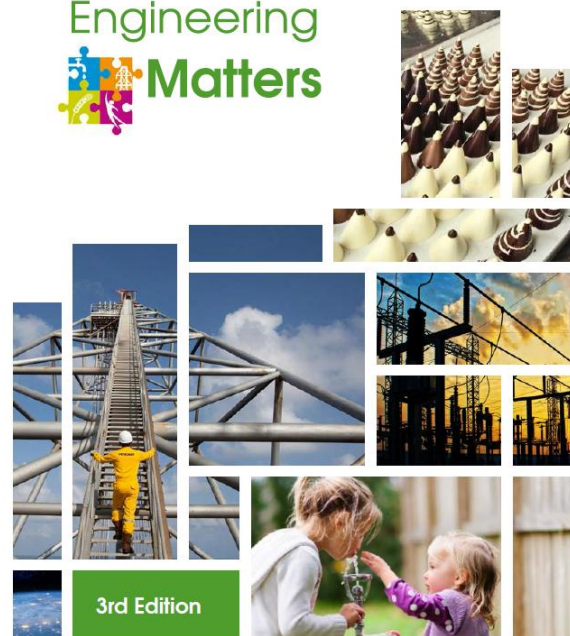


Chemical Engineering Matters

- Outlines the scope, application and implications for chemical engineering in activities across the four challenge areas (Water, Energy, Food and nutrition, and Health and wellbeing) where chemical engineers create, maintain and improve quality of life, now and in the future.

