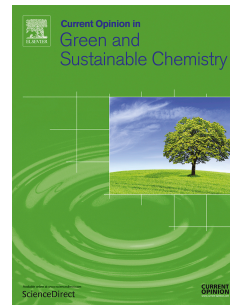


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A view from the chemical industry

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Current Opinion in Green and Sustainable Chemistry

The UN Sustainable Development Goals: how can sustainable chemistry contribute? A view from the chemical industry

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Abstract

Since their launch in 2015, the United Nations Sustainable Development Goals have been adopted by a wide range of businesses to capture their efforts in corporate sustainability. This review highlights specific examples from the chemical industry, together with an evaluation of the approaches and tools some companies are using to support the realisation of the goals. A view towards the efforts required by the chemical industry in order to maximise the impact of the goals is also provided.

Keywords:

Sustainable development goals

Chemical companies

Global challenges

Environmental

Social

Business

1. Introduction

The United Nations Sustainable Development Goals 2015-2030 (The Global Goals)

At the United Nations summit in September 2015, the UN announced the launch of the Sustainable Development Goals (SDGs). These were developed after lengthy consultations involving many stakeholders including international business, Non-Governmental Organisations (NGOs), policy makers and civil society.

Their aim is to tackle the most demanding global issues of our time and this requires the collective efforts of all stakeholders. The SDGs are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.

There are 17 universal goals for 2030 (Fig. 1) [1], each providing guidelines and targets for all countries, industries and organisations to adopt in line with their own priorities. They are intended to drive collaboration and bring about systemic change in the world. Underpinning the 17 goals are a set of 169 specific targets which describe, in detail, the ways in which the goals may be measured and achieved.



Fig. 1. The United Nations Sustainable Development Goals [1].

2. The Chemical Industry and the United Nations SDGs

So how can the chemical industry contribute to the SDGs?

Overall, the chemical industry and associated industries have for many years provided science and technology solutions that address many global challenges such as: environmental protection through pollution prevention and greenhouse gas abatement technologies; healthcare and human well-being through medical devices, components and pharmaceutical products; the efficient use of natural resources through the use of renewable feedstocks, the application of catalysis and expertise in re-using, recycling and refining of valuable metals. The UN SDGs therefore, as a starting point, provide a frame of reference to allow the industry to describe how it impacts the planet and how it can make a positive global contribution. Two recent review editorials describe this imperative on business and industry in more detail [2,3].

The link to trade associations and learned societies

The International Council of Chemical Associations (ICCA)

In January 2017, the ICCA published a report entitled “Global Chemical Industry Contributions to the Sustainable Development Goals” [4]. In it, the ICCA highlights its commitment to supporting the implementation of the SDGs and provides numerous industrial examples to demonstrate the contribution of the global chemical industry to the 2030 agenda for sustainable development. Six themes cross-referenced to specific SDG indicators are described: health & well-being, sustainable consumption and production, energy, environment & sustainable cities, sustainable economies, learning & education and public-private partnerships.

The American Chemical Society (ACS)

In its 2017 strategic review of priorities, the ACS defines Goal 4 of its strategic plan as: “Communicate Chemistry’s Value” and states: “The chemical sciences are increasingly central to development of solutions to the global challenges of energy, environment, water, health and food” [5]. In a related public policy statement entitled “Sustainability and the Chemistry Enterprise” [6], a series of recommendations are outlined which include: “increase federal funding for sustainable chemistry research and development”; “promote preferential hiring of scientists and engineers educated in sustainability principles and practices”; and leading by example to “endorse adoption of the UN Sustainable Development Goals” amongst its membership.

The European Chemical Industry Council (CEFIC)

In October 2017, CEFIC launched its sustainability report “ChemistryCAN” [7] in which it describes how the European chemical industry contributes significantly to the SDGs (goals 7, 12 and 13) or has a major impact on

them (goals 2, 3 and 6). The report focuses on 4 areas of impact: the low-carbon economy, resource efficiency, the circular economy and for people & planet.

