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Hazards, Near Misses & Incidents in Process Safety

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Company history – strong European heritage



Start of the Dutch company Koninklijke Nederlandse Zoutindustrie (KNZ).

1918



KNZ adds chemical products to its portfolio.

1931



KNZ becomes part of the newly formed company Akzo, the 4th biggest company in the Netherlands and the 10th biggest chemicals company in the world.

1969



Acquisition of the sites in Ibbenbüren and Bitterfeld.

2002



AkzoNobel sells its chemical activities, which continue under the name of Nouryon.

2018



Energy Storage Business Line established.

2024

In the Dutch Twente Region drilling for salt starts at a depth of 325 metres.



1919

Dansk Salt (Mariager) established.



1963

Akzo merges with Swedish company Nobel Industries to form AkzoNobel.



1994

Expansion with Frankfurt site.



2009

Nouryon splits its activities, Nobian launched as independent company.



2021

Further expansion of certified low-carbon and RFNBO product portfolio.



2025

Our company key numbers

Nobian has 3 salt production sites, 5 chlor-alkali plants, and 1 chloromethanes plant across 7 locations.

Head office in Amersfoort and R&D centre in Enschede.

~1,600

People



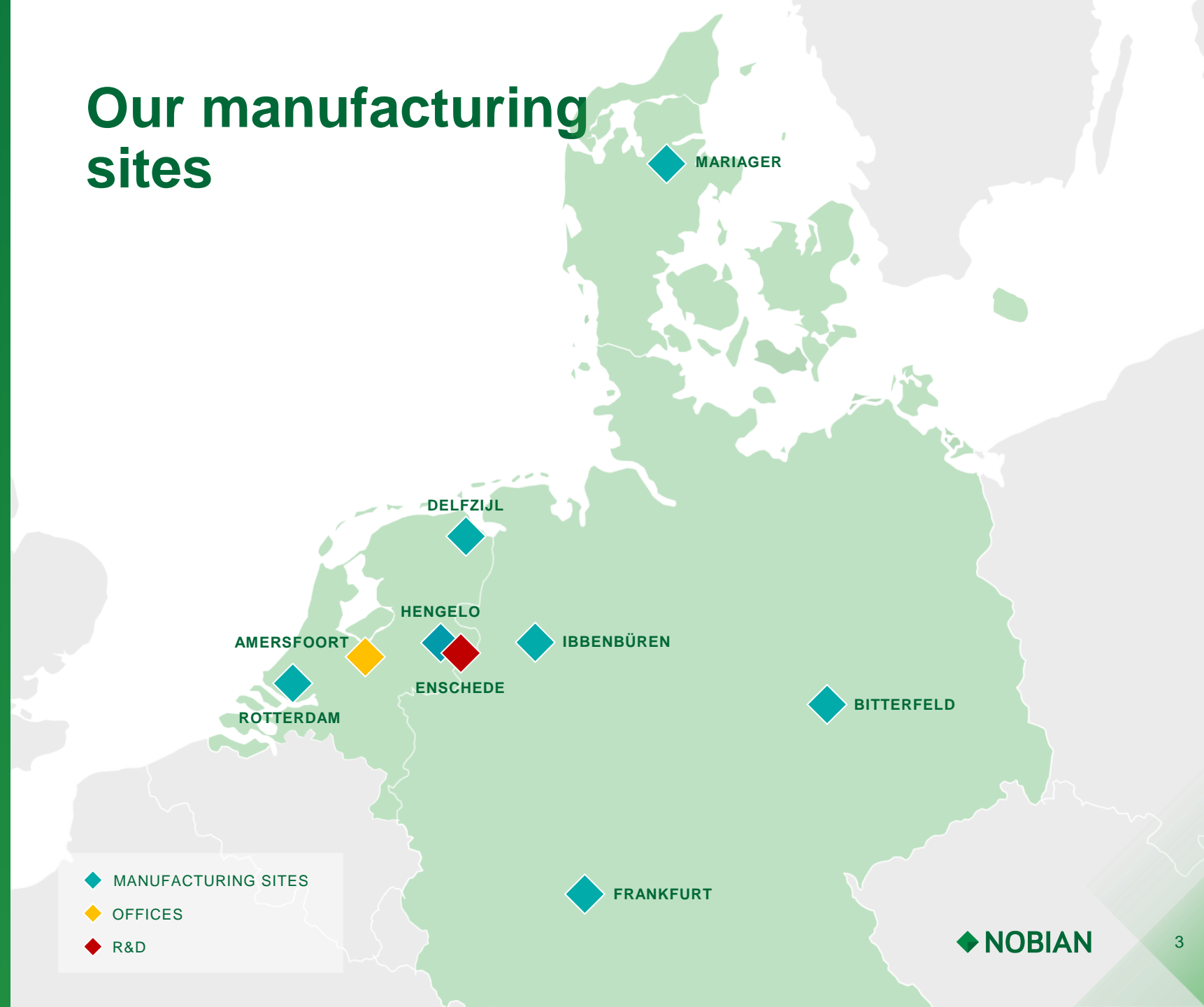
7

Manufacturing sites,
1 innovation centre

>€1.2 bln

Revenue

Our manufacturing sites



Our value chain

delivers strategic independence of Europe for key materials.

Salt caverns to become cornerstone of hydrogen infrastructure.

85%

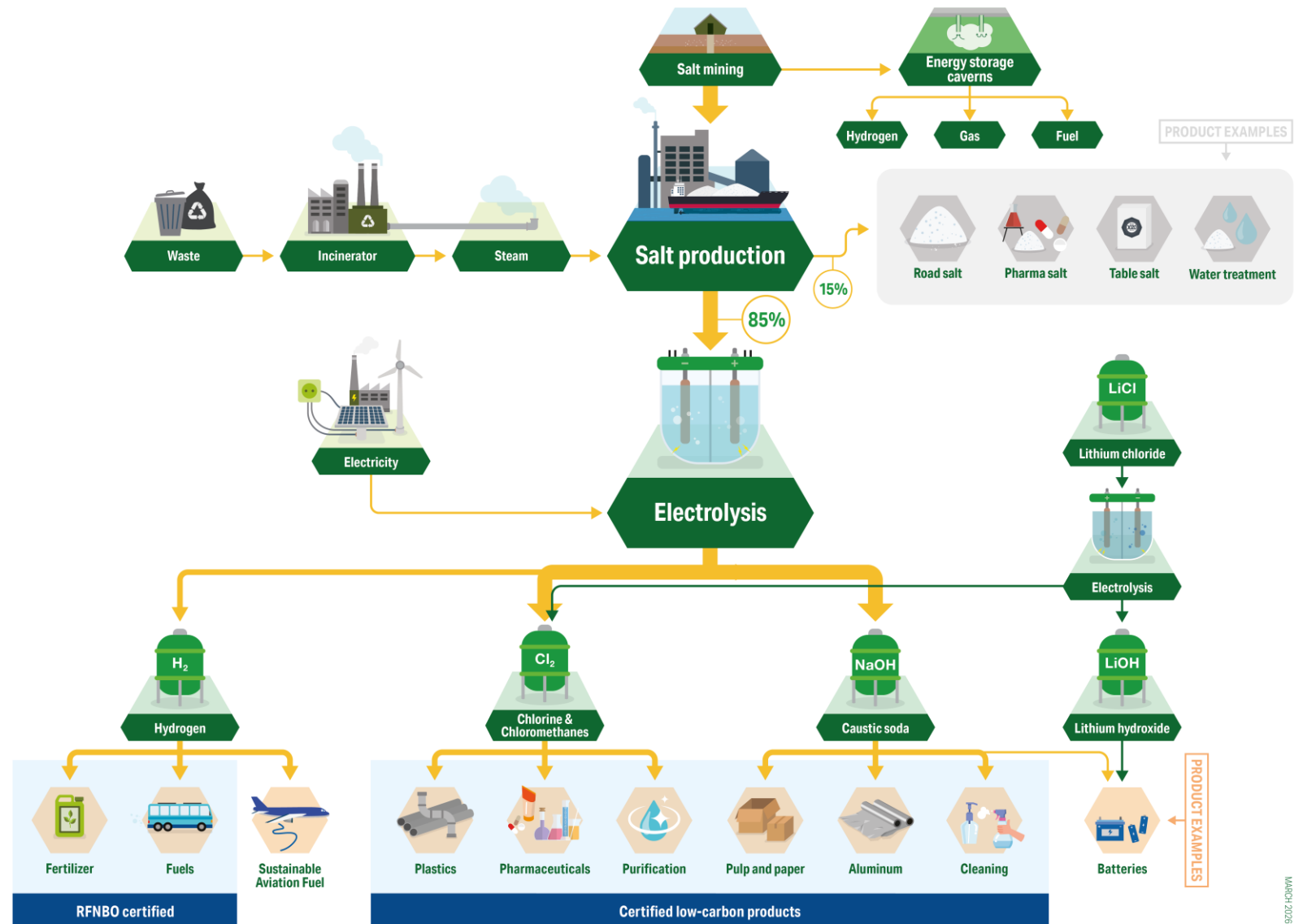
of Nobian's salt is sold to the chemical industry.

