IChemE POP SIG Evening

30th November 2015, Kuala Lumpur

Process Safety in the Palm Oil Industry

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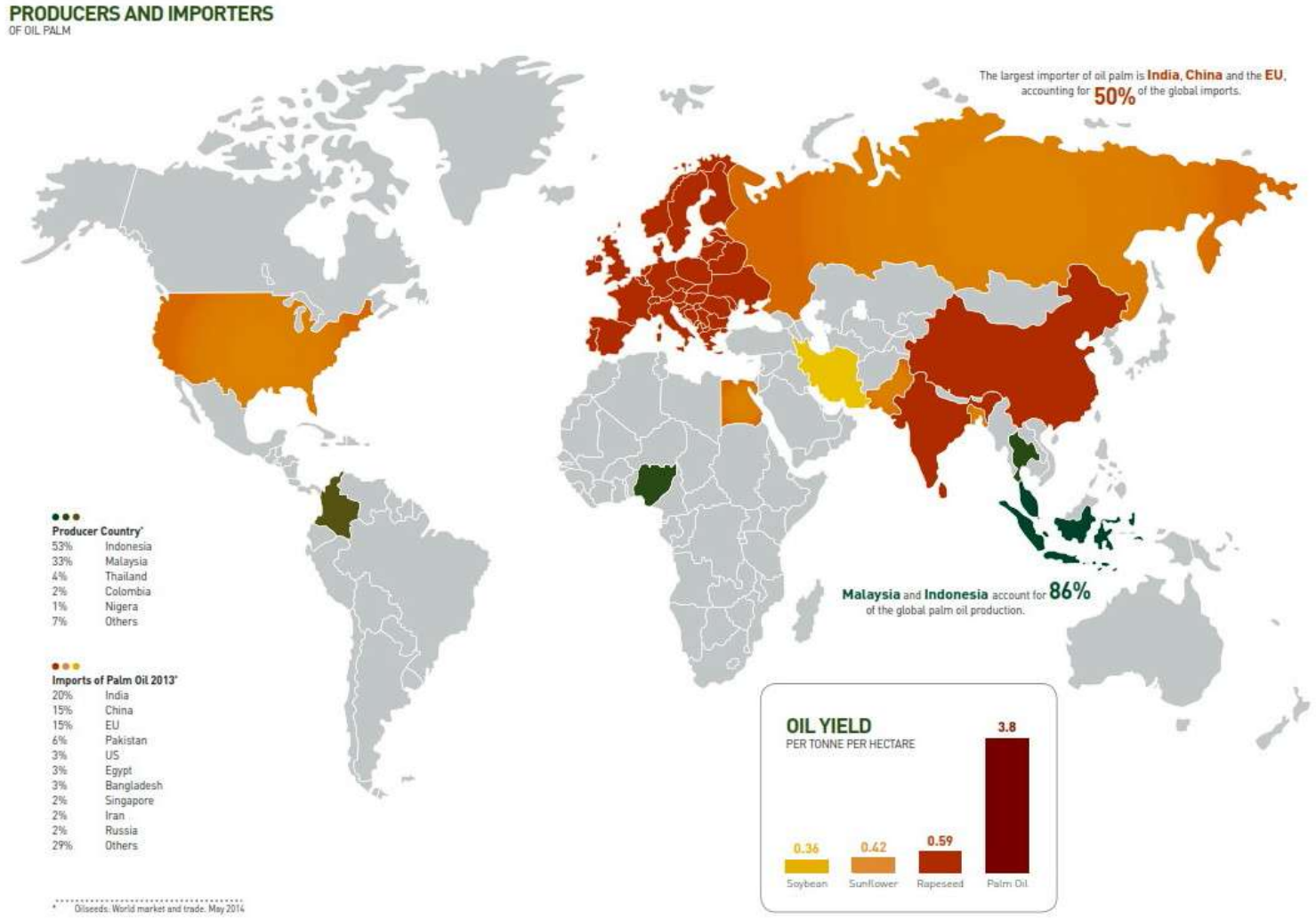
AOMG