United Nations Global Compact (UNGC)

In 2015, the UNGC developed the “SDG Industry Matrix”, which illustrates industry-specific examples of corporate action related to the SDGs. It is presented as a series of publications, each highlighting the ambition and progress made by diverse companies for each SDG. The SDG Industry Matrix for “Energy, Natural Resources & Chemicals” details some of the practical company examples submitted from the chemical industry [8].

Examples of chemical companies’ approach

Although the SDG programme is only in its third year, many chemical companies are already aligning their strategy with the goals. For example, Dow [9] has publically declared its commitment through alignment of its 2025 Sustainability Goals with the 17 UN SDGs. In this approach, Dow is attempting to bring about systemic change across seven areas: leading the blueprint, delivering breakthrough innovation, advancing a circular economy, valuing nature, increasing confidence in chemical technology, engaging employees for impact and world-leading operations performance.

BASF [10] has also stated that it “... welcomes the SDGs and supports the UN in making our planet more sustainable. BASF was actively involved in the development of the SDGs as a member of working groups.... Especially topics and SDGs related to hunger, clean water and sanitation, renewable energy, good jobs and economic growth, innovation and infrastructure, sustainable cities and communities, responsible consumption and production patterns, climate action and partnering are of great importance to BASF”.

Akzo Nobel [11] were one of over 60 signatories of the Post-2015 Charter that committed to contributing to the achievement of the SDGs. In Akzo Nobel’s 2016 annual report, they provide further commentary on their contribution “...We recognize that different companies impact each SDG to a different extent, subject to geography, sector and strategic profile. In 2016, we revised our review of the SDGs against our own agenda and priorities... we contribute, to varying degrees, to all the SDGs through our operations and supply chain, products and Human Cities initiative. There are a few where we can have a particular impact through our products or activities – including SDG 7: Affordable and clean energy; SDG 12: Responsible consumption and production; and SDG 13: Climate action. Our main focus areas are SDG 11: Sustainable cities and communities and SDG 17: Partnerships for the goals... “

In 2016, Eastman identified areas where their strategic priorities aligned with the SDGs and in their 2017 Sustainability Report they presented how they had mapped these global goals to their stakeholder priority assessment, aligning key areas of engagement to a common sustainability framework (Fig. 2) [12]. This work will continue in 2018, with an examination of a smaller set of the goals that are most strategically aligned with the business and where Eastman can make the biggest impact.

