



Climate change adaptation

How good are we?

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Presentation overview

- CDOIF success - Environmental risk tolerability
- Climate Change, Process Safety and Environmental Protection
 - CDOIF's new guidelines and the urgency for action
- How ready are we for a changed and changing climate?
- Next steps for regulators and operators

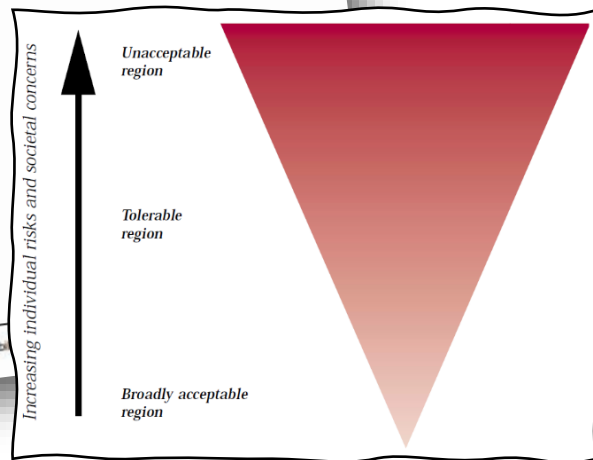
CDOIF Guideline – Environmental Risk Tolerability

CDOIF

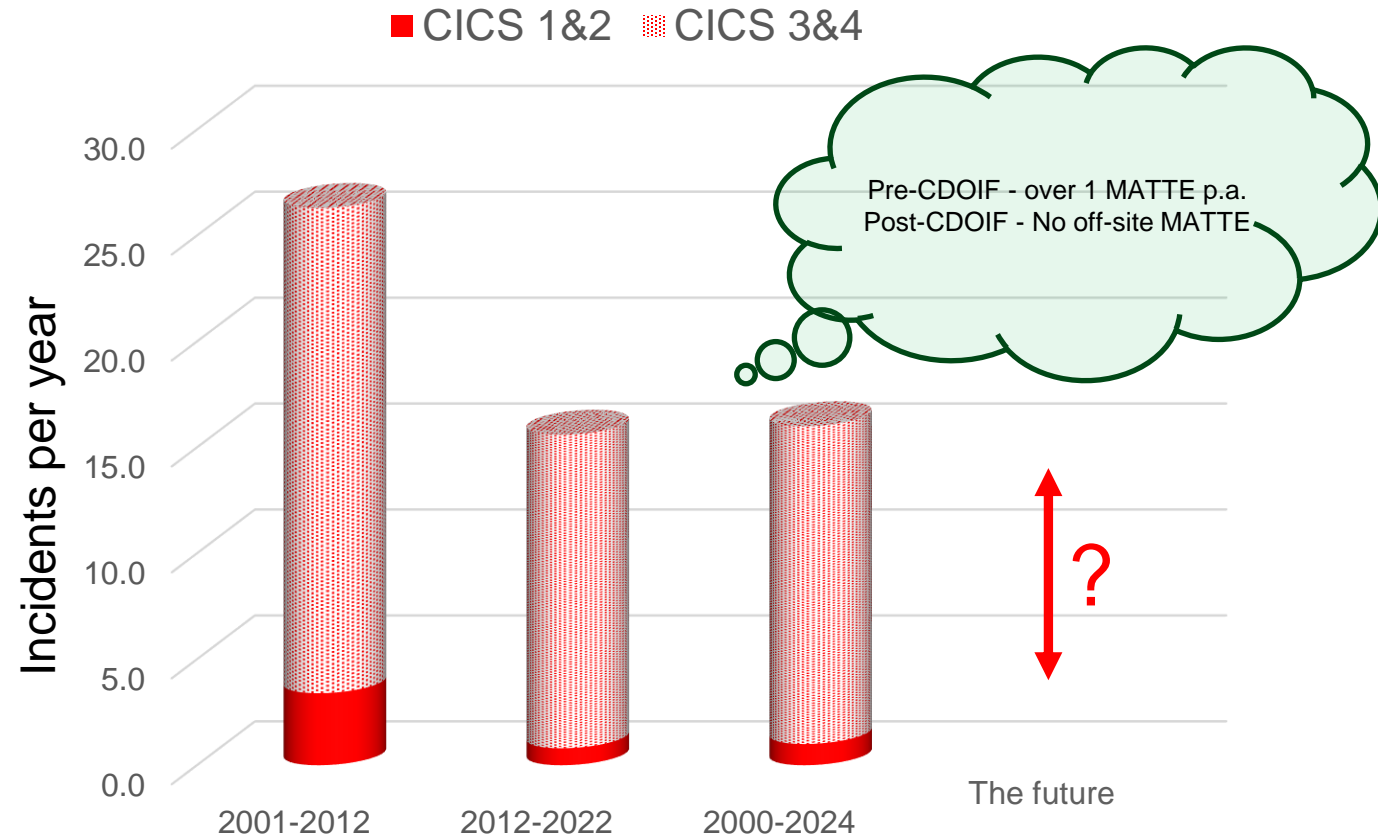
Chemical and Downstream Oil Industries Forum