ASEAN Oleochemical Manufacturers Group

Palm Oil at a Glance



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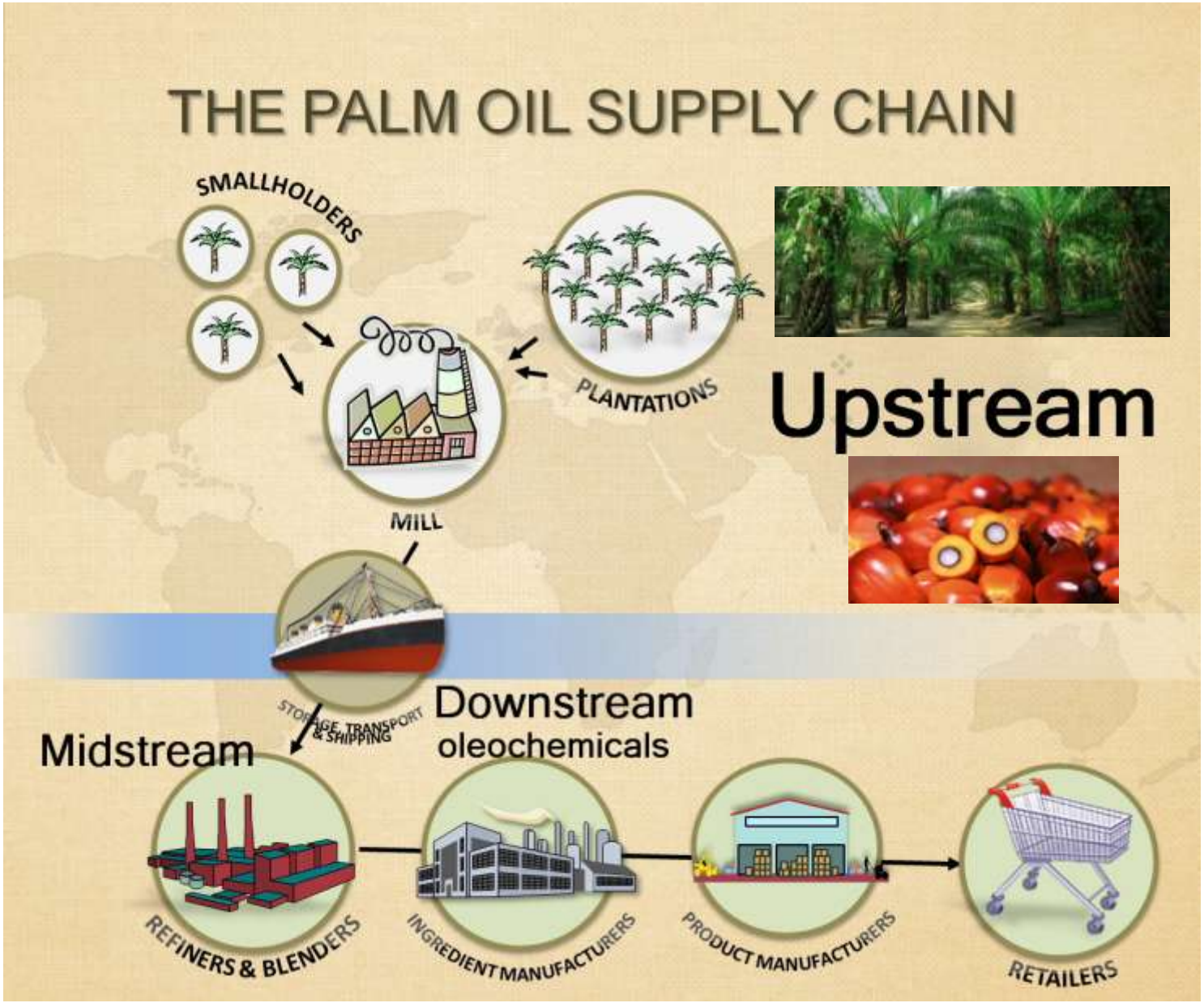
THE PALM OIL SUPPLY CHAIN
SMALLHOLDERS
PLANTATIONS
MILL
Upstream
STORAGE, TRANSPORT & SHIPPING
Midstream
Downstream
oleochemicals
REFINERS & BLENDERS
INGREDIENT MANUFACTURERS
PRODUCT MANUFACTURERS
RETAILERS

Characteristics of Asian companies

- Information hungry
- Information hoarders
- Thrifty
- Autocratic
- Satisfy legal requirements
- Short to medium term investment
- Successful

What will be covered

1. Process Safety in AOMG
2. Survey of Process Safety Management in member companies
3. Process safety – an ongoing journey
4. Improving process safety in the entire industry
5. Process safety leadership

1.Process Safety in AOMG

- What is AOMG?
- What makes it work?
- Areas of working together
- Process safety survey

What is AOMG?

- Established 30 years ago : MOMG 1984, POMA 1986, **AOMG 1986**, APOLIN 1996
- 15 Members from Indonesia, Malaysia & Philippines
- Represent the oleochemical industry to promote the formation of reliable and responsible production of oleochemicals without prejudicing normal competition between companies and countries.

AOMG members

Indonesia

1. PT Ecogreen
2. PT Musim Mas
3. PT Nubika Jaya
4. PT Soci Mas
5. PT Unilever Oleochemical Indonesia

Malaysia

1. Emery Oleochemicals
2. FPG Oleochemicals
3. Fatty Chemicals
4. IFFCO
5. IOI Oleochemicals
6. Natural Oleochemicals
7. Pacific Oleochemicals
8. Palm-Oleo
9. Southern Acids

Philippines

1. Chemrez

Early multinational members from Europe/USA in Malaysia

Unilever

ICI

Akzo Nobel

Henkel

P & G

What makes it work (1)?