40%

of all products produced by the chemical industry is derived from salt.

100%

of the salt used in the chlor-alkali clusters Delfzijl, Rotterdam and Frankfurt, and a significant share of the salt used in other major chlor-alkali clusters in North-Western Europe is produced by Nobian.



“What is our HSE/PSM Performance ?”

What is our HSE-PSM performance as a company ?

Common questions

- ◆ *What are the main causes of serious incidents ?*
- ◆ *Do we manage the risks at the right level ?*
- ◆ *Which area needs improvement to prevent serious incidents ?*
- ◆ *What do our leading indicators tell us?*
- ◆ *And so on*

All **valid questions**, requiring understanding of the **nature of the company**, work processes and the incidents (and near misses and hazards) – also the vision, goals, targets, decisions, resources etc on a company level.

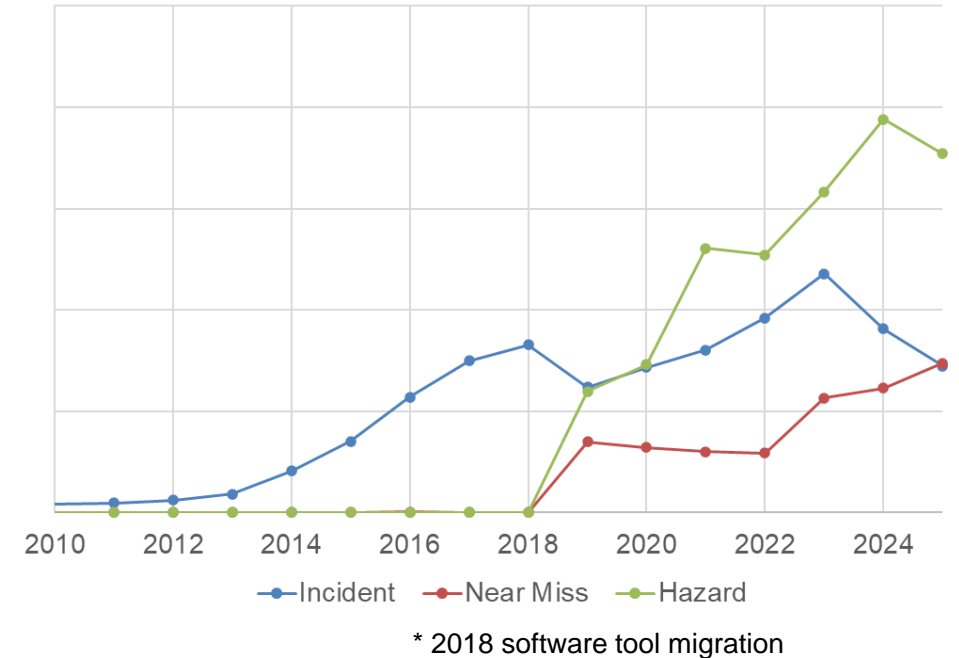
Leading PSM indicators and KPI's are essential to improve performance & prevent incidents.

To support the leading indicators, we also need to understand the (common) lagging indicators...

HSE Performance history

From a bird's eye view, what affects lagging performance indicators ?

- ◆ Safety culture,
- ◆ Management focus,
- ◆ Definitions
- ◆ Reporting requirements
- ◆ Software tools
- ◆ and so on



Changes in reporting, tools and/or management focus can & will distort trends.