IChemE ADVANCING
CHEMICAL
ENGINEERING
WORLDWIDE

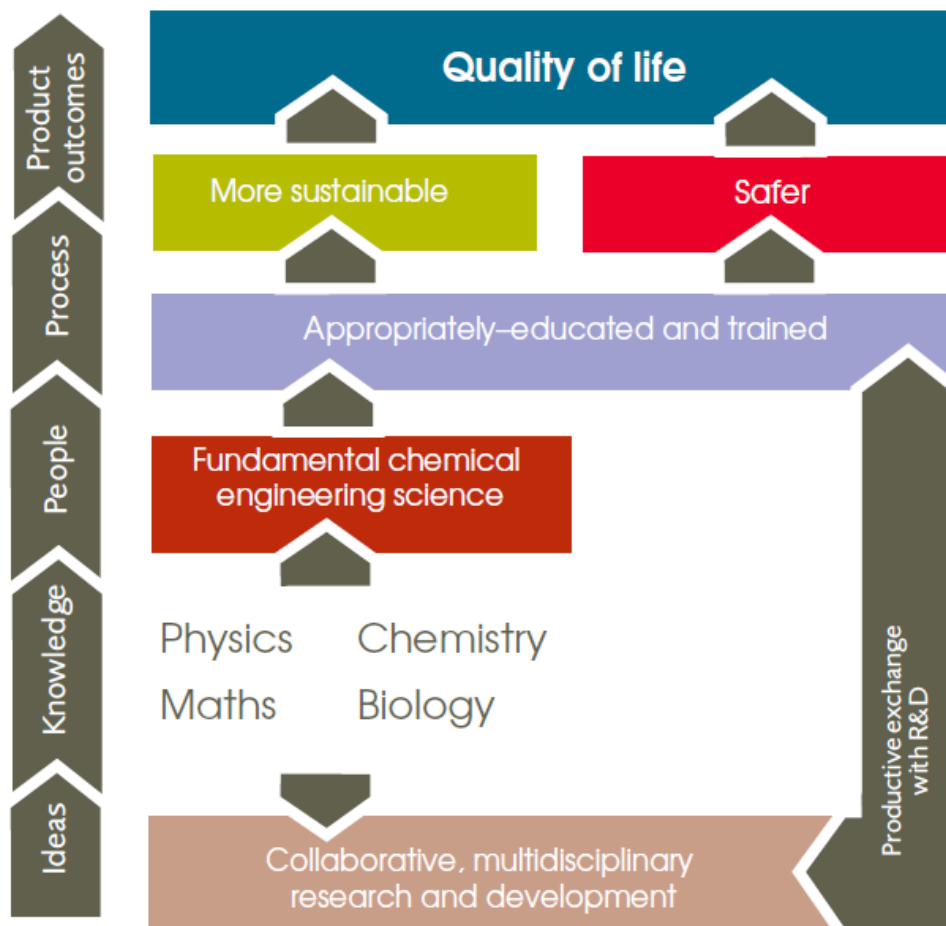
Chemical
Engineering
 Matters



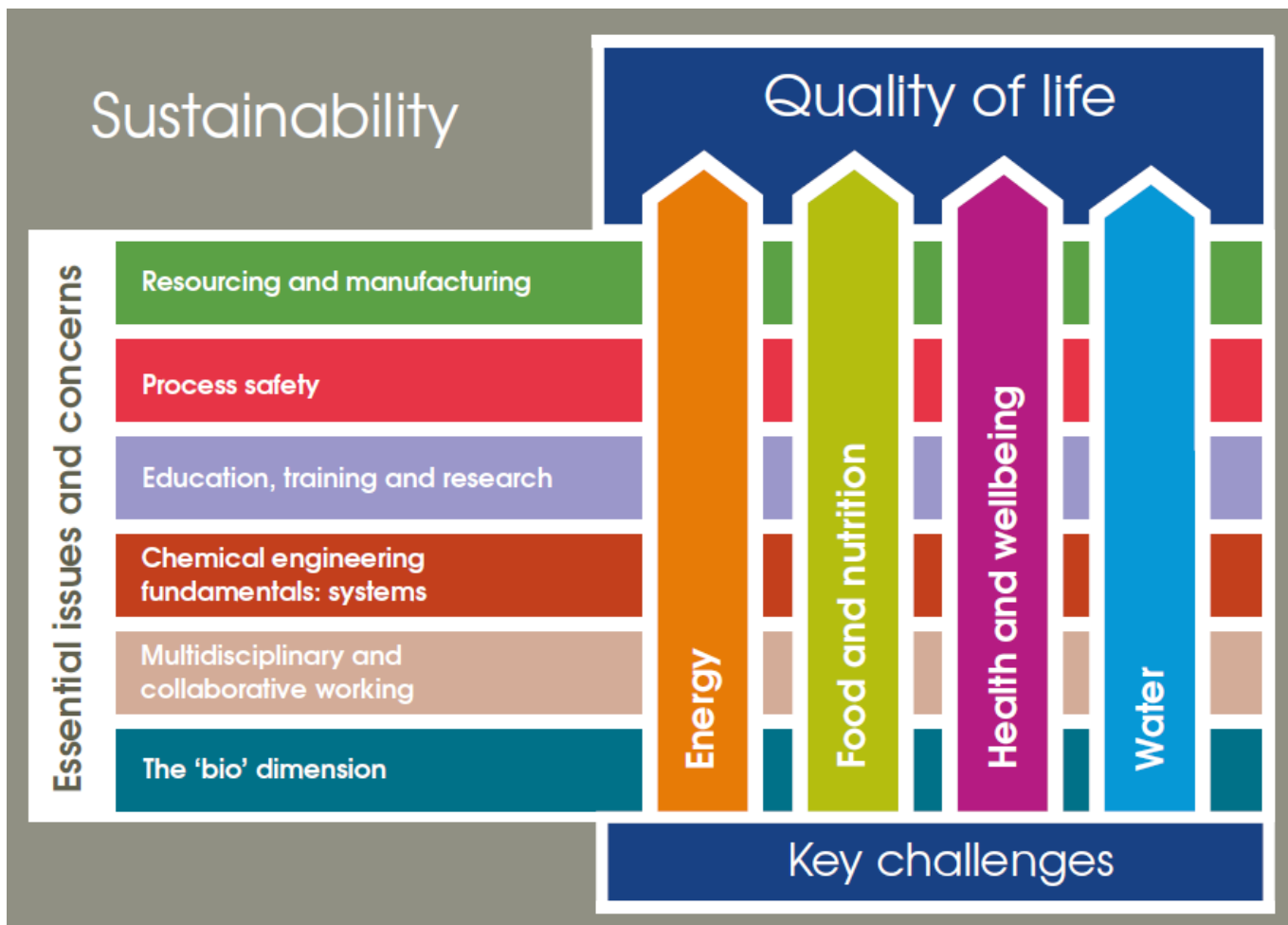
http://www.icheme.org/~media/Documents/icheme/pdfs/ChemEngMatters3_web.pdf



The Role of a Chemical Engineer



The Role of a Chemical Engineer



The Role of a Chemical Engineer

Competence

- Application of knowledge
- Wider implications
- Transferable skills



Application of Knowledge

Item	Examples
Process technologies	Distillation, crystallisation, filtration
Safety systems	Management of change, HAZOP
Laws of conservation	Multiple effect evaporation
Mathematical modeling	Spray crystallisation, catalysed reactions
Underlying chemistry	Hydrolysis, esterification, hydrogenation
Systems analysis	Trouble shooting, control of processes
Chemical thermodynamics	Increasing splitting degree in a hydrolyzer
Economic evaluation	Plant debottlenecking, cost savings



Technical Areas

Process plant operation	Legislation, regulation
Computer application	Development of products, services
Project management, administration	Teaching, managing, training
Instrumentation & control	Quality & assurance
Technical / economic evaluation	R&D
Economic accountancy, cost estimation	Technical sales, marketing, contracts
Health, safety, risk aspects	Design of process, plant & equipment
Sustainability & environmental aspects	