- European legacy
- Modeled on APAG (The European Oleochemicals and Allied Products Group) a Sector Group of Cefic (European Chemical Industry Council)
- Assemble Industry Statistics viz capacity and utilisation

What makes it work (2)?

Shared concerns

eg Insurance issues

- Industry reputation low
- High premiums
- Not insurable

Improved after 1998

	
Stearic acid warehouse fire	1992 Bellows rupture in Johor
1993 Selangor 1994 Penang	1997 Explosion H2 generation plant in Selangor

What makes it work (3)?

Commitment of CEOs

K H Tan FIChemE
COO IOI Oleo

Steve Goei
CEO PT Soci Mas

G C Tan FIChemE
MD Pacific Oleo

Commitment of Seniors

E C Goh

F G Wong

Y P Low

K S Qua FIChemE

Working together : Process Safety

2011

2012

Five process safety workshops

2013

2014

Process Safety Workshop 1
Bangkok 2011

HAZOP study on some oleochemical plants

Process Safety Workshop 2
Bali 2012

Process safety in fatty acid and fatty alcohol plants, PTW system, minimisation of solid & liquid waste and communication with the board

Process Safety Workshop 3
Kuantan 2013

Zero waste at BASF-Petronas Chemicals
Handling of hydrogen gas at Air Products

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The world around us

26/7/12 Bunga Alpinia

Leak and lightning?
5 fatalities

25/3/13 Peter Greven Asia

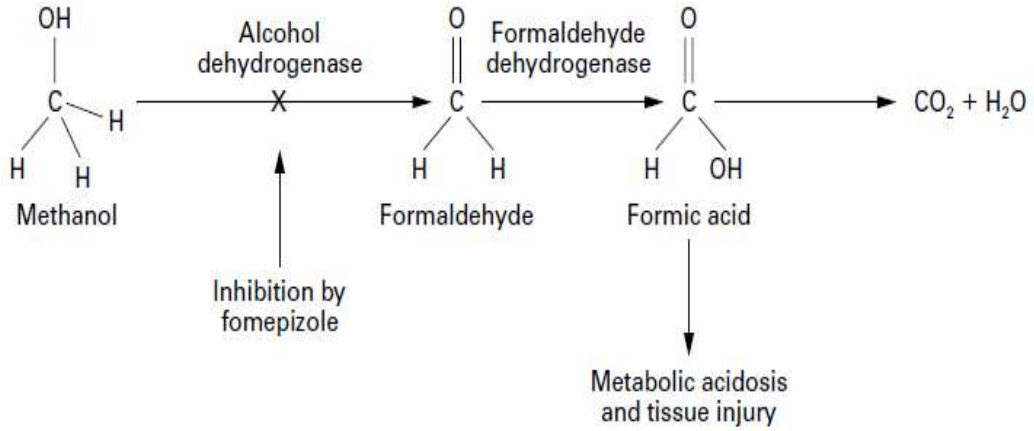
Dust explosion
2 fatalities, 2 serious injuries

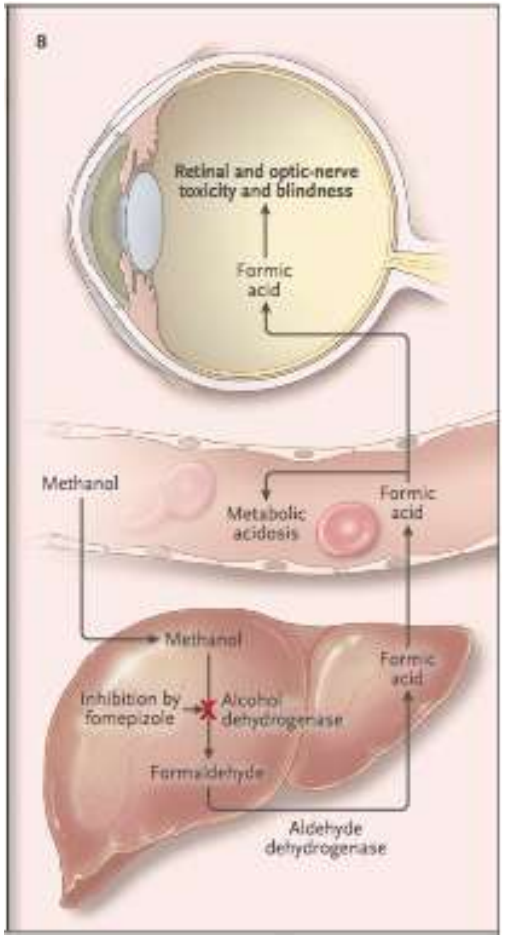
Process Safety Workshop 4
Bandung 2014

Handling of methanol by PETRONAS Chemicals Methanol Labuan
Industrial Dust Explosion Risk Management by BS&B Safety Systems
Layers of Protection Analysis (LOPA)