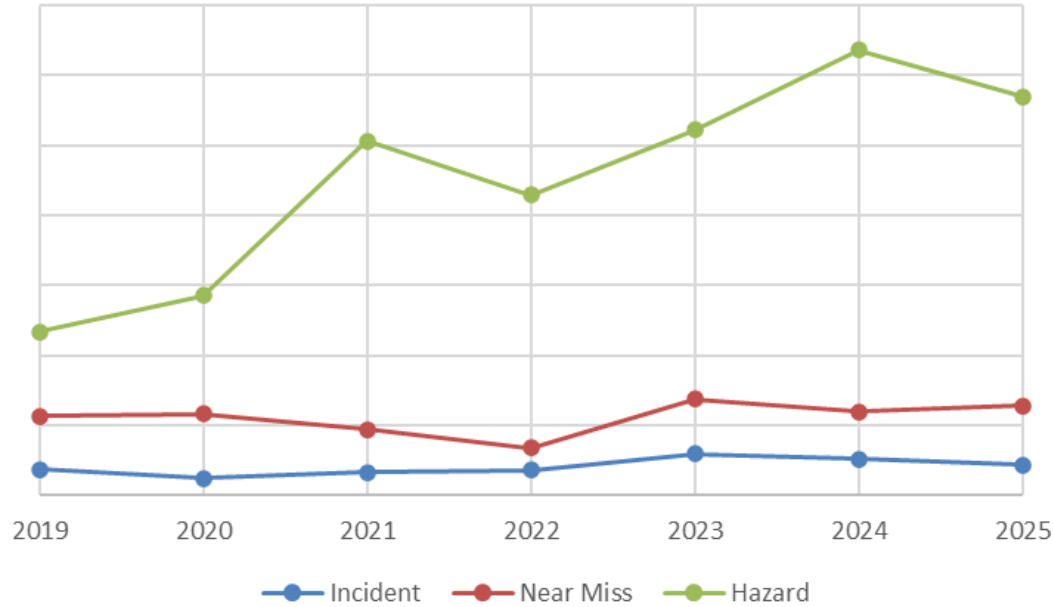
More reported events does not mean worse safety performance

As a result, the **real safety performance**

- ◆ is **reflected better** by the indicators over time, and
- ◆ is best reviewed over a **short(er) period**

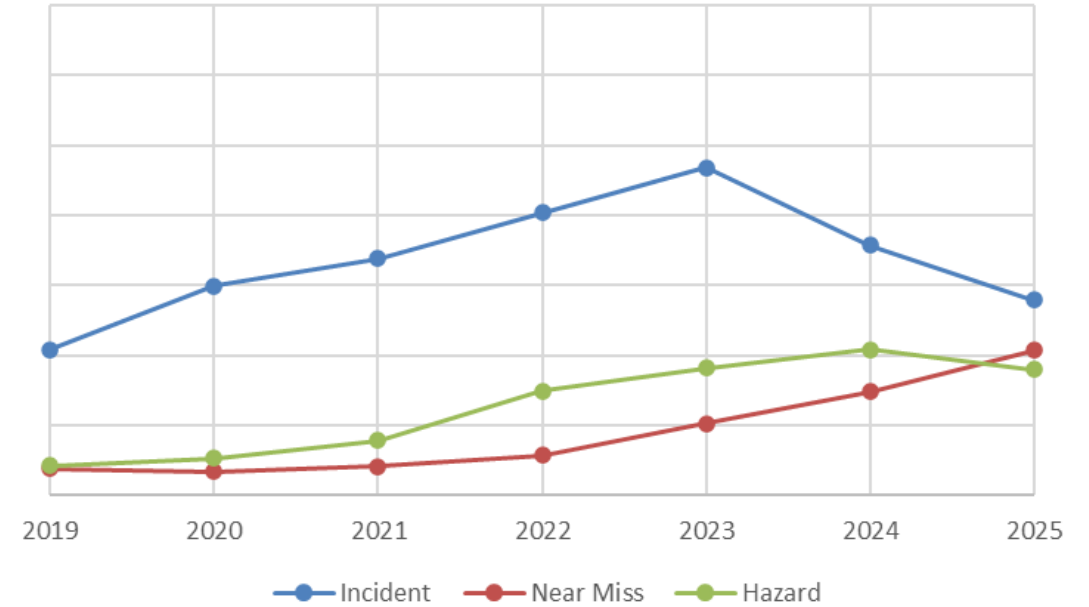
Let's dive in !

