Integrating Sustainability Into Hazard Studies – Making Projects Safe, Smart and Sustainable

With the uncertainty we are experiencing in relation to climate change and rising costs, professionals involved in process safety are confronted by a decision – keep project costs down or think about the bigger picture and try to make a project as sustainable as possible over its entire life.

Adopting sustainable practices is not only the right thing to do, but it also makes good business sense. Integrating sustainability into process safety is essential for businesses that want to reduce their ecological footprint and maximise long-term value by minimising waste, reducing operating costs and making a more marketable product. Sustainable practices are often neglected by projects for a variety of reasons, whether that be pressures of time and cost, or simply a lack of understanding of the appropriate techniques. Everyone must ask themselves a simple question – how beneficial can increased sustainability be?

Hazard Studies

Hazard studies are established good practice for managing process safety and involve a wide range of disciplines in structured discussions over the entire lifecycle of a project, from initial design, through to construction, operation and decommissioning. We believe that with relatively small changes to established and embedded hazard study processes, sustainability can be thought about at the right time to maximise the potential benefits of operating sustainably. The key to making your hazard studies safe, smart, and sustainable is to expand hazard study guidewords to ensure that sustainability discussions take place, and most importantly, the relevant information is documented. The questions about sustainability should be increasingly focused and more specific as projects transition through the hazard studies. The objective is to consider greener chemistry early in the project, moving to greener engineering in the design of the plant and systems, and then handing over a plant that will be green and efficient in its operational phase.

Sustainability also needs to be considered as part of modification projects to ensure that changes do not adversely impact plant sustainability.

Project phase

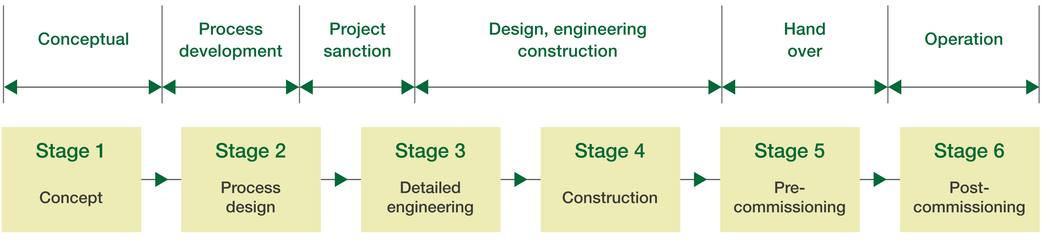

Image taken from Frank Crawley, Brian Tyler, in HAZOP: Guide to Best Practice (Third Edition), 2015.

Possible sustainability prompts in early project stages

Stage 1 – Objective = inherently greener chemistry	Stage 2 – Objective = inherently greener engineering design	Stage 3 – Objective = inherently greener operational process

• Are more inherently greener options available?
• Is there an option of greener chemistry?
  • (benign chemicals, renewable feedstocks, less hazardous synthesis, minimise material diversity)
• Do we understand the long-term environmental impact?
  • (chemicals designed for degradation, design for afterlife)
	• Can we calculate expected energy use and design for energy efficiency?
	• Can we optimise use of resources?
	  • (heat / water / electricity)
	• Can we minimise waste streams?
	  • (prevent generation of waste, rather than treating)
	• Is the design capacity appropriate, in order to avoid waste? Have we avoided a one size fits all?
		• Can we improve energy efficiencies?
		• Consider energy use at operational phase
		  • (select equipment that has low running energy, rather than the cheapest to supply. Select equipment based on durability rather than immortality).

Challenges

A key challenge to this is that projects are often driven to reduce project costs by selecting options that have the lowest purchase price, rather than thinking about ongoing operational costs and efficiencies, or the potential improvement to business reputation through increased social responsibility. Having the right team of people involved in hazard studies has always been important but ensuring that the hazard study team includes sustainability champions that support corporate sustainability goals can ensure that short term thinking does not override long term goals.

For projects it is particularly important to think about sustainability early in the design as it is more cost effective to make changes on paper than it is to make changes to an operating plant. Although the reluctance to spending more in the original design process of a plant is understandable, we believe that the proof is in the pudding. The initial costs can be offset in several ways, whether that be mitigating losses through waste or emissions, or reducing energy costs. If the beneficial effects to the environment alone were not enough reason to act sustainably, sustainable practices even have the potential to increase profits in the long run due to the cost reducing measures mentioned, alongside the inevitable positive impact on a company's reputation and brand image.

Sustainability must be embedded as a company goal to have the greatest impact, and integration into existing hazard study processes is a realistically achievable way to help demonstrate this. Introducing sustainability into the process safety management processes requires a strategic approach, but once implemented, it can have far-reaching benefits.

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