Methanol toxicity

Metabolism of methanol





Process Safety Workshop 5
Bangkok 2015

PSM 1. Contractor management 2.Mechanical integrity

Working together : Sustainability

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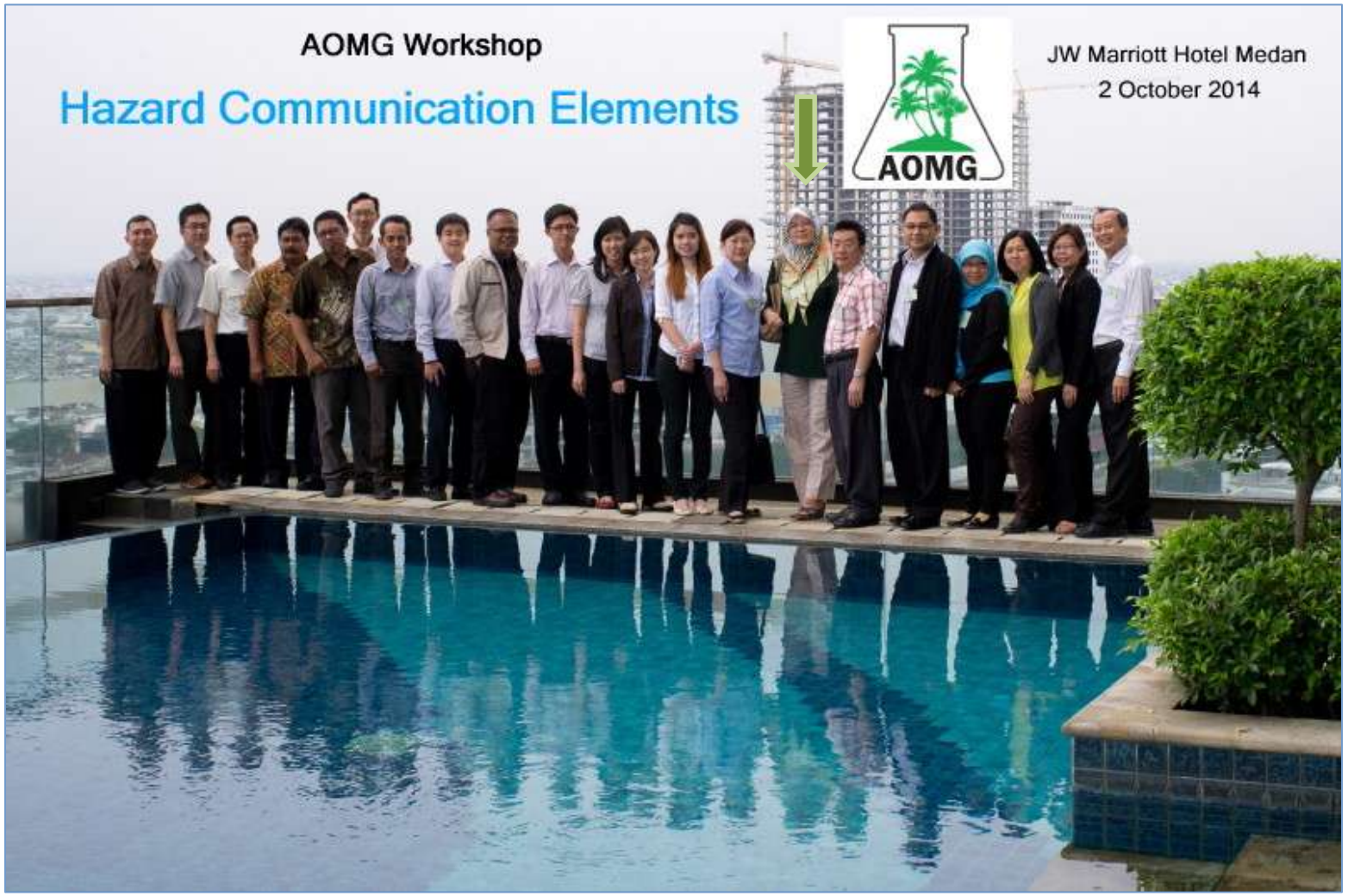
Working together : GHS