Guideline

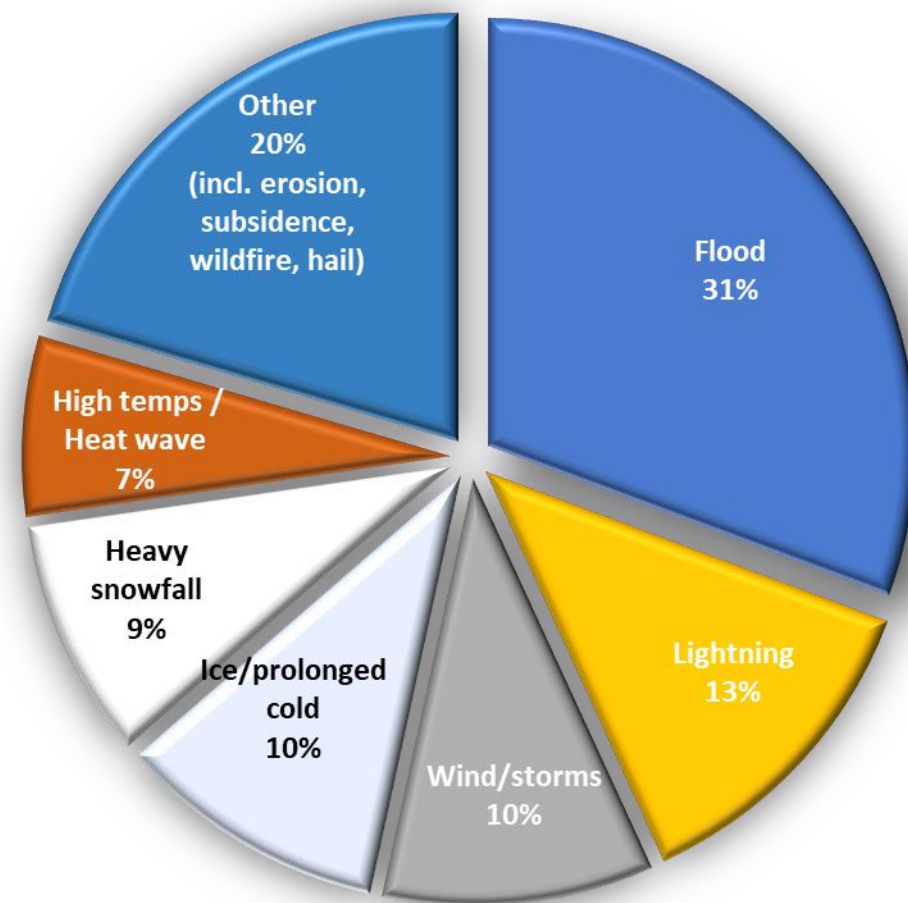
Environmental Risk Tolerability for COMAH Establishments



COMAH relevant incidents - England
EA national incident recording system data



Climate Change & Natechs



Extreme weather threats to GB establishments
(Survey by CDOIF, 2021)

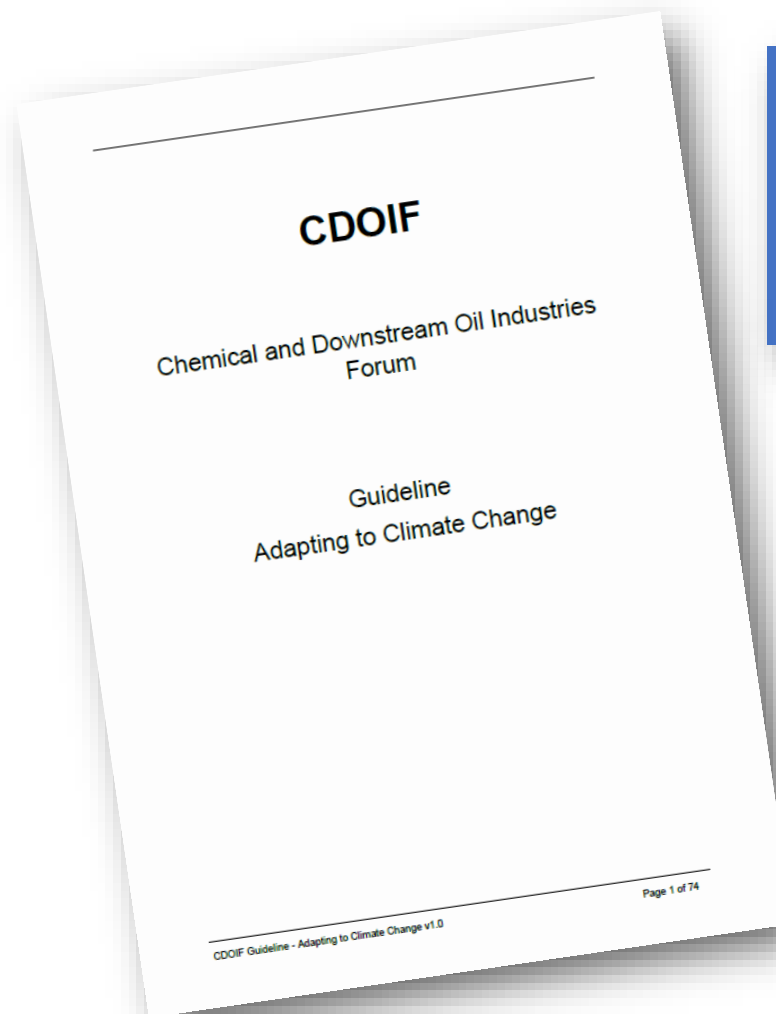


Our industrial future? (Bing AI generated)

CDOIF – Adapting to Climate Change

- Guideline and overview slides now published on Process Safety Forum website

- [CDOIF – Process Safety Forum \(p-s-f2.org.uk\)](https://p-s-f2.org.uk)



This block contains several overlapping slides from a presentation. The top-left slide is titled "What is a Natech?" and lists characteristics of such accidents. The top-right slide is titled "What are the most common extreme weather/Natech threats at present?" and features two pie charts. The bottom-left slide is titled "High temperatures" and discusses industrial impacts of heatwaves. The bottom-right slide is titled "Extreme weather threats to G.B. establishments (Survey by CDOIF, 2021)".

What is a Natech?