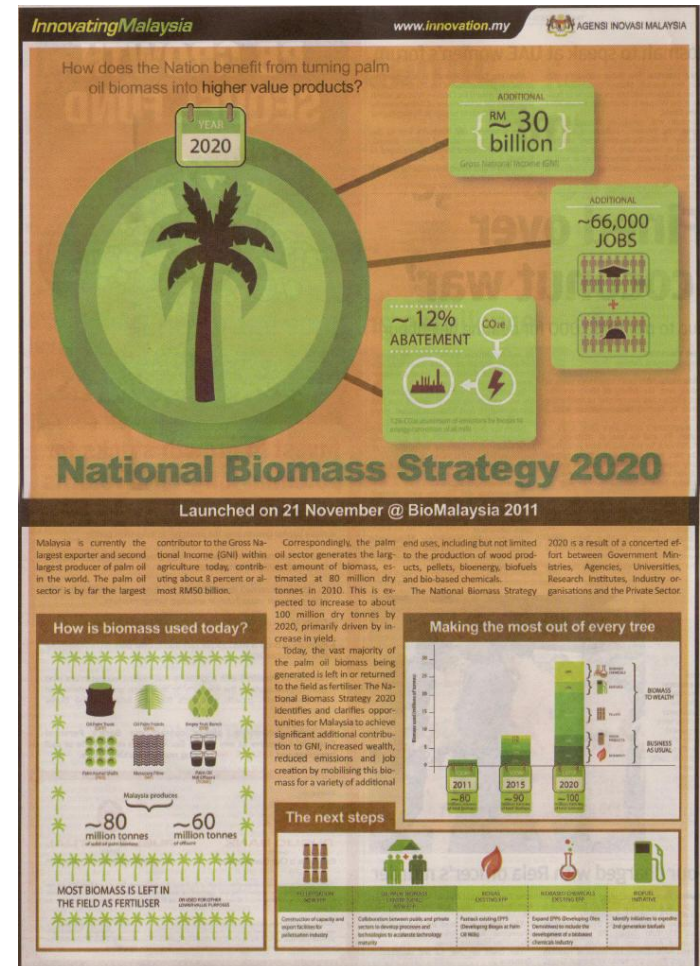
Wider Implications

Item	Examples
Health, hazard and safety aspects	Opportunity to improve process safety
	Registration, Evaluation, Authorisation and Restriction of C hemical substances (EU)
Sustainability aspects	Clean Development Mechanism (POME) & National Biomass Strategy 2020
	Roundtable on Sustainable Palm Oil (RSPO)
Commercial and economic aspects	Fluctuating palm oil & palm kernel prices
	NKEA : Palm Oil as a Growth Engine in the Tenth Malaysia Plan (2011-2021)



National Biomass Strategy

- It aims to assess how Malaysia can gain more revenue from its palm oil industry through utilisation of the associated biomass.



Palm oil can power the world

14 INSIGHT | 1st Q, 2011/2011 | MPOC

The palm oil sector can produce more energy than what most countries need.

By LEE LEE
lee@jlope.com.my

WHEN we talk about sustainable energy, we think about solar, wind, wave and geothermal which usually translate into biomass, geothermal, wind turbines, dams and solar farms. The idea of having oil palm biomass joining the race for sustainable energy is almost unheard of. But it is truly numerous potential to supply energy to the world.

As pointed out in consultant Dr Ian Halsall's paper published in the Malaysian Palm Oil Council (MPOC) Journal of Oil Palm and The Environment, if all the world's oil palm by-product were used as fuel, the annual energy supply would exceed most countries' requirements.

As an estimate of the potential of palm in the sustainable energy arena, the whole industry can produce up to 51 exajoules of energy per year, which is more than what most countries require.

Currently, only countries like the United States, China, Japan and India use more than 7.31 exajoules. For 151 other countries, this figure exceeds the national requirement of an individual country but potentially covering the needs of several smaller countries at one go.

In Halsall's paper, he explains how oil palm biomass can supply more than the world's electricity energy.

"If all the palm oil produced were combusted as fuel, dies that would produce 1.64 exajoules of energy per year. On top of that, there is the fuel oil industry biomass by-product which, if combusted, would give an extra 3.57 exajoules, bringing the total to 5.21 exajoules annually," he writes.

Halsall says there is no need to figure out how much energy a country consumes as the need is relative to what society wants. This is a big and complex question such as how big do we need our cars to be, how many cars do we need to have and we need our houses to be? It all depends on how much of a high-consumption lifestyle people want, he says.

"Presently, energy consumption in the world is very high and is growing rapidly. Malaysia is a developing country such as China and India, we are the same."

The annual production of the worldwide palm oil industry is estimated to be 42 million tonnes as of 2009 with most of that going to the real market as commodities, oil and palm products.

However, the sheer size of the industry is the only remaining reason for oil palm to be a contender in the energy arena.

In the real world, palm (oil) is renewable - unlike coal, oil and natural gas - and will continue as long as crops are planted and harvested.

From biomass to biofuel

The quantities of non-oil palm biomass such as palm lumber, fronds and leaf sheaths are being processed, equal around 1.5 times the energy value of palm oil alone.

At the moment, palm biomass is an invaluable by-product from plantations which have only a limited

Powering the world



under-utilisation of palm biomass can supply more than the world's electricity energy.

use in animal feed. This by-product makes up 85% non-oil biomass and could be changed to create fuel, commonly referred to as bio diesel.

Palm is a fuel that could be used as an alternative fuel source. On the local front, there are already initiatives to develop the palm biomass industry.

MPOC, chief executive officer Tan Sri Dr Yusof Basiron says: "It has been noted through many years of research carried out by the Malaysian Palm Oil Board and is currently used in Malaysia B5 programme."

"Here in the programme, instead of using 100% fossil fuel, there are mix columns of 5% palm oil biomass and 95% fossil fuel into the bio diesel. It is also used in the United States and European Union (EU) as B10 fuel," he says.