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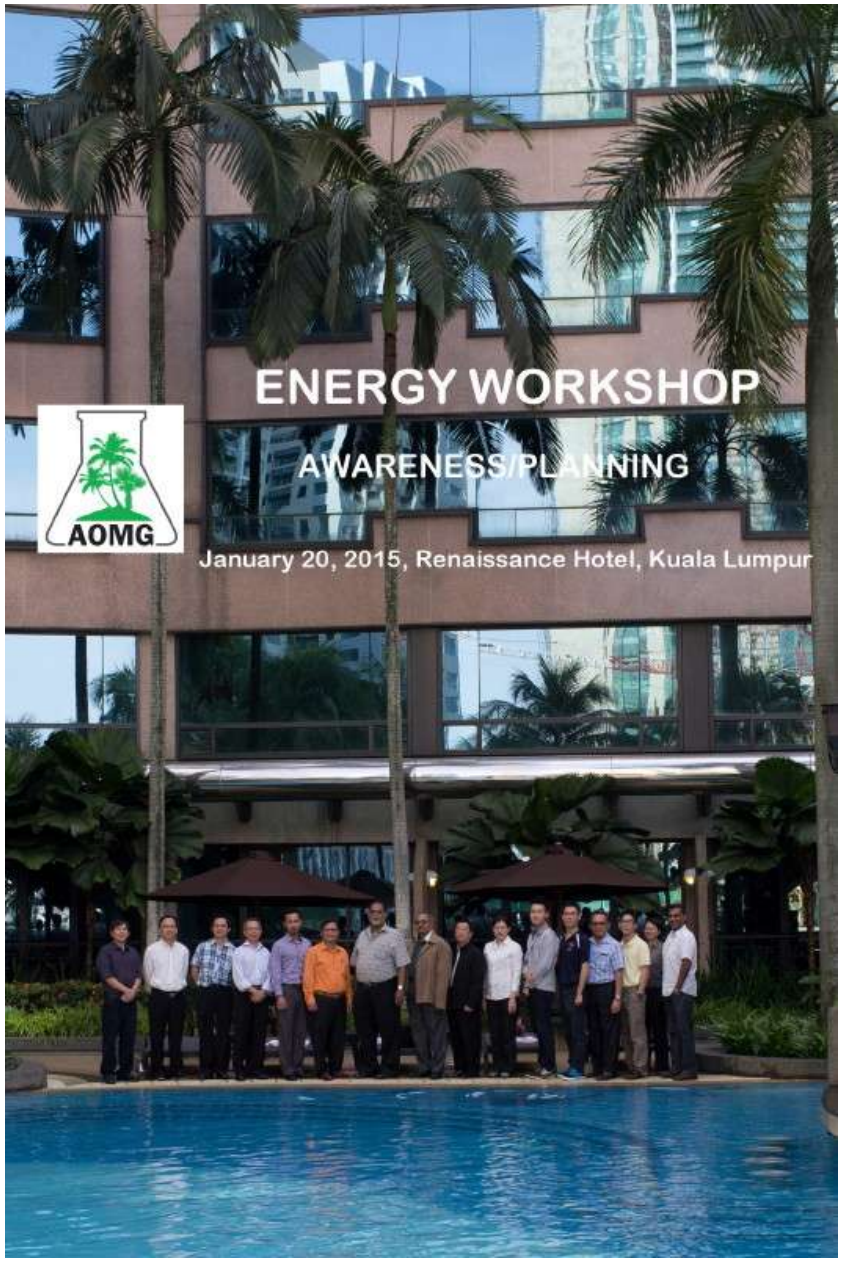
Working together : Energy Efficiency



2.Survey of process safety management in member companies

AOMG Process Safety Committee

Background

- OECD document for Corporate Governance for Process Safety, June 2012
- At 2 levels viz Head of Company & Frontline
- 5 sections

1. Leadership and Culture (8 questions)
2. Risk Awareness (7 questions)
3. Information (10 questions)
4. Competence (7 questions)
5. Action (7 questions) Total 39

Corporate Governance for Process Safety

OECD Guidance for Senior Leaders in
High Hazard Industries

http://www.oecd.org/chemicalsafety/corporategovernanceforprocesssafety.htm

SELF-ASSESSMENT QUESTIONS FOR SENIOR LEADERS

How well are you doing at managing process safety?

The following self-assessment aims to show how well your organisation is managing process safety. In line with the principles of corporate governance of process safety, the questions are intended to be answered by senior leaders: at this stage don't pass the question set to your HSE manager, but answer them yourself as best you can. Once you have done so, you should then discuss with your staff how to address any gaps, get more information, or find out the status of 'work in progress' to address known gaps. The questions are intended to be answered using 'traffic light' scores:

1 = Yes, and I can easily demonstrate this 

2 = Uncertain, I would need to find out, or this is already work in progress 

3 = No, I think there is a gap 

Leadership and Culture 			
Do you have a policy on corporate governance for process safety which describes the management expectations, required commitment, and corporate activities in relation to process safety?			
Do you include process safety on the agenda for all board meetings?			
Do you have a designated board member responsible for process safety?			
Do you and senior leaders actively work to remove any barriers to the reporting of 'bad news' up the management hierarchy, and promote an open culture for communicating process safety issues (*e.g.* by providing direct communications routes from the shopfloor to senior leaders, or from the national board to overseas HQ)?			

