International Journal of Sustainable Engineering

ISSN: 1939-7038 (Print) 1939-7046 (Online) Journal homepage: https://www.tandfonline.com/loi/tsue20

UN Sustainable Development Goals: an engineering perspective

Shahin Rahimifard & Hana Trollman

To cite this article: Shahin Rahimifard & Hana Trollman (2018) UN Sustainable Development Goals: an engineering perspective, International Journal of Sustainable Engineering, 11:1, 1-3, DOI: 10.1080/19397038.2018.1434985

To link to this article: https://doi.org/10.1080/19397038.2018.1434985

Published online: 11 Apr 2018.

Submit your article to this journal

Article views: 11480

View related articles

View Crossmark data

Citing articles: 11 View citing articles

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=tsue20

INTERNATIONAL JOURNAL OF SUSTAINABLE ENGINEERING, 2018
VOL. 11, NO. 1, 1–3
https://doi.org/10.1080/19397038.2018.1434985

Taylor & Francis
Taylor & Francis Group

EDITORIAL

Check for updates

UN Sustainable Development Goals: an engineering perspective

Although sustainable development has had different interpretations over the years, most countries agree that it promotes prosperity and economic opportunity, greater social well-being and protection of the environment. It is also commonly understood that the realisation of these benefits can only be achieved through holistic international co-operation. The United Nations (UN) has been working to define goals for such global co-operation in solving problems of an economic, social, cultural or humanitarian nature since its formation in 1945.

On 25 September 2015, the UN General Assembly adopted resolution 70/1, outlined in a document entitled 'Transforming our world: the 2030 Agenda for Sustainable Development' (2016). This document presents the agenda for post-2015 development, progressing from the 8 Millennium Development Goals (MDGs) set in 2000. The 2030 Agenda encompasses 17 broad and interrelated Sustainable Development Goals (SDGs), as depicted in Figure 1. Unlike the MDGs, the SDG framework does not distinguish between 'developed' and 'developing' nations – the goals apply to all countries, and more significantly, there are over 230 indicators on which general agreement has been reached to focus on the root causes of problems and to support attainment of various goals (Sustainable Development Goal Indicators 2016).

In the first decade of publication, IJSE has seen numerous submissions in line with the MDGs, particularly with respect to 'MDG 7: Ensure Environmental Sustainability'. Our authors have investigated a broad range of issues ranging from nature inspired design and resource efficient production to sustainable business and consumption models as well as challenges in educating and communicating the underlying principles of sustainable development across a multitude of industries, processes and products.

However, a greater understanding of sustainable development challenges through the SDG framework compels significant expansion of research in this field, in particular, by the engineering community (Rahimifard and Trollman 2017). In this context, there are several new perspectives for engineering research, including:

(1) The complex nature of such SDGs often necessitates solutions based on complex systems that will require wide-ranging skills, lateral thinking and knowledge transfer between various social, life and physical sciences as well as engineering disciplines.
(2) Such unique modern challenges oblige and encourage the engineering community to work closely with experts from fields that they may not have interacted with previously, and to overcome inherent and fundamental barriers to their cooperation.
(3) The focus on transformation of outcomes and results from engineering research into real-life and notable impacts are fundamental for improving quality of life, increases in productivity and associated growth in trade and access to education and work at regional, national and global levels.
(4) In achieving the SDGs, engineers will be challenged to meet the needs of a growing global population while minimising the pressure on our planet's resources, and will need to focus on resource consumption in a way that does not exceed ecological limits. Efficiency improvements are insufficient to achieve this. Only a transition away from economic growth as the chief indicator of human progress will facilitate global scale decent livelihoods.
(5) Engineering-based net positive and regenerative approaches (Rahimifard and Trollman 2017) will enable manufacturers to advance beyond incremental efficiencies and create resilient platforms for sustainable growth. Poverty may be overcome through technological leapfrogging as it will enable countries to avoid traditional growth patterns. Laying these new industrial foundations based on the use of both the existing and emerging technologies will be a major engineering challenge.
(6) The social and societal dimension of SDGs demand a deeper understanding of the specific needs of people, consumers and general users of engineering solutions, and where possible the adoption of a user-centric approach to innovation and development.
(7) A fundamental SDG challenge will be to engineer the infrastructure for universal access to green sources of energy, clean water, sanitation and public services in a manner that is well planned, managed and maintained to satisfy basic needs for all. Furthermore, engineering solutions to urban infrastructure will be central to determining the quality of life for a rapidly growing urban population and the health of the planet as a whole.
(8) The specific goals related to elimination of hunger and long-term global food security demand a special focus on a sector which has not comparatively enjoyed a very high level of engineering research investment to investigate new and sustainable sources of food ingredients, innovative farming, processing and preservation