"Just add that palm biomass can be used in all climates in temperate countries as the oil has a low pour point."

It has also been noted and used successfully as an aviation fuel in a Jumbo Jet in 2008.

Halsall says in his paper that diesel engine cars work with non-oil biomass and MPOC has shown that running diesels on palm oil works just fine. He adds that palm biomass can be used in turbines,



"At the world's oil palm by-products were used as fuel, the annual energy supply would exceed most countries' requirements," says Halsall.



Palm biomass can be used in all climates to compare countries as the oil has a low pour point, says MPOC's chief.

"The good news is that the palm industry is well placed to be much closer to carbon neutral - if the world is there," he says.

Yusof says the official data has been published and submitted by the Natural Resource and Environment Minister on this matter, showing that oil palm is a carbon sink, taking up 100 times more carbon from the atmosphere than it produces.

"Every five years, countries do a carbon accounting and submit a report to the United Nations Framework Convention on Climate Change (UNFCCC). Malaysia's submission to UNFCCC in January 2011 clearly shows that in 2009, Malaysia's palm had a net removal of more than 80 million tonnes CO2 equivalent," he says.

"Used equitably in 2009, Malaysia had 1.75 million hectares of oil palm plantations and the carbon removal capacity of this plantation crop was 87 million tonnes, while total emissions from the land use and land use change, and forestry and agricultural sector was 35 million tonnes CO2 equivalent."

"This implies that oil palm plantations are carbon sinks. Their own emissions generated from other sources and methane emission from processing of effluent gases at the mills, but the net emissions from all land use change and agricultural activities of the country," he says.

While there is much to be researched on, developed, and jobs to be put palm oil feature the main page of Jope, it has undoubtedly the opportunity to give us plus factors.

"What the amount of methane coming from palm oil mill effluent, the carbon footprint of fertilisers and pesticides, bioethanol fuel used in the processing and distribution of palm oil, the industry is far from carbon neutral just now in my estimate."

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Journal of Oil Palm & The Environment
An official publication of the Malaysian Palm Oil Council (MPOC)

Review

Open Access

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Towards a Sustainable Energy Economy – The Role of Palm Ian L. Halsall, PhD, Consultant

Abstract

This paper reviews the factors which affect the palm industry's role in the world energy economy. Currently palm's role as a renewable fuel is small, but if all the world's palm oil, and palm biomass by-product, were to be used as fuel, then the annual energy supply would be 7.31 exajoules - more than most countries' requirements. Alternatives are evaluated, as are social issues.

Keywords

Palm, Renewable Fuel, Palm Biomass, Energy Economy, Sustainable Energy
JOPE 2011, 2:8-14

1. Introduction

Today the worldwide palm oil industry is sizeable, with an annual production of some 42 million tonnes (as of 2009). Most of this gets consumed in food uses, soaps and cosmetics, but in recent years palm oil has already entered the world's fuel market too.

To give an idea of the palm industry's potential for energy, these figures are sizeable also. If all the palm oil produced were combusted as a fuel then that would produce 1.64 exajoules (exa = 10¹⁸) of energy per year. On top of that, there is the palm industry's biomass by-product (ie palm lumber, fronds, and fruit bunches after processing) which, if combusted, would give an extra 3.57 exajoules, bringing the total for palm to 7.31 exajoules annually.

To give these numbers some perspective: 42 million tonnes of oil per year equals 640,068 barrels per day. That is equivalent to 38% of the UK's current oil consumption of 1,710,000 barrels per day (crude oil and palm oil have comparable energy densities). An alternative perspective is that 640,068 barrels per day is more than the total daily oil consumption of

Argentina. Also, 640,068 barrels per day is greater than the oil consumption of Malaysia, or for that matter The United Arab Emirates or, for that matter, 182 different countries (208 being the total number countries in the world).

The above figures refer to palm oil production and fuel oil consumption. If we include the non-oil palm biomass too, then the potential increases considerably. This is because the quantities of energy from non-oil palm biomass equal around 3.5 times the energy value of palm oil alone. When we sum up both the palm oil and the non-oil biomass, we get the above mentioned figure of 7.31 exajoules per year. That means the palm industry could supply more than the total energy consumption of many countries. For example, if we focus on electricity consumption, then 7.31 exajoules of fuel value equates to 2.03 trillion kWh per year. Taking a typical power station efficiency of 30%, the figure for available electricity is then 609 billion kWh per year. For comparison, only a few countries consume more than this (such as USA, China, Russia, Japan and India). But, there are another 151 countries in the world, where such a number would be more than the national requirement (on an individual country basis - in fact, it would be more than several smaller countries combined). All in all, the potential is large¹. How much of this potential gets reached, depends on a number of factors.

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Waste is profit

Profits from oil palm waste

All Cosmos uses bio-technology to improve fertiliser quality

BY WORCHIE-SHEE
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The recycled biomass industry is now thriving as growers in every region throughout the world in Malaysia, awareness of using recycled biomass products to the more eco-friendly option on the rise.

All Cosmos Industries Sdn. Bhd., a pioneer in bio-organic fertilisers, is a joint subsidiary of All Cosmos Bio-Tech. All Cosmos is a Malaysian manufacturer and marketer of high-grade bio-organic and bio-chemical fertilisers. They strive to be the innovative driver in the bio-technology industry while helping to improve country's ecological state.