Gap analysis

"Heads of companies ticked 'yes' for many items but frontline staff did not always agree"

No	Section	Gap %
1	Leadership & Culture	30
2	Risk Awareness	0
3	Information	20
4	Competence	5
5	Action	45

Highlights

No	Section	Observation
1	Leadership & Culture (30%)	Safety policy not well communicated?
3	Information (20%)	MOMG members participate in CICM's RC Awards. Not winning a process safety award pushed them to focus on process safety.
5	Action (45%)	People at plant may not always be able to get their process safety recommendation or proposals approved.

Keys Findings 1

- The difference between process safety and OSH (occupational safety and health) is not always clear.
- Insurance companies risk survey programmes are more geared towards process safety as their focus is on security of assets and continuity of business. People are also protected as a result.
- Formal Process Safety Management training is recommended to cover the gaps in piecemeal PSM activities and to build a good foundation over a few years for process safety.

Key Findings

1. Formal PSM Training
2. Senior managers should pay more attention to front line production managers on their process safety concerns and formalize a channel for early ‘bad news’ to prevent it from becoming disastrous.
3. Management of contractors is a difficult area and is recognized by all, particularly by production managers.

3.Process Safety – an ongoing journey

3.Process Safety – an ongoing journey

10/7/15 Berkasi, Indonesia

Gas pipeline failure
17 fatalities, 44 injured

6/10/15 Kundang

Dust explosion fire
23 injuries

IChemE ADVANCING CHEMICAL ENGINEERING WORLDWIDE

Dust Explosions – ATEX and Beyond

Webinar series

Register now for a series of four webinars by BPE examining the causes and prevention of explosive atmospheres and the requirements of current European directives (ATEX) to improve health and safety in the workplace.

Dates: 10 November 2015 | 24 November 2015 | 8 December 2015 | 10 December 2015

Register online at: www.icheme.org/dust

bpe

Photo: 14 people were killed and 42 injured at a dust explosion at the Georgia sugar refinery, US, in 2008.

tce SAFETY

Fatal flaws?

Process safety consultant **Keith Plumb** highlights some fundamental problems with hazardous area classification for dusts

DUST explosions can be deadly, delivering tragic consequences caused by what many of us consider are benign products such as sugar or aluminium dust. Dispersed into the air, however, and given a source of ignition, we have seen these products level production facilities, as happened at a UK wood mill in Hooley earlier this year, killing four members of staff.

Having reviewed the measures designed to prevent explosive dust atmospheres from forming, I am concerned they are fundamentally flawed.

For instance, in many countries there is a legal requirement to carry out a 'hazardous area classification' (HAC) where there is an expectation that an explosive atmosphere could occur. In the EU this requirement is covered by Directive 1999/92/EC, which is frequently referred to as the ATEX 137 Directive. I will simply refer to it as the Directive for the rest of the article.

However, as I will explain, the measures for HAC do not require a formal risk assessment or provide a basis for assessing whether the selected equipment requires further protection measures. Furthermore, it does not consider the inventory of the combustible dust, the level of confinement, the likely power of an explosion, the number of people working in the vicinity of the equipment or its location.

That's a lot of flaws.

explosive atmosphere definition is too narrow

The first flaw is that the Directive only covers explosive atmospheres within the following ranges:

1) Temperature -20°C to +60°C;
2) Pressure 80 kPa to 110 kPa; and
3) Air with a normal oxygen content, ie ~21%.

It does not take much process knowledge to know that there are plenty of processes that operate outside this range. An explosive atmosphere including air with only ~21% oxygen is limiting since many processes include an oxygen concentration over a very wide range. It also ignores oxidants such as chlorine.

This limit encourages flawed thinking since it suggests that mixtures with a concentration less than 21% are not hazardous, which is not true. Mixtures of dust in air will remain explosive down to the limiting oxygen concentration which typically ranges from 5–15% depending on the dust. This can occur when working with reactions that generate non-combustible gases or use non-combustible solvents.

3.Process Safety – an ongoing journey

15/1/13 Hulu Trengganu

Palm oil mill steriliser explosion
4 fatalities

4/7/14 Kidurong

Welders fell into a water-filled palm oil tank , 2 fatalities

15/8/14 Cutting FFB from tree, struck electrical line & electrocuted in Sabah
2/8/14 As above, cutting pole stuck in transformer & electrocuted in Johore
26/7/14 Mechanical buffalo overturned on slope. Victim crushed and died
25/3/11 Died being wedged between FFB cages as he pulled them from steriliser

4.Improving Process Safety in the entire Palm Oil Industry

1. Identify pockets of excellence and key persons

Indication of process safety in place

4.Improving Process Safety in the entire Palm Oil Industry

1. Identify pockets of excellence and key persons
2. RSPO (Roundtable on Sustainable Palm Oil) P&C (Principles & Criteria) 4.7

4.7	An occupational health and safety plan is documented, effectively communicated and implemented.	**Indicators:** The health and safety plan shall cover the following: 4.7.1 (M) A health and safety policy shall be in place. A health and safety plan covering all activities shall be documented and implemented, and its effectiveness monitored. 4.7.2 (M) All operations where health and safety is an issue shall be risk assessed, and procedures and actions shall be documented and implemented to address the identified issues. All precautions attached to products shall be properly observed and applied to the workers. 4.7.3 (M) All workers involved in the operation shall be adequately trained in safe working practices (see Criterion 4.8). Adequate and appropriate protective equipment shall be available to all workers at the place of work to cover all potentially hazardous operations, such as pesticide application, machine operations, and land preparation, harvesting and, if it is used, burning.