'People Safety' Events



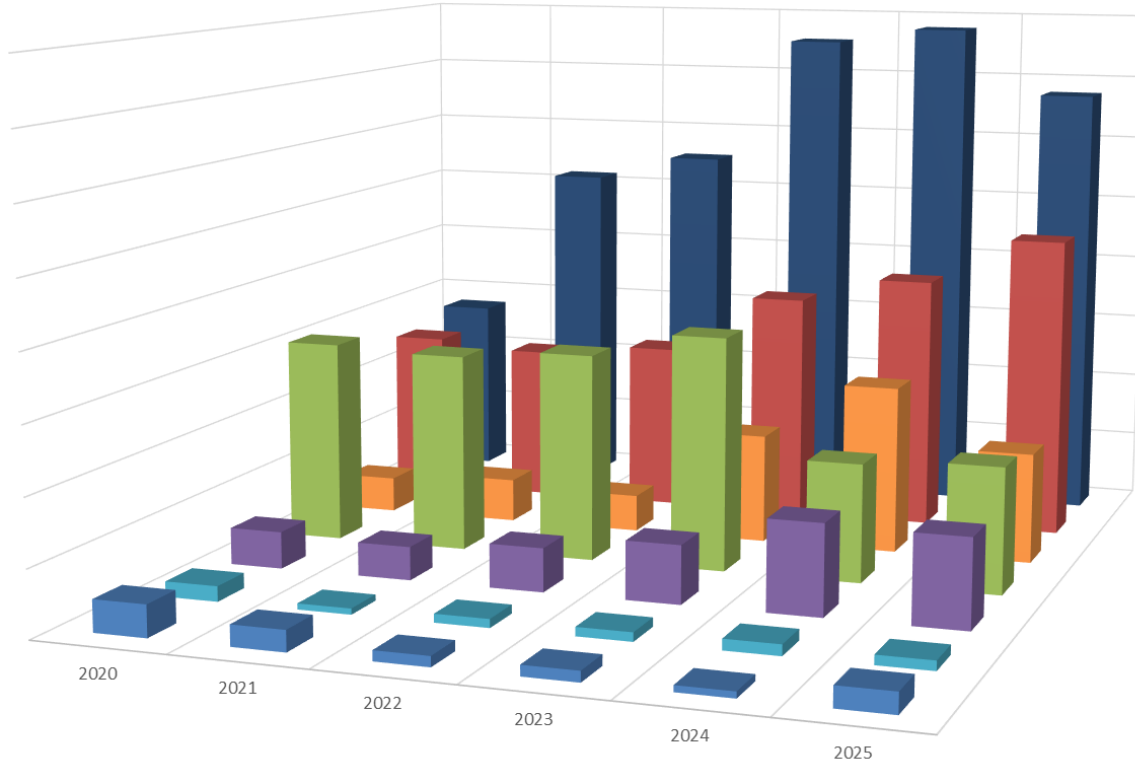
- ◆ “Pyramid” - principle : #HAZ > #NM > #Inc
- ◆ Stable near misses & incidents
- ◆ Increased hazard reporting
 - Due to communication & feedback on reporting/analysis