Natural Hazard Triggered Technological Accident (Natech)

- Industrial accidents with natural causes, such as flooding, storms, lightning, high/low temperatures, sea level rise, subsidence, wildfires etc.
- Natechs can degrade protection measures, causing harm to people and the environment ... and assets / businesses / supply chains...
- Planning for Natechs is essential for process safety

Common Natech characteristics:

- Wide area impact – both local impacts and wider area disruption (such as power and communications outages and supply chain disruption – **cascading risks**)
- Existing control measures (barriers and systems) not designed for present day and future environmental extremes
- Common cause failures across barriers
- Multiple, simultaneous failures & releases
- Impact on preventive and mitigatory measures – including emergency responders
- Potential for multistate simultaneous Major Accidents (e.g. [East Coa](#))

What are the most common extreme weather/Natech threats at present?

Natech accidents reported by 5 EU countries (1990-2009) MAH, Lessons Learned Bulletin No.6 – Natech accidents, 2014

Category	Percentage
High temperature	10%
Lightning	10%
Low temperature	10%
Flood	10%
Storm	10%
Other	10%

Extreme weather threats to G.B. establishments (Survey by CDOIF, 2021)

Category	Percentage
Flood	18%
Lightning	10%
High temperature	7%
Heavy snowfall	7%
Other	20%
Low temperature	10%
Storm	10%
Wildfires	10%

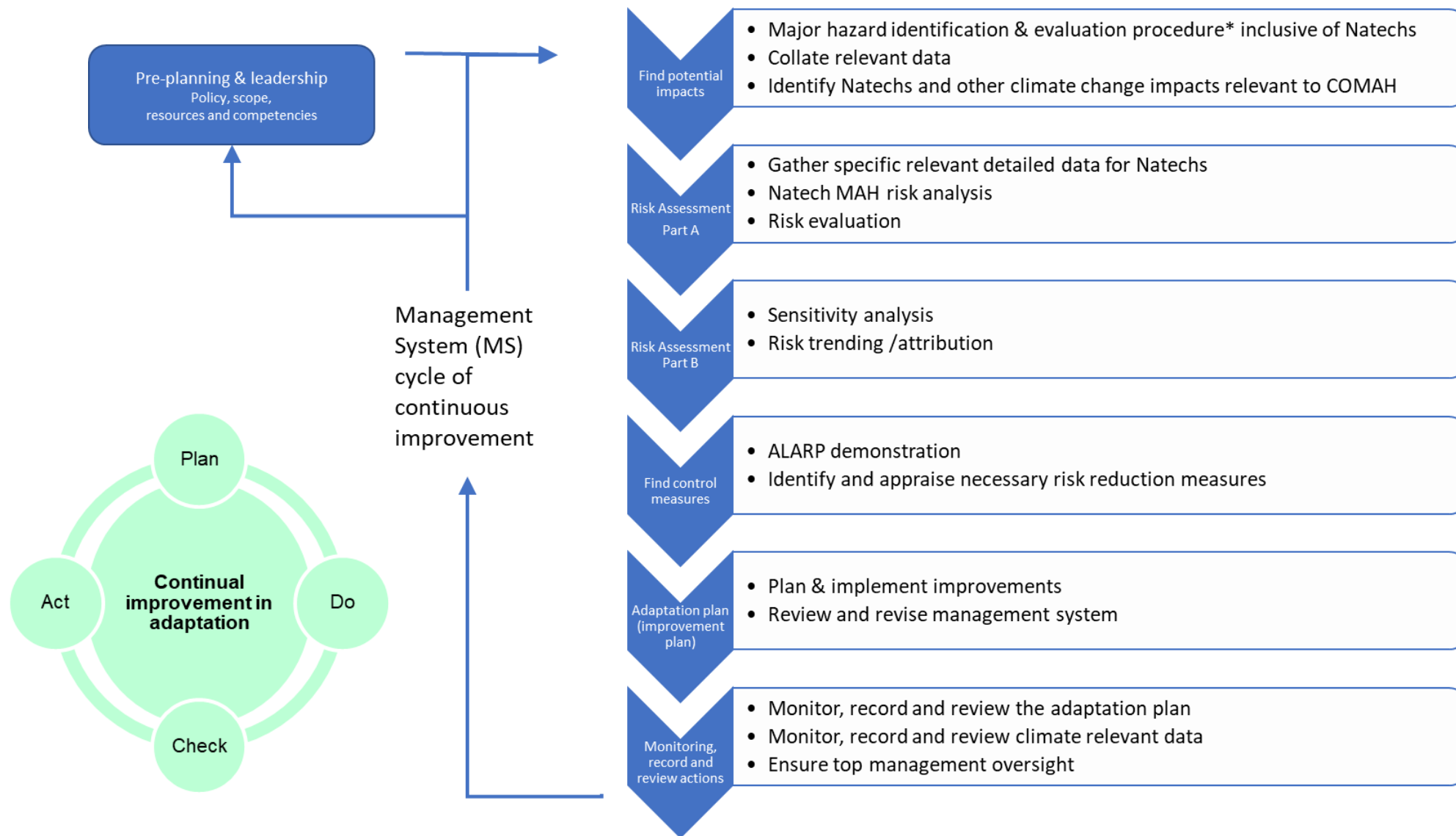
High temperatures

High temperatures and heatwaves can cause multiple issues for industry (*Meché has discussed these for people and processes*) and aggravate hazardous industrial events. A common accident scenario is fire generated by the self-heating of materials or waste. To combat fires during extreme heat, significant water resources are required. A report on climate extremes in the UK found that we are experiencing higher maximum temperatures and longer warm spells in recent years.

In July 2019, the phenomenon was seen in France impacting industrial activities. [In CDOIF, a fire broke out](#) in a capacitor bank of a food-processing plant which impacted 50% of the site's production capacity. Overheating of the capacitor banks due to exceptional heatwaves was determined as the cause of the fire.