* (M) indicates *Major Indicators*

PRINCIPLE 4: USE OF APPROPRIATE BEST PRACTICES BY GROWERS AND MILLERS

NO.	PRINCIPLES AND CRITERIA	INDICATORS/GUIDANCE
		4.7.4 (M) The responsible person/persons shall be identified. There shall be records of regular meetings between the responsible person/s and workers. Concerns of all parties about health, safety and welfare shall be discussed at these meetings, and any issues raised shall be recorded. 4.7.5 Accident and emergency procedures shall exist and instructions shall be clearly understood by all workers. Accident procedures shall be available in the appropriate language of the workforce. Assigned operatives trained in First Aid should be present in both field and other operations, and first aid equipment shall be available at worksites. Records of all accidents shall be kept and periodically reviewed. 4.7.6 All workers shall be provided with medical care, and covered by accident insurance. 4.7.7 Occupational injuries shall be recorded using Lost Time Accident (LTA) metrics Specific Guidance for 4.7.7: The National Interpretation will define the metrics for LTA. For countries where there are no national interpretations, the growers will determine their own metrics. **Guidance:** Growers and millers should ensure that the workplace, machinery, equipment, transport and processes under their control are safe and without undue risk to health. Growers and millers should ensure that the chemical, physical and biological substances and agents under their control are without undue risk to health when appropriate measures are taken. All indicators apply to all workers regardless of status. The health and safety plan should also reflect guidance in ILO Convention 184 (see Annex 1).

Growers and millers should ensure that the workplace, machinery, equipment, transport and **processes** under their control are safe …

4.Improving Process Safety in the entire Palm Oil Industry

1. Identify pockets of excellence and key persons ↓
2. RSPO (Roundtable on Sustainable Palm Oil) P&C (Principles & Criteria) 4.7 & 4.8
3. DOSH must publish full investigations

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- SAFETY ALERT
- FATAL ACCIDENT CASE
- PROSECUTION CASE
- OCCUPATIONAL HEALTH
- CHEMICAL MANAGEMENT

SAFETY ALERT - 2015

TITLE	HITS
Bolt And Nut Failure At The Slewing Ring Of The Tower Crane	89
Floor Of Supermarket Under Construction Collapse At Pulau Sebang Melaka	290
Tower Crane Boom Bent	896
Kes Kegagalan Passenger/Material Hoist Di Tapak Pembinaan Di Putrajaya	977
Kes Kemalangan Permanent Gondola	767
Kes Kegagalan Struktur Bumbung Kanopi Di Sabah	767
Welding Failure Of A Gondola Arm Structure	1117
Pilot Wire Breakage During Cable Installation Works	1249
Safety Alert Penyelenggaraan Kren Menara Bagi Komponen Slewing Ring	1431
Fire And Explosion Of Natural Gas Pipeline In Sarawak	2223
The Failure Of Corrosion Inhibitor Piping System	1424
Lift Overrun Up Incident	2069

FIRE AND EXPLOSION OF NATURAL GAS PIPELINE IN SARAWAK

Fire and explosion of a 36" diameter natural gas pipelines occurred on June 10, 2014, at approximately 1.30 am. At about 5.00 am, the fire is extinguished after fuel sources of natural gas in the pipeline was thoroughly burned. This event does not result in any loss of life or injury to humans (public or worker). However, the impact from the explosion and fire formed a crater of about 10 metres in diameter and 3 metres depth. It also caused crops surrounding area of 500 metres radius from the center of the explosion to burnt out. During that time, there was no work activity is in progress, nor arson activity identified.

Radius of fire estimated about 100-150 metres.

This incident caused by the release of gas from the pipeline through a welded joint between two pipes. This failure was due to the low strain capacity of the girth weld at joint that was subjected to external loading (such as soil movement and vibration loads by heavy vehicle). Fracture at the weld joint was resulting from welding defects and flaws. Type of consumables (electrodes) used, expertise of welders and welding technique implemented caused this condition to happen. These inherent defects have not been identified and translated effectively through Non-Destructive Test (NDT) performed on respective welded joint.