'Process Safety' Events

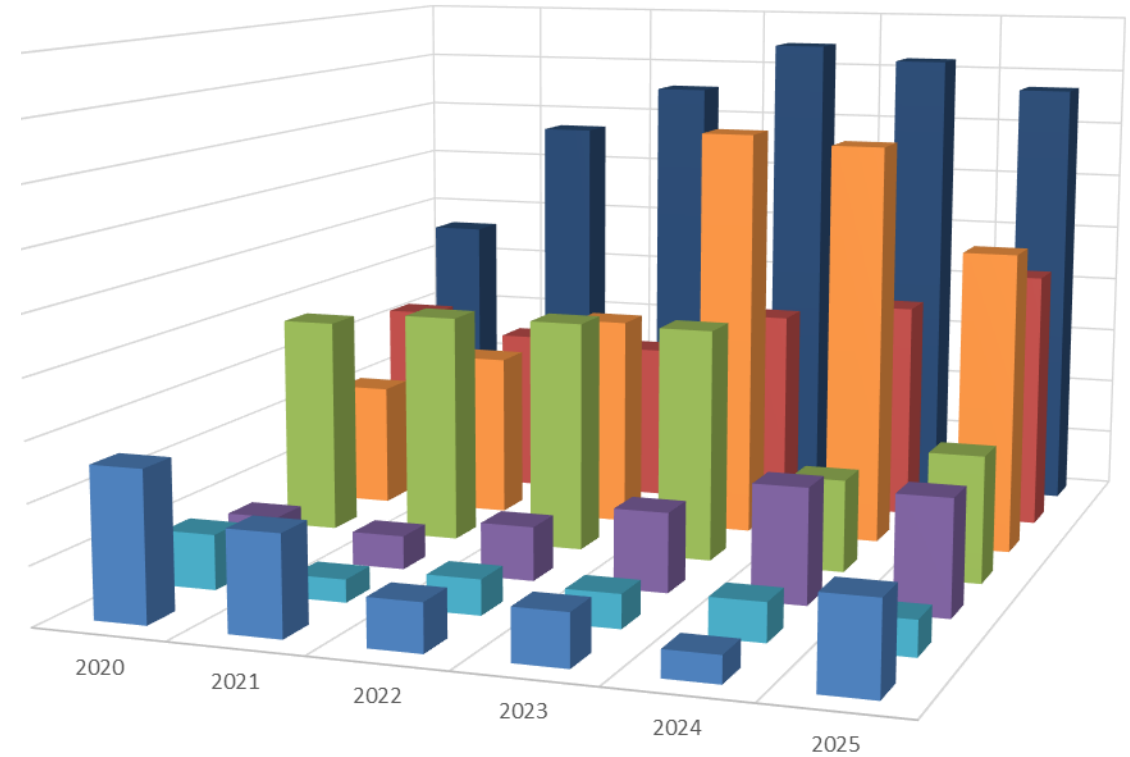


- ◆ Inverse pyramid ! (definitions related)
- ◆ Increase of Near Miss and Hazard reporting
 - Due to communication & feedback on reporting/analysis

One level deeper - are all locations reporting similar ?