Temperatures in the UK soared to the highest the country has ever seen during the heatwave in July 2022. Due to extreme heat, conductors sagged, and transformers were overheating leaving approximately 8,000 properties in Yorkshire, Lincolnshire and North East without electricity. Heat related impacts also affected Transport and Technology sectors, leading to significant disruption. Industry impacts that occurred affected multiple sites with fire, explosion and other infrastructure / equipment failures. Lessons from high temperature events can be explored further in French case study material – [East 2020 Report 2020](#) with experience from previous heatwaves e.g. 2011 and 2012.

CDOIF – Embedding adaptation into SMS



Signposted Guidance

BS EN ISO 14090:2019
BSI Standards Publication
Adaptation to climate change - Principles, requirements and guidelines (ISO 14090:2019)

BS 8631:2021
BSI Standards Publication
Adaptation to climate change — Using adaptation pathways for decision making — Guide

BS EN ISO 14091:2021
BSI Standards Publication
Adaptation to climate change - Guidelines on vulnerability, impacts and risk assessment

bsi.



CENELEC

TAILORED GUIDANCE FOR STANDARDIZATION TECHNICAL COMMITTEES:
HOW TO INCLUDE ADAPTION TO CLIMATE CHANGE (ACC) IN EUROPEAN INFRASTRUCTURE STANDARDS

March 2022

CIA

2ND EDITION

Safeguarding chemical businesses in a changing climate

How to prepare a Climate Change Adaptation Plan

www.cia.org.uk

#EEC_OPEN_BUS

RESPONSIBLE CARE

ADAPTING INDUSTRY TO WITHSTAND RISING TEMPERATURES AND FUTURE HEATWAVES.

Institution of MECHANICAL ENGINEERS

Improving the world through engineering

Extreme Weather Events in England (2020-2024)

2020



1. (3rd-16th Feb) Storm Ciara
2. (13rd-18th Feb) Storm Dennis
3. (Aug 2020) Heatwave
4. (16th Aug) Extreme Norfolk rainfall
5. (19th-20th Aug) Storms Ellen and (25th Aug) Francis
6. (2nd-4th Oct 2024) Storm Alex and heavy rain

2021



1. (18th-20th Jan) Storm Christoph
2. (Feb 2021) Winter Weather and Storm Darcy
3. (Mar and Apr) Extreme Temperature
4. (29th-30th Jul) Storm Evert
5. (Oct 2021) Heavy and persistent rain
6. (26th-27th Nov) Storm Arwen
7. (2021/2022) Mild New Year

2022



1. (29th-31st Jan) Storms Malik and Corrie
2. (16th-21st Feb) Storms Dudley, Eunice and Franklin
3. (16th-19th Jul) Heatwave
4. (8th-18th Dec) Low Temperatures

2023



1. (17th Feb) Storm Otto
2. (12th Apr) Storm Noa
3. (5th Aug) Storm Antoni
4. (18th-19th Aug) Storm Betty
5. (Sep 2023) Heatwave
6. (18th - 21st Oct) Storm Babet
7. (1st-2nd Nov) Storm Ciarán
8. (13th Nov) Storm Debi
9. (9th-10th Dec) Storms Elin and Fergus

2024



1. (2nd Jan) Storm Henk
2. (21st-24th Jan) Storms Isha and Jocelyn
3. (6th-7th April) Storm Kathleen
4. (9th April) Hampshire and Isle of Wight coastal flooding.
5. (21st- 23rd May) Exceptionally Wet Weather

Key weather events and climate impacts (2020-2024)

Storms Ellen and Francis

Aug,
2020



40-Degree Heatwave

Jul,
2022



Coastal Flooding

Apr,
2024

Extreme Winter Cold

Feb,
2021



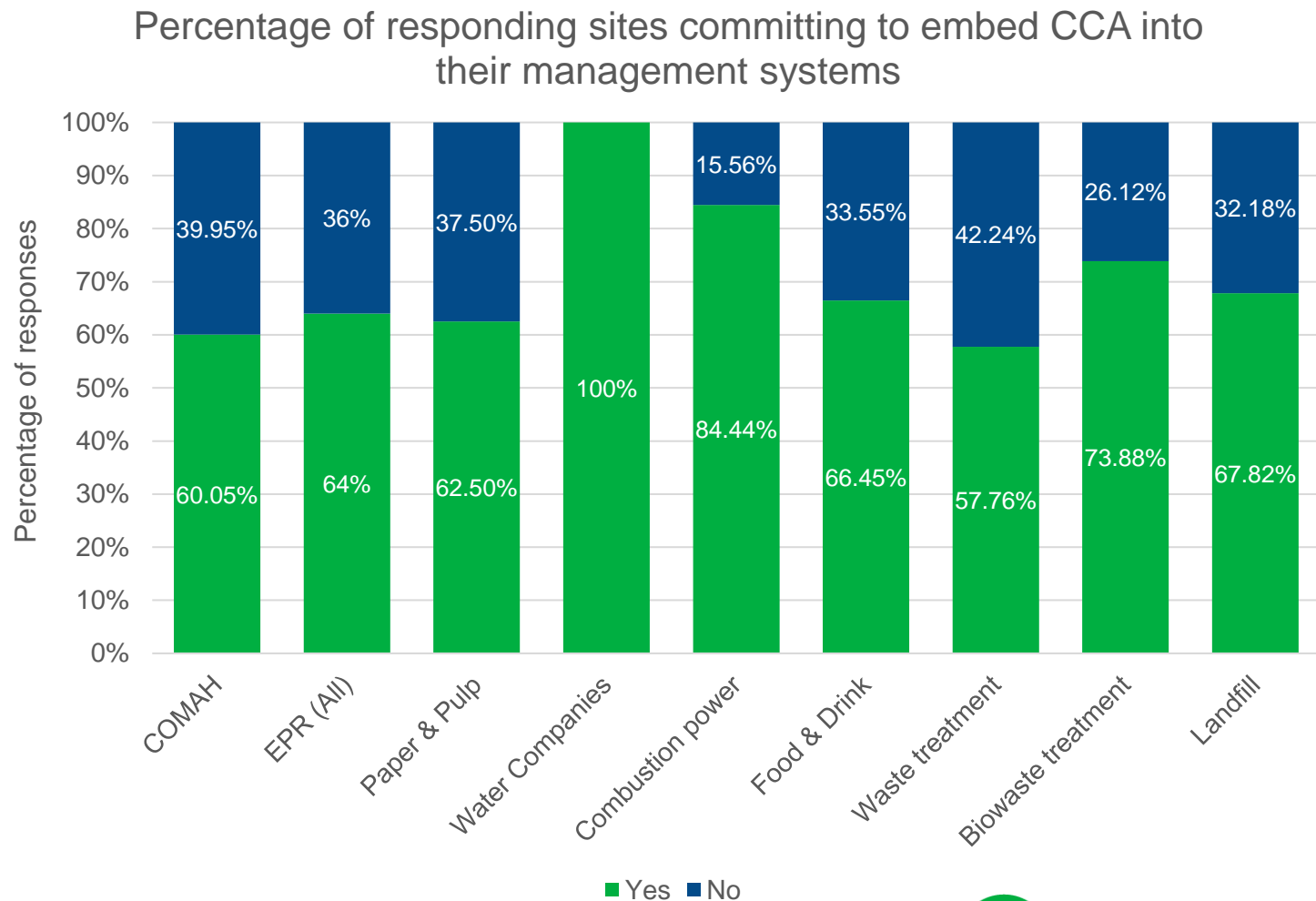
Multiple Storms - Direct and Cascading Impacts