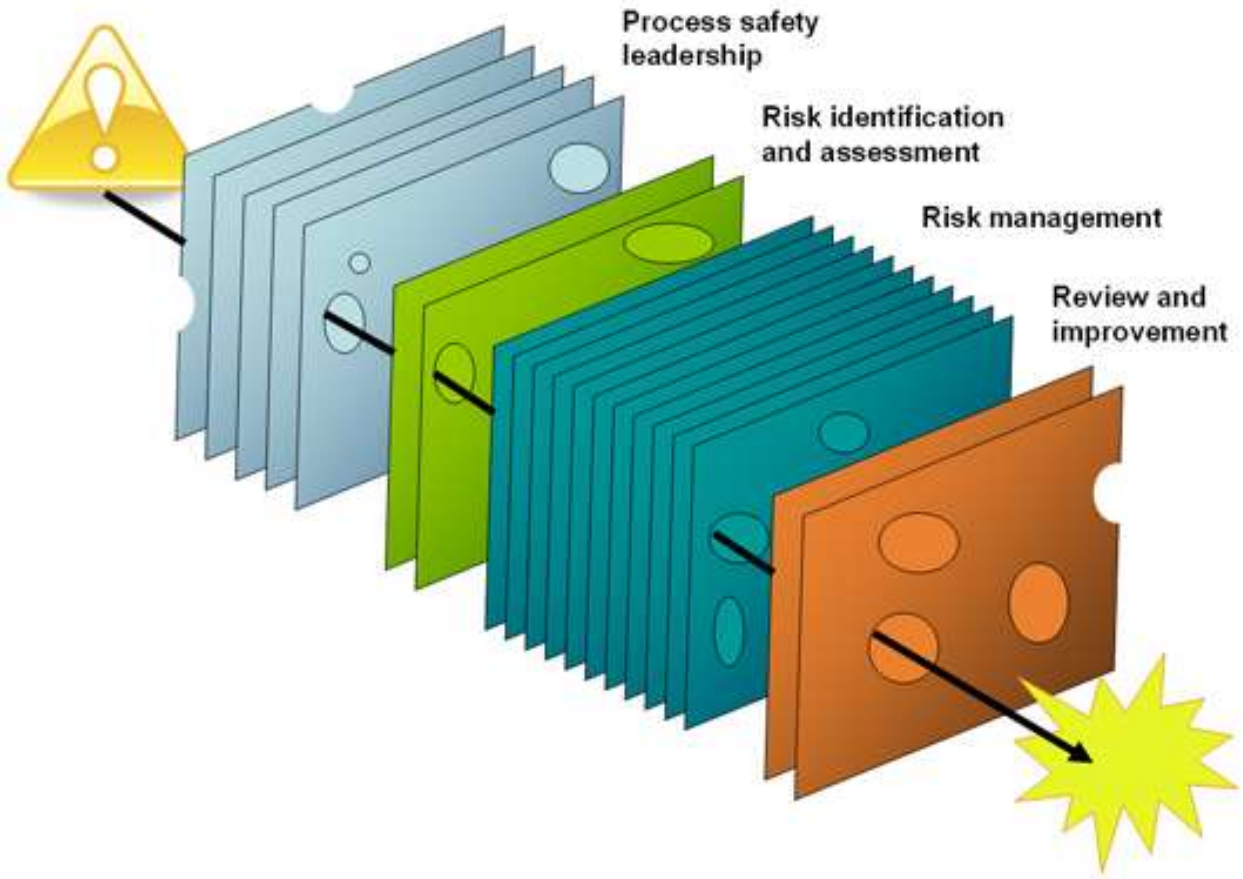
From the results of the investigation made on these events, emphasis on the integrity of the welding should be given, particularly for welding works of the underground gas pipeline. Therefore, attentions to the following point must be considered:

- Preparation of a thorough and accurate Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) should consider all the elements requiredby the respective welding design code.
- The welding work carried out should be effectively and thoroughly supervised in ensuring compliance with welding techniques, procedures and materials used as specified in the provided WPS and PQR.
- A competent person must interpret and evaluate accurately and transparently the results of the non-destructive tests of welding conducted.
- The effectiveness and usability of a detection system of gas relief from underground gas pipelines and its control measures over such events should be provided and monitored from time to time.

4.Improving Process Safety in the entire Palm Oil Industry

1. Identify pockets of excellence and key persons ↓
2. RSPO (Roundtable on Sustainable Palm Oil) P&C (Principles & Criteria) 4.7 & 4.8
3. DOSH must publish investigations
4. Start an IChemE Palm Oil Processing SIG (Special Interest Group) ↑

5. Process safety leadership is vital



5. Process safety leadership is vital

Senior executives are the weakest link in PSM

- Don't understand risk
- Trust absolutely the system design
- Make business decisions without understanding the impact on process safety management
- Don't know how to challenge what they are being told
- Have a strong bias towards messages about success

Process Safety in the Palm Oil Industry

Thank you – Questions?

What was covered

1. Process Safety in AOMG
2. Survey of Process Safety Management in member companies
3. Process safety – an ongoing journey
4. Improving process safety in the entire industry
5. Process safety leadership