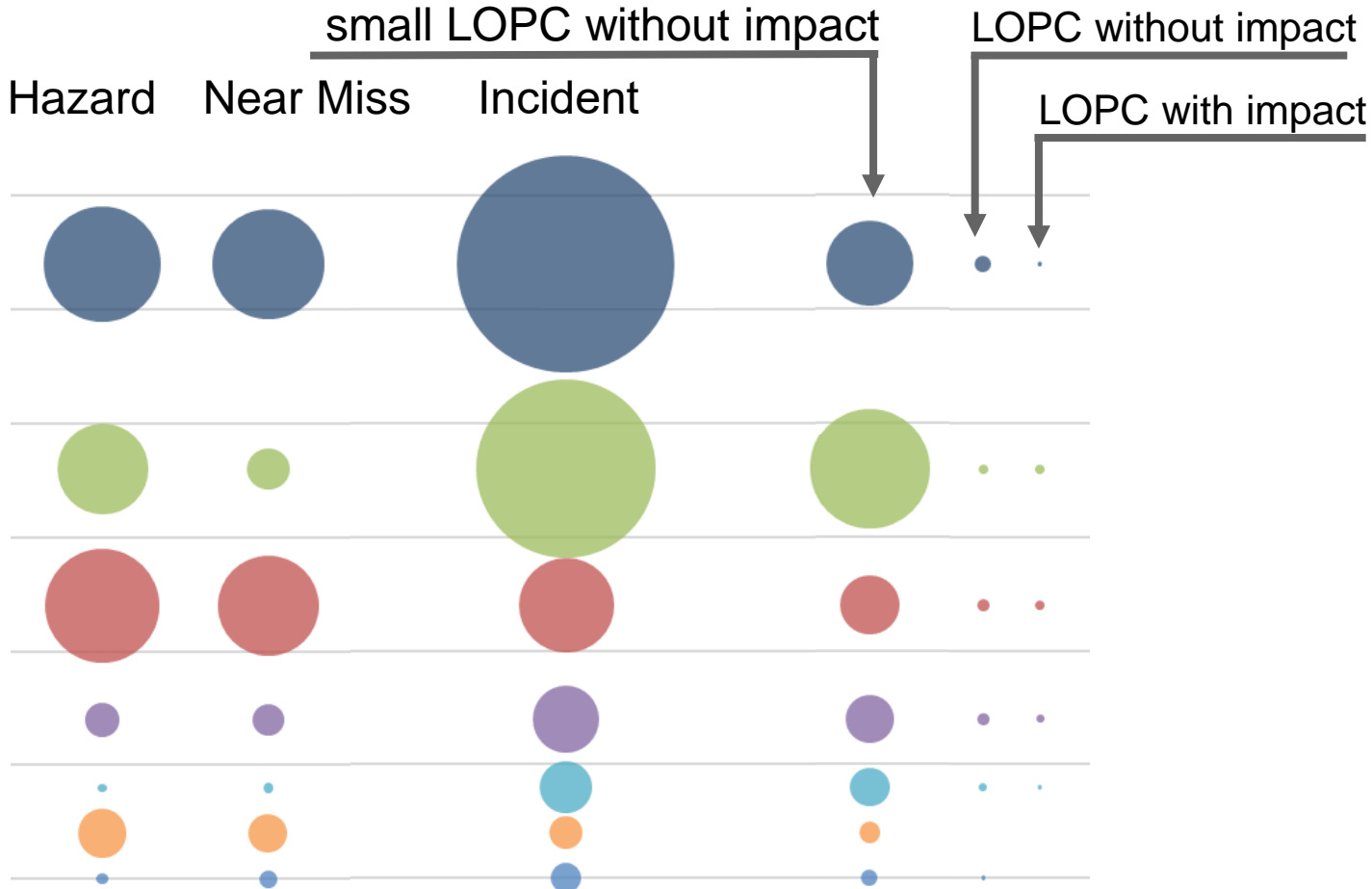
Reported PS events per year



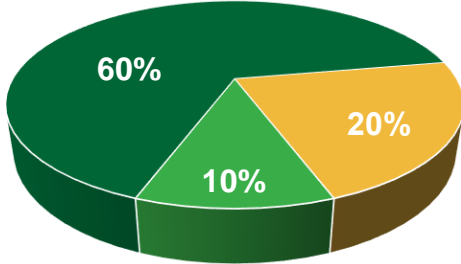
Report PS events per mln hours per year

differences due to organization (size, stability, turnover, culture), process installation (age, operational dynamics)

One more level deeper – PSE’s per location

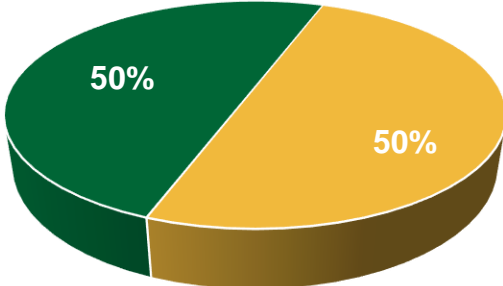


Direct cause all incidents



■ Mechanical ■ Human Error ■ Instrumentation

Direct cause major incidents



■ Mechanical ■ Human Error

“Reporting per mln hours worked” works for People Safety Events
 Not for Process Safety Events (Office, Turn Arounds, low hazard processes, remote operated processes, etc). **◆ NOBIAN**

PSE Definitions – *key* in event reporting

PSE Incident

- ◆ **LOPC of hazardous chemical(s)**, quantity exceeding threshold, or release of **(electrical) energy**, or
- ◆ LOPC or hazardous chemicals, quantity **below reporting threshold with impact** on people/environment, or
- ◆ **Demand on a safety system** with impact