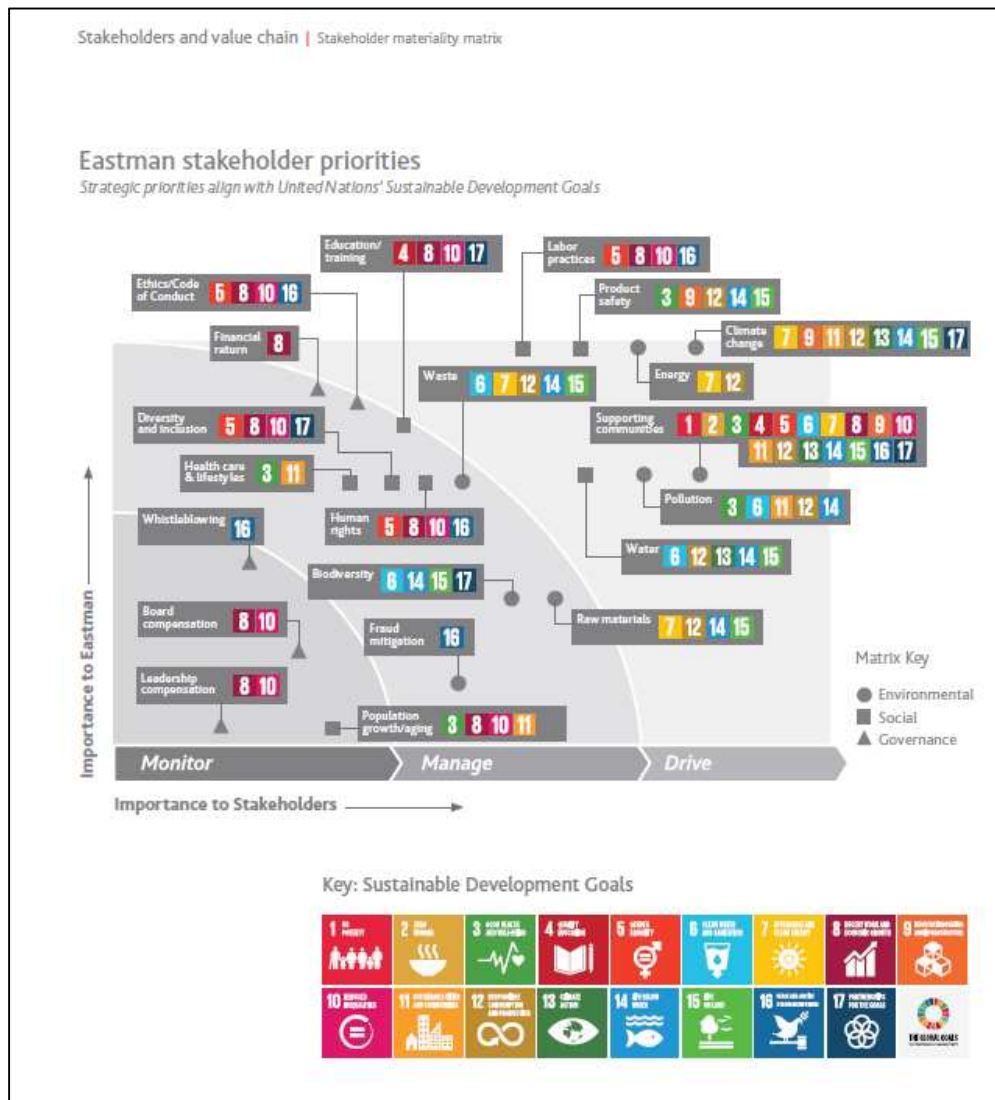


Fig. 2. Eastman Stakeholder Priorities [12].

Similarly, Johnson Matthey have evaluated and aligned their priorities against the SDGs to understand where their products, services, technologies, and the way they run the business, have the potential to make the greatest contribution. There are six SDGs where they state they can make the biggest positive impact. These have been considered in the context of areas of material importance, risks, strategic themes and key performance indicators. (Fig. 3) [13].

	Financial performance	Social	Environmental	Governance
Material topics	<ul style="list-style-type: none"> Financial sustainability 	<ul style="list-style-type: none"> Community volunteering Diversity and inclusion Employee retention and recruitment Health and safety Modern slavery and child labour Responsible sourcing 	<ul style="list-style-type: none"> Air quality Greenhouse gas emissions Product lifecycle management Resource scarcity Responsible sourcing Water use 	<ul style="list-style-type: none"> Climate change risk Ethical business practices and compliance Sustainability leadership
Principal risks and uncertainties	<ul style="list-style-type: none"> Existing market outlook Future revenue growth Maintaining competitive advantage People Business transition 	<ul style="list-style-type: none"> Environment, health and safety Sourcing of strategic materials People Security of metal and highly regulated substances Ethics and compliance 	<ul style="list-style-type: none"> Environment, health and safety Sourcing of strategic materials Intellectual capital management Failure of significant sites Product quality 	<ul style="list-style-type: none"> Environment, health and safety People Ethics and compliance
Strategic themes	<ul style="list-style-type: none"> Creating shareholder value Sustainable growth 	<ul style="list-style-type: none"> Diversity and inclusion Zero harm 	<ul style="list-style-type: none"> Greenhouse gas emissions Increase positive impact of products 	<ul style="list-style-type: none"> Community engagement Responsible sourcing
Key performance indicators	<ul style="list-style-type: none"> Sales excl. precious metals Underlying earnings per share Return on invested capital Capital expenditure R&D expenditure 	<ul style="list-style-type: none"> Lost time injury and illness rate (LTIIR) Annual incidence of occupational illnesses Voluntary employee turnover 	<ul style="list-style-type: none"> Carbon footprint 	<ul style="list-style-type: none"> Gross R&D expenditure
UN SDGs				

Fig. 3. Johnson Matthey Performance Criteria [13].