"This industry will continue to grow as environmental awareness increases," says a Cosmos Industries senior regional and marketing manager. "All the need for recycled biomass in the oil palm industry is still great. For added value, the California Ball Farm Root Disease which is a major threat to palm oil plantations in the US, has been found to be caused by the nematodes surviving the base of the oil palm trees to rot. By using fertiliser products with recycled biomass with the addition of good bacteria, the disease can be prevented."

The company believes that using a mixture of organic material, inorganic material and effective micro-organisms can increase the quality of fertiliser. The organic materials used are the biomass waste from chemical oil palm and paddy plantations. The inorganic materials used are chemicals such as urea, potassium sulphate, rock phosphate, mixture of potassium nitrate and others. Examples of effective micro-organisms are used are Bacillus subtilis, Azotobacter, Trichoderma, Hericium, and Trichoderma. Micro-chemicals are also used.

When inorganic fertilisers are used on oil palm plantations, especially during monsoon seasons, the trees will be less likely to absorb the nutrients as the rain will wash them away. This causes a major problem in the equipment, as the chemical leak into the water supply through the soil.

To gain the effective micro-organisms used by biological fertilisers, the company uses a bio process to produce and store them in a bio process. Chemicals and biological fertilisers are used in the chemical environment by making the chemical process of the fertiliser more effective. Also, by adding micro-organisms to the fertiliser, it will reduce the amount of chemical fertiliser.

The ideology of the company is to produce a high quality fertiliser. The chief executive officer Frank Tey Feng Bin has come to Malaysia from Taiwan. He was impressed with Malaysia's climate and also with the fact that the country is a major palm oil producer. Taiwan was a lot larger than the area he had seen.

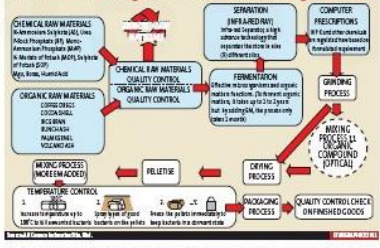
He found that Malaysia plantation were more green than those in Taiwan. He realised that the reason was that they used to use the nitrogen fertiliser. Feng Bin found that the reason was that they used to use the nitrogen fertiliser. Feng Bin found that the reason was that they used to use the nitrogen fertiliser.

The idea of adding effective micro-organisms to fertiliser came



Palma production: The use of biomass with recycled biomass with the addition of good bacteria can improve fertiliser products from one that is toxic to soil, pests, and rain.

Bio-Chemical & Bio-Organic Fertilisers Manufacturing Flow Chart



from Taiwan. Combining this factor with the agriculture operations in this country, Feng believed that Malaysia's climate could be a much better grower and quality of their products.

To produce the fertilizer, the main biomass organic raw material used are through fermentation process with the addition of effective micro-organisms. The fermentation process usually takes two to two and a half years. However, the use of effective micro-organisms, the process is completed in only a month. Now, the fermented product and chemical raw materials (urea, potassium sulphate, rock phosphate, potassium nitrate, etc.) are mixed together to produce the fertilizer.

There is a lot through another program that divides the products and the final product is put through a high temperature-complexing process in only a month. Now, the fermented product and chemical raw materials (urea, potassium sulphate, rock phosphate, potassium nitrate, etc.) are mixed together to produce the fertilizer. This process is completed in only a month.

so they do not contain the effective micro-organisms.

He says that the without help from the effective micro-organisms, the oil palm trees are still susceptible to the canker disease. All Cosmos prevents the biomass waste from being recycled as a waste by using it as a fertilizer. The biomass waste is used as a fertilizer for cocoa, waste and sugar coffee. The biomass waste is used as a fertilizer for cocoa, waste and sugar coffee. The biomass waste is used as a fertilizer for cocoa, waste and sugar coffee.

Over the past 10 years, prices of biomass wastes have increased at least two-fold due to demand. Even so, All Cosmos stays competitive by having its supply in contract.

This means that in processing the biomass waste is built at a fixed price for a fixed number of years. Its suppliers are chosen based on their capability to provide the supplies that are high in quality, and able to provide the products in quantity in good time. It does not risk procuring products that are not available and hazardous.

The fertilizer is produced after oil palm, vegetable, fruit, flower, and rice plantation.

Besides catering for the Malaysian market, All Cosmos distributes their fertiliser to countries across the greater Asia-Pacific region, such as Indonesia, Vietnam, China, Thailand, Taiwan, Myanmar, and the Philippines. It is currently in the final stages of entering the Cambodia market.

Particulars is currently working with include ICI Corp, Bally Plantation Division, Kuala Lumpur Airport, Rimbunan Hijau Group, Sabal Sarawak, Bina Bina, and FICCA in oil palm. All Cosmos also works with other plantation such as Lembeh, Cegah Malaysia and Rapi.

The application of fertilizer is dependent on the type of crop, plant age, soil nutrient status, weather conditions and management practice.