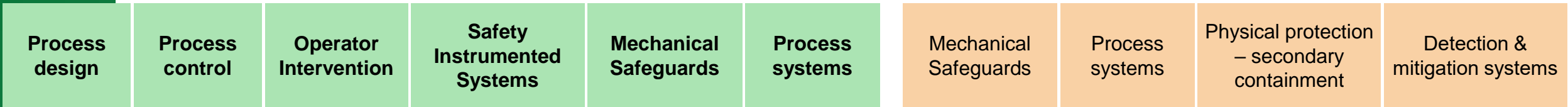
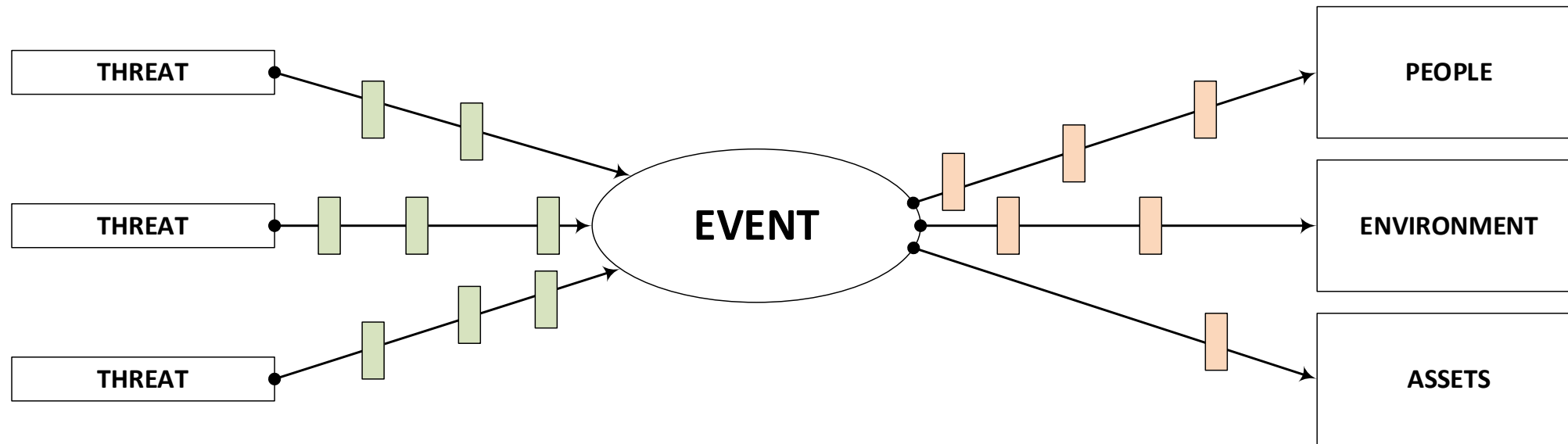
PSE Near miss

- ◆ **Event without impact** on people/environment
 - LOPC quantity below threshold
 - Demand on a safety system
- ◆ **Weakness found in LOD**
 - Integrity issue identified without LOPC
 - Incorrect applied safety critical procedure
 - Active safety system found defective - without demand

PS Hazard

A process Safety Event/Deviation that **does not fit** into the definitions for PSE incident or the PSE near miss.

Let's dive in PS Hazards, near Misses, Incidents



Several **work processes** to improve performance of the line of defense:

Process Safety Information & documentation, Risk Assessments, Management of Change, Operating Procedures, Training & Competency, Mechanical Integrity, Inspection & Testing, Alarm Management, Emergency Preparedness, Incident Investigation, PTW, LOTOTO, hose management, double isolation management

Minor issues P&ID errors, missing blind flanges, etc. are resolved without a Hazard registration !

For minor issues : **finding the right balance** between solving the issue & solving the issue + creating a report

Summarizing

Lagging indicators on company level only show overall PSM performance

- ◆ Differences to standard pyramid, mainly due to definitions
- ◆ Improved reporting due to improved tools, definitions, focus, training & feedback
- ◆ Right balance between required effort to report an event and specific events details is key
- ◆ Further improvements can be obtained by improve ease of reporting (automation & AI),

Consolidated results on company level vs individual site results

- ◆ Leading Indicators at sites are in place to focus on the work processes and the performance
- ◆ Leading Indicators on company level focus on management processes (not detail site work processes)

Incidents, near misses, hazards and their trends continue to be investigated & monitored

- ◆ Strengthen the performance of site work processes (reduce weakness, strengthen Lines of Defense)
- ◆ Share knowledge & learning over the sites

“What is our HSE/PSM Performance ?”

- ◆ A combination of indicators, trends and insight in company & sites is essential due to the differences between sites & processes.

Thank you for your attention!

Questions ?