2023

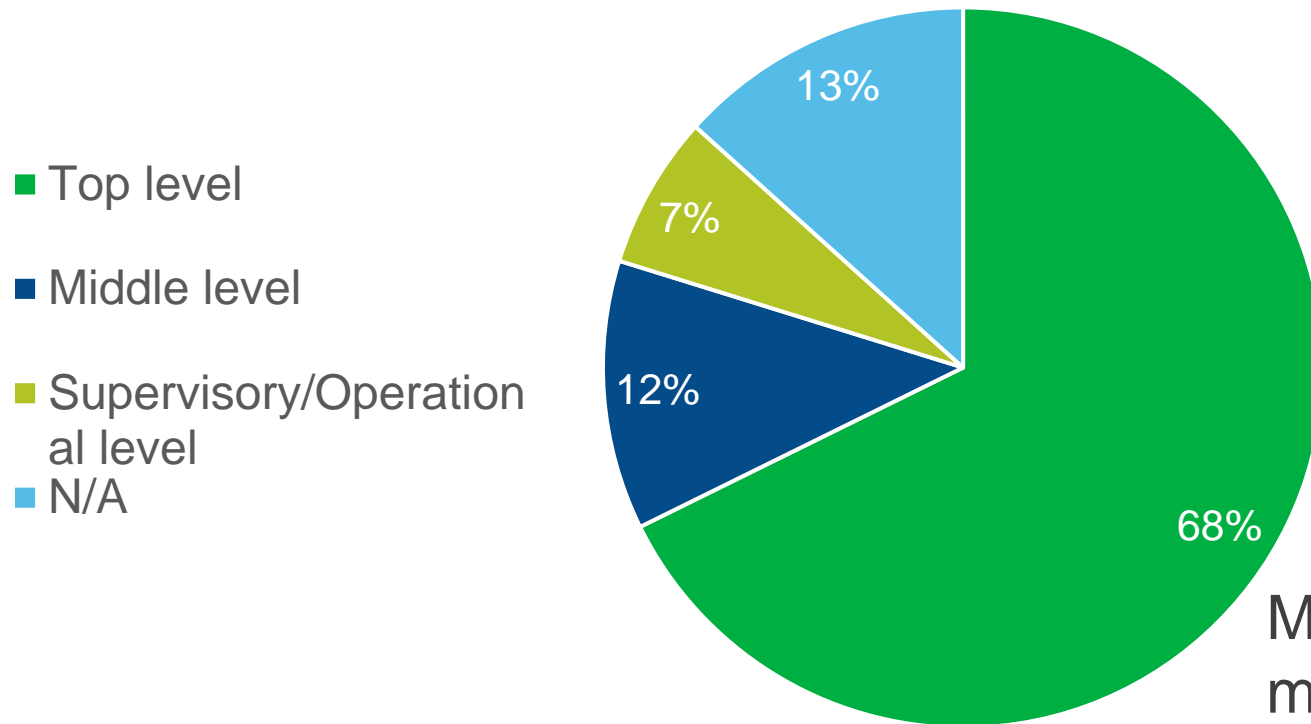


CA Questionnaire - overview & company commitments

- 418 responses (COMAH)
1289 responses (EPR)
- 73% response rate for COMAH sites (compared to $\approx 15\%$ for EPR)
- 2/3 operators committing to embed climate change adaption into their management systems



Level of management responsibility for Natech & adaptation management



Feb 2024 ISO amendments of management system standards require embedding of climate change, including top management oversight

Many operators have defined top management as responsible for ensuring compliance