All Cosmos is striving to create awareness of biological fertilisers by promoting their products at events attended by the Malaysian Palm Oil Board, International Society of Planters, Malaysian Agricultural Research and Development Institute and plantation organizations. They also conduct seminars to planters to educate them on the benefits of using organic fertilisers and also how their produce can be used as raw material.

In long-term objectives are to create a higher standard of living for the people. This is done by increasing the productivity of the work force, improving the efficiency of the agricultural sector, and transforming the national structure into a knowledge-based economy. In response to each objective of growth, the company has set up a quality control measure before being released for distribution.

The challenge that recycled biomass companies face is that more and more plantations are rejecting their own organic waste to produce their own fertiliser. However, Tan says that the fertiliser that these plantations produce are incomplete.

BY WORCHIE-SHEE

All Cosmos sets up second plant in Sabah



A bag of fertilizer stored at the All Cosmos warehouse. (Photo left: The production facility; right: worker).

FROM PREVIOUS PAGE

produces 20 different types of fertilisers that are distributed locally as well as for the larger Asia Pacific region.

A modern plant was built in Felda Cudang Jalin, and completed in 2011 to meet increasing demand for its products. Construction for a second plant in Sabah has just started and completion is expected to be in September this year.

All Cosmos currently largely focuses on the oil palm sector of the volume and potential are higher. Between 2000 and 2011, the areas planted with oil palm trees in Malaysia increased from 1.38 million hectares to 1.7 million hectares. Meanwhile, research on paddy, rubber and vegetables is currently in progress.

The company is currently working with various farmers in Kelantan, Terengganu, and Johor to calibrate effective micro-organisms, as research has shown that farms grow micro-organisms are more effective and efficient. It is also currently working on producing a 4-to-1 formula that includes more added value in the fertilizer depending on current and future need.

Biomass products gain demand

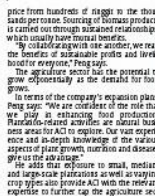
They promote efficiency and are environmentally friendly

PROFITABILITY biomass was a product that was sought after. In fact, companies used to pay their parent to assist in disposing it. However, as recently as people and companies are getting more environmentally friendly, biomass products began to gain in demand.

All Cosmos Industries (ACI) group chairman and chief executive officer Frank Tey Feng Bin says that "the use of biomass helps in producing the soil for the planting and fertilising plants is a great practice, making it more 'being' more natural."

"Biomass is used by ACI in the form of the nutrient source by the crop," he says. He adds that biomass also reduces the retention of chemical nutrients in the soil to also increase the efficiency of the nutrient source by the crop," he says. He adds that biomass also reduces the retention of chemical nutrients in the soil to also increase the efficiency of the nutrient source by the crop."

On average, ACI consumes about 50,000 tonnes of biomass products which ranges in



Frank Tey Feng Bin, CEO of All Cosmos Industries, says that biomass products are becoming more popular as people and companies are getting more environmentally friendly.

price from hundreds of ringgit to the thousands per tonne. Sourcing of biomass products is carried out through subsector relationship, which usually have mutual benefits.

"By collaborating with the farmer, we reap the benefits of sustainable practice and livelihood for everyone," he says.

The agriculture sector has the potential to grow exponentially as the demand for food grows.

"In terms of the company's expansion plans, Feng says: "We are confident of the role that we play in enhancing food production. Plantation-related activities are natural business areas for ACI to explore. Our vast experience and in-depth knowledge of the various aspects of plant growth, nutrition and diseases give us the advantage."

He adds that exposure to small, medium and large-scale plantations as well as varying crop types also provides ACI with the requisite expertise to further tap the agriculture sector.

Currently, the demand for ACI's fertilizer is largely in Indonesia and Vietnam. Both countries have excess lands that can be used for agriculture. Feng says that as extra countries in Asia start developing, the demand for food is also increasing.

Over the past three decades, the price of palm oil in rural areas have fallen by around 15 per annum, which represents a major investment in food security for one-sustaining character," Feng says.

Research and development are the main activities of a growing company. It is considered a top priority for ACI. In fact, we are the first company in the world to apply EM technology in Malaysia. Feng is the company's operational secretary.

"We will endeavor to work with corporations locally and overseas to provide special technologies and information that meet their individual needs," he says.

The increasing role of governments around the world to promote green and safe technologies is expected to be a major trend.

Another milestone of the company's success is the ongoing marketing effort to secure the company's future. Despite hard times, which most companies have not experienced, ACI continues to invest both in existing and new product development.

"Historical and opportunity grabbing is part of the operational success of the company," Feng says.