© 2018 Informa UK Limited, trading as Taylor & Francis Group

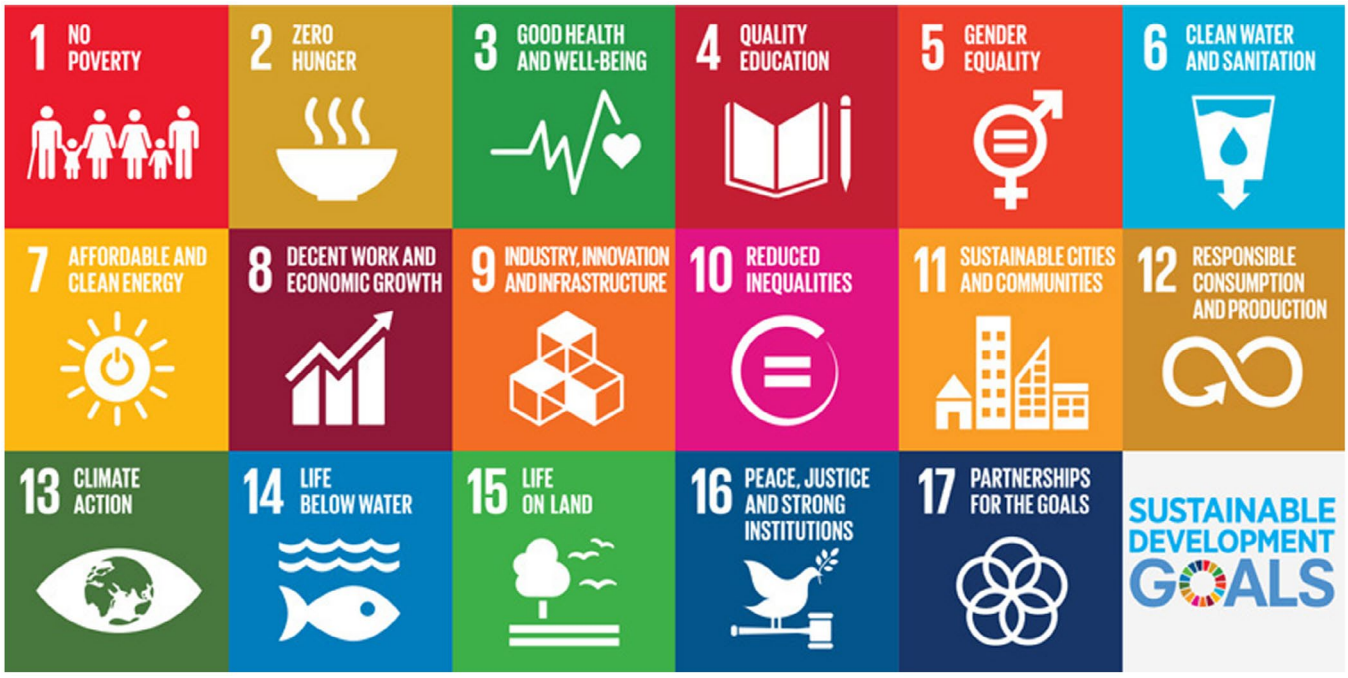

Figure 1. United Nations Sustainable Development Goals (2016).

technologies as well as the most efficient management and valorisation processes for food waste across the entire supply chain.

(9) The emerging and rapidly growing field of healthcare engineering offers several exciting, expansive and multi-criteria challenges combining the potential of some of the most advanced engineering and technological breakthroughs with their complex ethical, social and societal considerations.

(10) In tackling climate change, the goal will be to decouple growth from its environmental footprint and seek engineering solutions that help redesign the entire value chain. This is not about accepting and prioritising strategies to make business resilient to climate change, but rather enacting radical change to eliminate such scenarios. This entails engineering the movement away from linear consumption and production patterns and developing proactive approaches to reducing waste. The long-term challenge lies in the translation of scientific discoveries in circular use of resources into practical solutions.

(11) Open data infrastructures are an engineering opportunity to create public web-based freely accessible data to share knowledge and support innovation. Such effective, efficient and equitable data infrastructure will generate value for this and succeeding generations.

(12) The above-mentioned engineering challenges highlight an urgent need for a significant increase in engineering capabilities and capacity in every region of the world through direct engagement with younger generations, and in particular women who are significantly underrepresented in a majority of engineering disciplines. In addition, these challenges clearly necessitate the inclusion of the underlying principles of sustainable development at the heart of engineering education.

We encourage our potential authors to explore the UN SDG framework themes and to discuss the potential impacts of their research in support of these goals, and look forward to your submissions.

An overview of publications in this issue

Welcome to the first issue of 2018. In this issue, there are two main themes centred on wastewater and biomass, and solar energy. Water pollution is one of the most serious ecological threats we face today in line with SDG 6: Clean Water and Sanitation. The efficient use of solar power supports SDG 7: Affordable and Clean Energy.

The first paper by Olabode et al. examines the adsorptive potential of activated carbon prepared by chemical activation of Cocoa pod husk to remove Congo red dye from its aqueous solution. The adsorption process is an attractive alternative treatment for dye removal from wastewater due to its efficiency and economy.

In the second paper, Sahu et al. attempt to treat sugar industry wastewater by a combination of thermal and electrocoagulation processes. The sludge obtained after combined treatment is found to have a high heating value and hence may be suitable as a fuel.

The third paper by Doll et al. investigates the decarboxylation of cinnamic acids using a ruthenium sawhorse to further the understanding of this interesting chemistry behind such bio-refinery relevant conversions.

In the fourth paper, Guimarães et al. evaluate the potential of Brasília wastewater sludge as a fuel for gasification. This is an attractive option for the disposal of this renewable waste resource.

In the latter half of this issue, Abed et al. bring the focus on solar energy by estimating the performance of a hybrid solar energy collector system for water and air heating during days with different stability of the radiative regime.

In the sixth paper, Mehla and Yadav demonstrate experimentally that the use of latent heat storage is feasible to run a phase change material-based solar-powered desiccant wheel air conditioning system in winter during hours of darkness using a novel header with the storage unit.

In the last paper, Yousef et al. propose a new power management tool able to manage the power flow from different renewable energy sources with photovoltaic and wind being the primary power sources.

References

Rahimifard, S., and H. Trollman. 2017. "Surpassing Sustainability: Making a 'Net-positive' Impact." *International Journal of Sustainable Engineering* 10 (6): 299–301.

Sustainable Development Goal Indicators (E/CN.3/2016/2/Rev.1), Annex IV. 2016. Accessed January 4, 2017. https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf

Shahin Rahimifard and Hana Trollman
IJSE@lboro.ac.uk