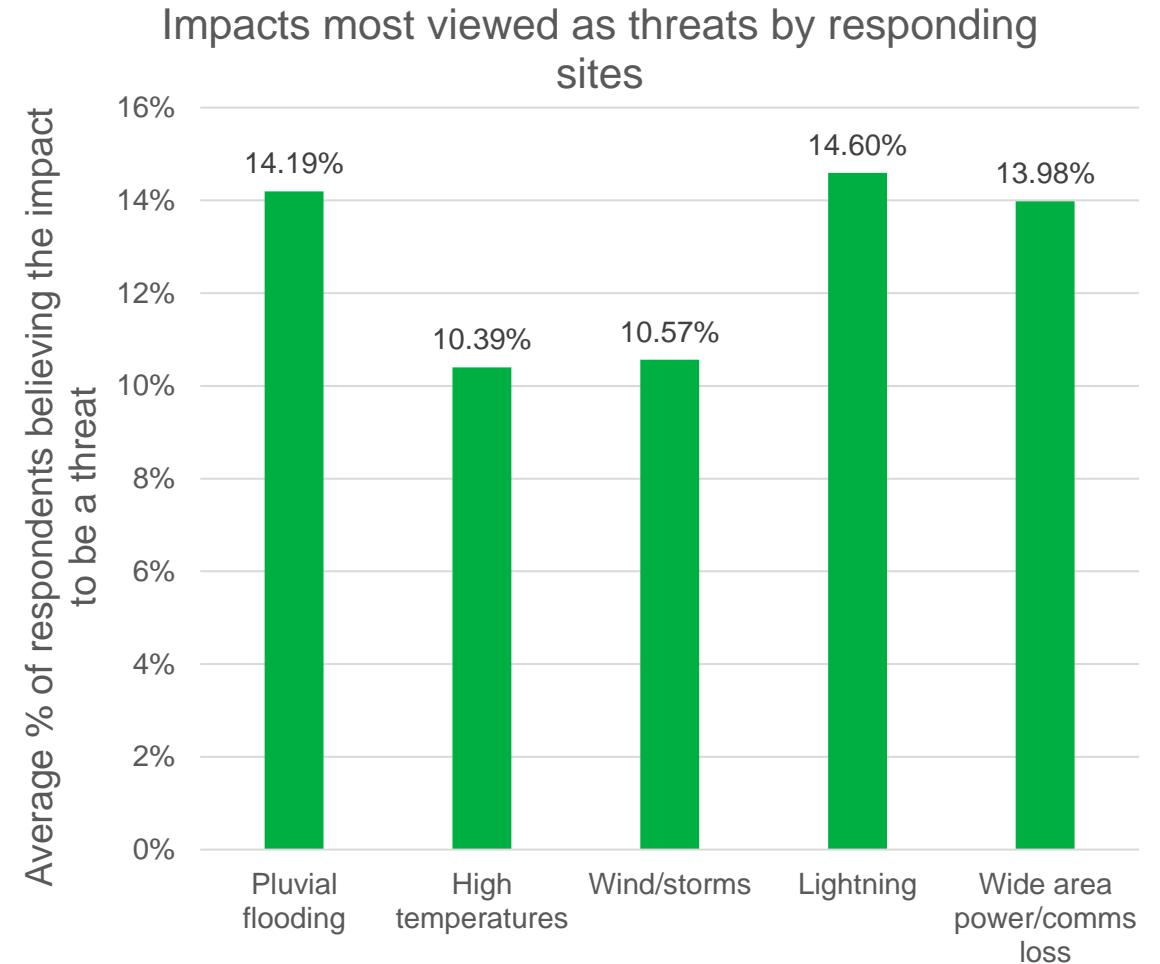
Benchmarking against standards & guidance, including Management System revisions and improvement plans

	EPR responses ISO 14090, ISO 14091 & BS 8631	COMAH responses ISO 14090, ISO 14091 & BS 8631
Total benchmarking & improving	340	96
Percentage of respondents	26.4%	23.05%
Total average	<u>25%</u>	

	EPR EMS guidance		EPR responses other guidance	COMAH responses other guidance
	EPR	COMAH		
Total benchmarking & improving	841	187	319	87
Percentage of respondents	65%	45%	25%	21%
Total average				<u>23%</u>

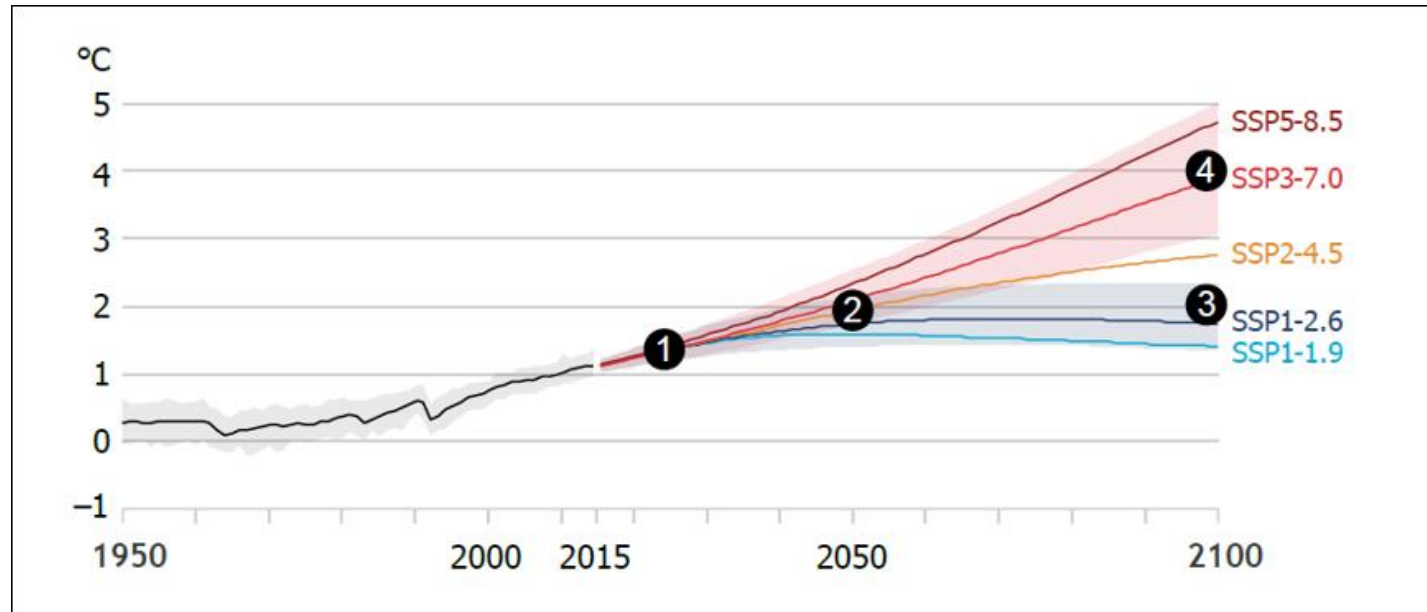
Key risk assessment findings – present day impacts