Wider Implications

Item	Examples
Health, hazard and safety aspects	Opportunity to improve process safety
	Registration, Evaluation, Authorisation and Restriction of C hemical substances (EU)
Sustainability aspects	Clean Development Mechanism (POME) & National Biomass Strategy 2020
	Roundtable on Sustainable Palm Oil (RSPO)
Commercial and economic aspects	Fluctuating palm oil & palm kernel prices
	NKEA : Palm Oil as a Growth Engine in the Tenth Malaysia Plan (2011-2021)



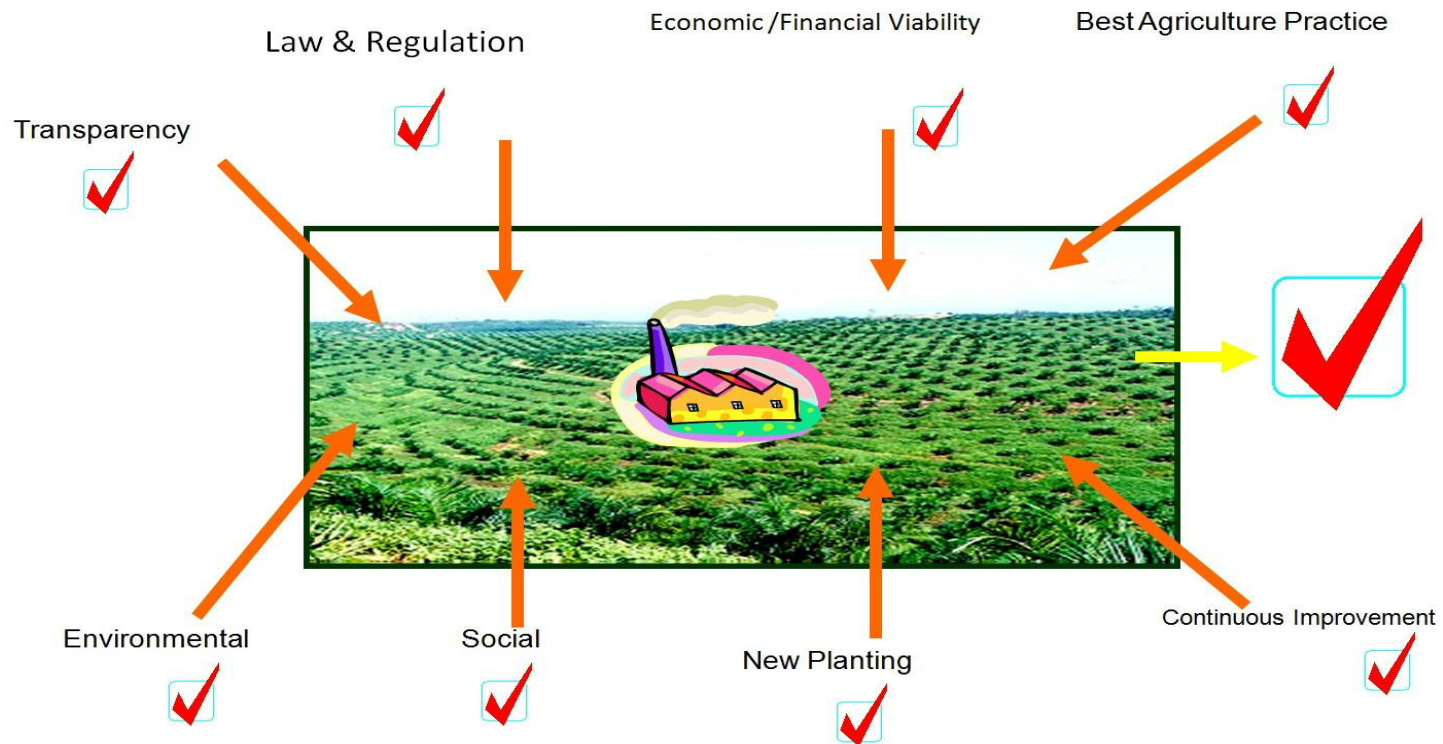
Sustainable development

RSPO

Roundtable on Sustainable Palm Oil

RSPO P & C

8 principles, 39 criteria, 125 indicators



Stand on Palm Oil Production

- IChemE believes that chemical engineers play an important role in a current and future sustainable palm oil industry.
- IChemE supports the practice of certification of palm oil from the plantation through to final consumer products.

Policy position: palm oil production

Palm oil is a widely used raw material and is found in many products from food, cosmetics and pharmaceuticals to biofuels, it has many applications. The high yield of palm oil per hectare, relatively low cost and versatility in use are attractive; it accounts for over 30% of global oil and fat production.¹ In 2015, around 85% of global palm oil was produced in Indonesia and Malaysia.² This has supported economic development in this region.

In recent years there has been considerable concern regarding the sustainability aspects of the palm oil industry. The growth in palm oil production has led to deforestation, loss of habitats, negative impacts on rural and indigenous communities and air and water pollution. International concern about the sustainability of this industry has led to the establishment of different groups, including the Roundtable for Sustainable Palm Oil (RSPO).³ Many companies that use palm oil in their products have made commitments to either reduce their consumption of palm oil or ensure that it comes from sustainable sources.

Upstream palm oil production (agriculture and mills) employ few, if any, chemical engineers. However, many chemical engineers work in downstream refining and industries such as oleochemicals. The chemical engineering skillset can be applied in both upstream and downstream areas. This can influence good practice and improve sustainability through improved yield, energy efficiency, waste reduction, effluent treatment and reduction in water, land and air pollution.

IChemE believes that chemical engineers play an important role in a current and future sustainable palm oil industry. It is essential high standards of environmental protection, process safety and responsible production are implemented across the sector. IChemE supports the practice of certification of palm oil from the plantation through to final consumer products.

The principles that are the foundation to a sustainable industry are essential components of IChemE accredited undergraduate courses and the ethics and integrity of professional, Chartered Chemical engineers.