3. Linking awareness and innovation to green chemistry, sustainability and the United Nations SDGs

The awareness of environmental and social (largely health and safety) matters relating to chemistry has been known for many years. From laboratory scale experimentation to full commercial scale chemicals manufacture, the safe design and operation of these activities whilst minimising impacts to human health and the environment, is inherent. There have been multiple approaches and tools developed to aid chemists in the development, design and application of chemical products, although to date, these have not directly aligned to the SDGs.

For example, the e-Factor, 25 years old in 2017 [14] provides scientists with a quantitative methodology to optimise resource efficiency and minimize the waste generated in existing and new synthetic routes, and move thinking away from process efficiency and waste treatment.

The 12 principles of green chemistry [15] has provided a powerful approach to help chemists look for alternative raw materials, product compositions and renewable components in product design whilst considering health and safety risks. The associated Sandestin declaration [16] and 12 principles of green engineering [17] further assist in the design of new chemical processes in respect of safety, energy, waste and other environmental considerations.

Life cycle analysis (LCA) methods applied to design of chemical products and processes have helped scientists to look at environmental impacts throughout the life cycle of products, from raw material sourcing to manufacture, use and end-of-life [18].

All of the above have sustainability principles as their basis and implicitly support some of the UN SDGs in their approach. However, none of the above explicitly allow quantification of all factors such as: the health, environmental, social or resource efficiency benefits of the chemical products in use.

Within the chemical industry some commercial companies are trying to address this issue. Solvay's Sustainable Portfolio Management (SPM) approach [19] links the company strategy to sustainability by considering Solvay's products through their environmental manufacturing footprint and how, in their applications, they bring benefits or face challenges from a market perspective. Meanwhile, BASF's Eco-Efficiency Analysis tool [20] assesses ecological and economic issues related to chemical products and its SocioEcoEfficiency Analysis (SEEBALANCE®) tool [21] provides an assessment of environmental impact and costs, but also of the societal impacts of products and processes.

The Global Reporting Initiative (GRI), the UN Global Compact and the World Business Council for Sustainable Development (WBCSD) have developed a tool for business to apply - the "SDG Compass" [22] - which provides guidance for companies on how they can align their strategies as well as measure and manage their contribution to the realization of the SDGs. Whilst this is a useful guide for large multi-national enterprises, it is not specific to the chemicals industry.

4. Conclusions

Whilst, overall, the chemical industry has positively embraced the United Nations SDGs and has used them as a frame of reference to post-rationalise and define what the industry already does, there is still a need to apply them to *drive* innovation and provide technology solutions over the next 10 years that will deliver breakthroughs to address the global challenges highlighted in the goals.

This will require increased efforts and new responsibilities in all aspects of the chemistry world:

For education and training providers to set an understanding amongst our existing and emerging scientific talent of the role that chemistry can play to address the challenges set within the UN SDG framework.

For national and international funding bodies to align some of their platforms and programmes more strongly to specific SDG categories. The authors note that today, funding and research grants are indirectly addressing some of the SDGs through: decarbonisation (goal 13), the circular economy (goal 12) and health (goal 3) themes.

For industrial chemical companies to continue to invest in R&D to provide commercial solutions to macro-scale world challenges.

For businesses to truly engage with the SDGs by understanding the links between the 17 goals and 169 targets, and ensuring they align their priorities with those deemed most important by the public.

There is clearly a gap and an opportunity for a harmonised, systematic tool to assess the development, manufacture and use of chemical products whilst, at the same time, allowing measurement of benefits in service at a local scale that can be mapped onto specific UN SDG indicators. An open willingness to share best practices across the chemical industry would serve to facilitate the realisation of such a tool.

Finally, a more ambitious, systemic approach for the chemical enterprise is needed in setting goals that fulfil social, environmental and economic issues and will provide more solutions to meet the demands of an ever-growing human population, whilst maintaining a truly sustainable planetary ecosystem in harmony with nature.

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