- Pluvial flooding and lightning – top impacts
- Consideration of cascading impacts encouraging
- ~70% of responding sites have currently assessed against the impacts
- Most common impacts yet to be currently assessed were:
 - Wildfire
 - High temperatures/heatwave
 - Increased sunlight (UV & heat)
 - Heavy snowfall
 - Hail
 - Climate impacts on the environment



Key risk assessment findings – future risks

- Flooding impacts are the most common to include future scenarios in risk assessments
- Less than 50% of respondents replied to questions on future data inclusion within risk assessments
- On average only 16% of responding COMAH sites have included future scenarios within their RAs vs. 11% for EPR



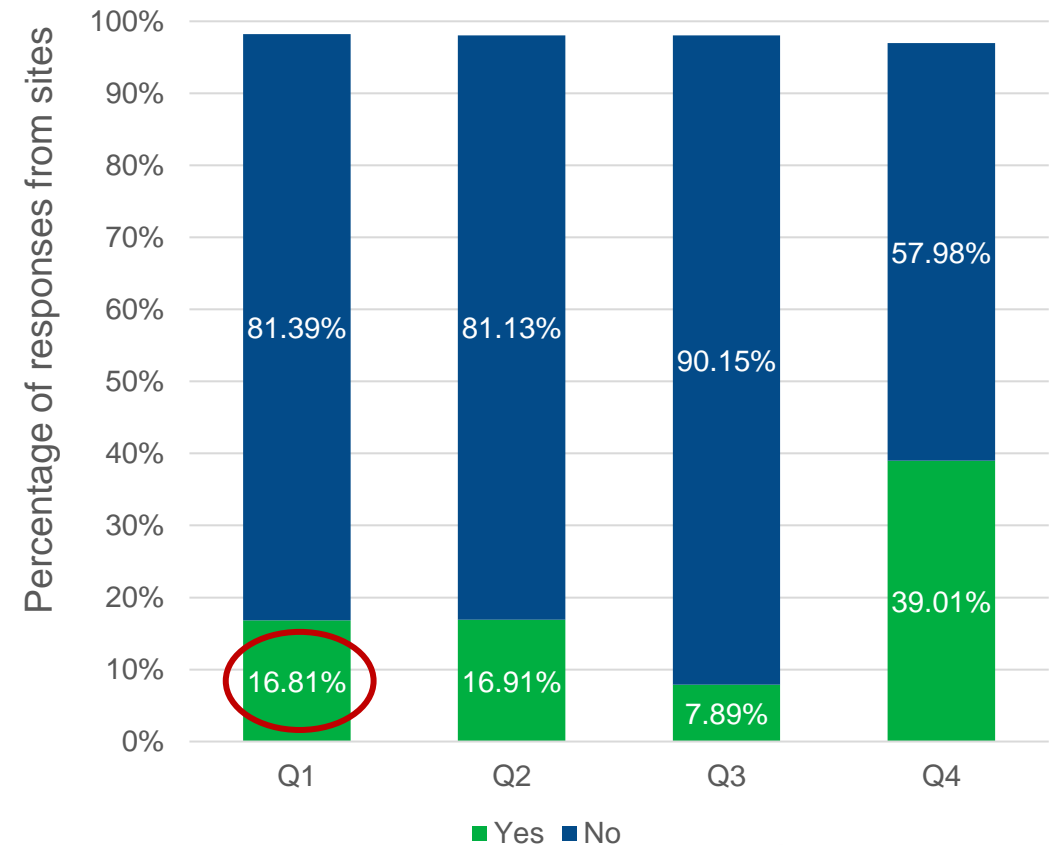
1. Present day (The climate has already changed).
2. Mid-century (+2°C by 2050: medium-high emissions scenario).
3. Managed transition (+2°C by 2100: low-medium emissions scenario)
4. Runaway change (+4°C by 2100: medium-high emissions scenario).

<https://www.gov.uk/government/publications/climate-impacts-tool>

Average responses for management systems questions

- 1) Have you carried out a specific test/exercise of your emergency plans using a relevant incident or extreme weather scenario?
- 2) Do you keep records of local data associated with the risks identified? (e.g. extreme weather events / sea level data / loss of utilities or supply chain issues associated with climate impacts)
- 3) Have you developed any indicators specifically associated with monitoring climate change adaptation risks and the performance of the SMS in relation to these risks and the need to ensure compliance?
- 4) Do you have in place a system to log identified improvements (specifically relevant to climate change impacts), prioritise these and determine implementation timescales, assign an owner, track their implementation, and report progress to senior management?