IChemE serves as an advocate for the profession; engaging with the public and policy- and decision-makers to inform on the issues and where chemical engineers can inform on good practice and provide realistic, tangible solutions.

Through the network of technical special interest groups, IChemE will continue to share knowledge and experience relevant to the industry and champion good practice. This includes improvements in process technology, process safety and working to certified standards. Case studies for water effluent treatment and biogas as examples of valuable contributions.

IChemE calls on all chemical engineers and employers that are involved in the supply chain and consumer industries to work to the highest standards of safety and efficiency.

IChemE will work with members to articulate the positive contribution that the discipline makes and how chemical engineering matters to the future of this industry and the wellbeing of all the people that are connected with it, from farmers to processors and consumers.

¹ <http://www.oilmolresearch.org/statistics.html> [accessed 28/04/2016]

² <http://www.indexmundi.com/agriculture/?commodity=palm-oil> [accessed 28/04/2016]

³ <http://www.rspo.org>

29/04/2016

<http://www.icheme.org/~media/Documents/icheme/Media%20centre/Policy%20position%20statements/Policy%20position%20-%20palm%20oil%20production.pdf>



Palm oil for well-being (tocotrienols)

Tocotrienols, the lesser-known siblings of the vitamin E family, are fast emerging as a superior addition to the prevalent and more popularly used tocopherols. Together, they provide a full range of antioxidant properties that are vital for good health.

By FIONA HO
Senior Health Correspondent

VITAMIN E was discovered in the early 1930s and, at once, from its scientific discovery to become a superstar (1). It is an antioxidant.

To date, the antioxidant's story has not only become known for a myriad of health-protecting benefits, they include the ability to slow off the effects of stroke, diabetes, cancer, osteoporosis, respiratory tract infections and various other cancers.

It is also well known to be a skin soother, and is being high on the list of natural skin and health vitamins.

This is because the antioxidant properties of vitamin E are being offered in a variety of products responsible for aging and skin cancer, and, moreover, it is being targeted to the skin and hair. This can be seen from all the skin care and hair care products.

There are two main types of vitamin E supplements available: synthetic and natural. The synthetic form is a mixture of all eight tocopherols, while the natural form is a mixture of all eight tocopherols and tocotrienols.

Most vitamin E supplements are usually available as capsules or tablets in a capsule form.

Others can be purchased in a variety of other forms, such as topical creams, lotions, and so on. They can also be found in a variety of other forms, such as topical creams, lotions, and so on.

There has also been evidence that the oil-soluble form of vitamin E is more effective than the water-soluble form, by dissolving off some of the skin's protective barrier.

Not all equal

The various benefits of vitamin E make it an important nutrient in our daily diet, but as all are not the same, it is important to know the difference between the synthetic and natural forms.

The most common form of vitamin E is the synthetic form, which is a mixture of all eight tocopherols.

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A rising star



What if I had a vitamin E supplement that was as effective as the natural form?



Dr. M. S. Wong, a leading expert in the field of natural health products, is the author of 'The Natural Health Revolution'.

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Transferable Skills

Item	Examples
Managing relationships	Developing supporting staff with low level of formal education
Leadership in a professional role	Lead peers from different backgrounds in project
Communicating ideas formally	Applying to be a Chartered Chemical Engineer



The Role of a Chemical Engineer

Commitment

Item	Example
Commitment to profession	Be active in IChemE & your trade/technical association
Continuing professional development.	Do regular gap analysis



Typical Numbers ...

Item	Mill	Refinery	Oleochemical Plant
Investment, RM mil	55	85	125
Capacity, t/day	500	1000	400
No of employees	50	100	180
No. of Chemical Engineers	0.5	2	10



Activity 3

2 minutes

Enter into the question section
some key players in the palm oil industry:-
Suppliers, Manufacturers, and Customers



Key Players

Suppliers		Manufacturers		Customers	
Item	Company	Item	Company	Item	Company
Caustic Soda	CCM	Mill	Sime Darby	Soap noodles	J & J
Plant	Desmet Ballestra	Refinery	Cargill	Edible Oils	Unilever
Methanol	Petronas	Fatty Acids	IOI Oleo	Edible Oils	Kraft Heinz
Boiler	Boilermech	Fatty Alcohol	Emery Oleo	Fatty Acids	P & G
Mill	CBIP	Esters	Nat Oleo	Fatty Alcohol	BASF
Enzyme	Novozymes	Biodiesel	Carotino	Esters	L'Oreal
Biogas plant	Kubota	Biorefinery	Genting	Biodiesel	Shell



100 Years for Malaysian Palm Oil

- Can we continue to be the global technology leader in the processing of this Golden Crop?
- Big potential for us to transform the industry particularly in process engineering through science and innovation.



Conclusion

- Palm oil is the most widely-used vegetable oil in the world
- The oil palm tree is the most efficient oil crop in terms of land use
- Join the palm oil industry and be a leader
- Set your sights now on being a Chartered Chemical Engineer



Thank You

Next Evening Talk

Challenges in Biodiesel Business

on 10 April 2017

at Monash University Malaysia

by U.R. Unnithan, founder & CEO of SUMWIN Group