Site responses from final management system questions



Questionnaire conclusions

- Majority of sites have top level management responsible for ensuring compliance
- Only 1 in 4 operators have utilised climate change standards/guidance
- Lack of awareness on the above has been acknowledged by sites
 - ✓ CDOIF guideline has answers, but skills and capacity building is an ongoing challenge
- Sites need to include more scenarios with future data within their risk assessments
- Few sites have the necessary climate change measures embedded throughout their management systems



What the COMAH Competent Authority expects of operators, to manage risks of a changing climate



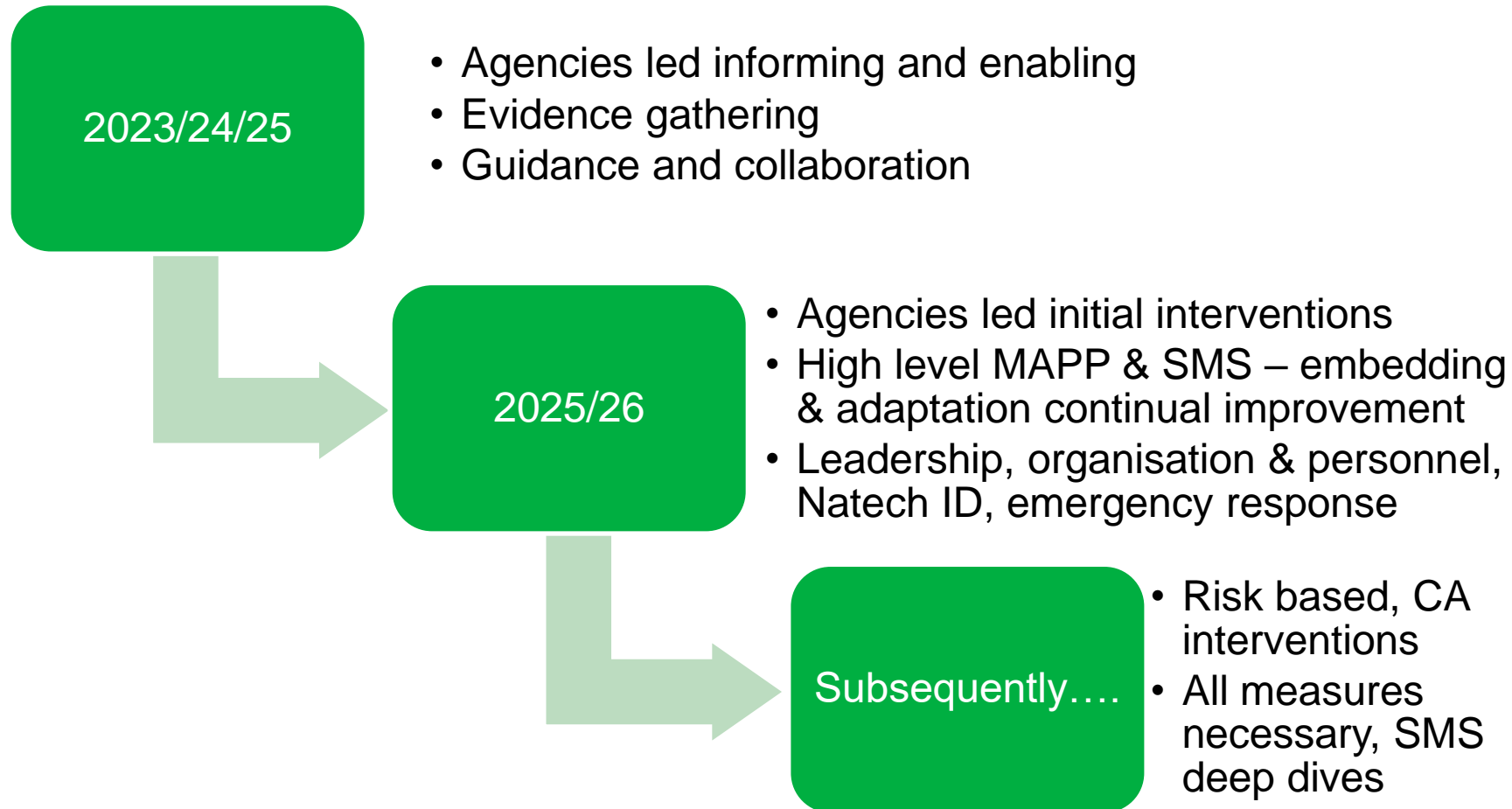
The operator of a COMAH establishment would be expected to:

- assess how Major Accident risks associated with extreme weather events and other climate change impacts will vary over the lifetime of their establishment; and
- plan how to respond to these changes, and implement modifications at an appropriate time, to manage both present and longer-term risk to ALARP levels.

EPR permitted sites need to embed adaptation into their management systems – guidance on gov.uk

Ongoing COMAH regulatory activities

– subject to CASMG & CSF strategy discussions



CA Delivery Guide - commitment to continual improvement



DG v.1 – enable early interventions on key issues (planned from Sept 2024). User needs and pilots, summer 2024



DG v.2 – consolidation of flood and Natech DGs + multi-disciplinary guidance (planned from Sept 2025 onwards)



DG v.3, 4...

Key messages

- The climate has changed and continues to change.
- Without adequate management, risks will increase (including safety and environmental).
- Regulators (and others) expect climate change adaptation to be embedded into management systems, to maintain control of compliance risks (accidents or other risks).
- This requires operators of high hazard sites to ensure:
 - Leadership, resource and competencies
 - Climate change risk assessment - assess for 4°C, plan for 2°C, and avoid lock-ins
 - Plan, monitor, record and review, with top management oversight.....
.....delivering Continual Improvement
- International standards, guidance and case studies are available to support this work.
 - See CDOIF guidance at https://www.p-s-f2.org.uk/?page_id=669



(Bing AI generated)

Climate change adaptation

Collaboration and continual improvement to deliver sustainable industries of the future

Many thanks to Solveig McLeod and Aiyasha Swarnn – EA interns supporting this work