

# What are the extent and opportunities of Sustainable Development in the Construction Industry?

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## Abstract:

Since the United Nations Conference on the Human Environment held in Stockholm in 1972, sustainability has been a significant focus across a broad range of human activities. In 1983, the World Commission on Environment and Development (WCED) introduced the popular definition of sustainable development: to meet the needs of the present generation without compromising the ability of future generations to meet their needs [1]. Our understanding of sustainable development has expanded to engage further complex issues such as economic development models, world food supply, poverty reduction, justice, and nature conservation [2]. Furthermore, sustainability issues and the ways that organizations address them impact not just the environment, but also employees, nearby communities, and material sources. Sustainable development is defined as the combination of the three pillars of sustainability: social, environmental, and economical. Approaches that address just one or two of the sustainability pillars does not fit the definition as a sustainable development [3]. The 2030 Agenda for Sustainable Development, adopted in 2015 by the United Nations and committed by more than 193 countries, contains 17 Sustainable Development Goals (SDG) approaching the three pillars of sustainability [4]. For the purposes of this research, the definition of sustainable development consists of sustainable practices involved in achieving sustainability objectives approaching the three pillars defined as sustainably developed and detailed by the 17 United Nations SDGs. This research is reviewing several relevant sustainable development codes, certification systems, and frameworks to understand the extent and opportunities of Sustainable Development in the construction industry. This research presents a consolidated list of 100 Sustainable Development Indices (100 SDI), including the sustainability targets, indicators and assessment methodologies, giving a better understanding of where and how the construction industry can contribute to the sustainable development goals.

## Keywords:

Sustainable construction impact analysis, sustainable development goals of the construction industry, sustainability construction indicators, SDGs in the construction industry

## 1. Introduction

Since the United Nations Conference on the Human Environment, held in Stockholm in 1972, sustainability has been a major focus of discussion. The term has become a political and ethical argument for addressing the ecological and social crises of the world. The World Commission on Environment and Development (WCED) presented in 1983 the most popular sustainable development interpretation: to meet the needs of the present generation without compromising the ability of future generations to meet their needs [1].

Although the initiative to implement sustainability in daily operations starts with a desire to impact the world positively, organizations are detecting the benefits of sustainable practices such as to reduce costs and to improve corporate image [5].

However, there is an excessive number of articles and standards that describe different interpretations of sustainability across diverse fields. The diversity of studies makes it hard to consolidate an approach, justifying the lack of understanding and the difficulty of implementing sustainability management into the daily operations of the organization.

Likewise, a sustainability approach will be different according to the diverse interpretations across fields and depends on the priorities, demands of the stakeholders and the impacts of the sector. The sustainability approach in the construction industry has several standards, rating systems, and other materials for helping to capture and codify sustainable practices. Each of these materials helps to approach some of the sustainability targets, complementing or overlapping each other. A more well-defined understanding of sustainable development in the construction industry would provide a foundation for sustainable development management in the sector.

## 2. Sustainable Development

Our understanding of sustainability has been changing for the last three decades and has expanded to engage further complex issues. The focus of sustainability from 1960 to 1970, 1990 to 2000, and 2010 to the present day have expanded from air & water pollution to safety & consumer protection to climate change, respectively [7].

Nowadays, sustainable development engages further complex issues such as economic development models, the world food supply, poverty reduction, justice, and also nature conservation [2]. Sustainable development became a significant term to describe the balance between the use and preservation of current resources (Grober, 2007), and the relationship between human beings and nature.

Sustainability is commonly conceptualized as involving the three pillars: social, environmental, and economic—and Sustainable Development is understood to require to address all three of these domains [3]

Upon a decade of major United Nations conferences and summits, world leaders came together at United Nations Headquarters in New York, In September 2000 to adopt the United Nations Millennium Declaration. The nations committed to a new global partnership to reduce extreme poverty and to set out a series of time-bound targets - with a deadline of 2015 - that is known as the Millennium Development Goals [8].

The Sustainable Development Goals (SDGs) are the continuation of the United Nations Millennium Development Goals (MDGs). On September 25<sup>th</sup> of 2015, the United Nations General Assembly formally adopted the universal, integrated and transformative 2030 Agenda for Sustainable Development, along with a set of 17 Sustainable Development Goals and 169 associated targets and committed by more than 193 countries [4]:

- *SDG 1* No Poverty;
- *SDG 2* Zero Hunger;
- *SDG 3* Good Health and Well-Being;
- *SDG 4* Quality Education;
- *SDG 5* Gender Equality;
- *SDG 6* Clean Water and Sanitation;
- *SDG 7* Affordable and Clean Energy;
- *SDG 8* Decent Work and Economic Growth;
- *SDG 9* Industry, Innovation and Infrastructure;
- *SDG 10* Reduced Inequalities;
- *SDG 11* Sustainable Cities and Communities;
- *SDG 12* Responsible Consumption and Production;
- *SDG 13* Climate Action;
- *SDG 14* Life Below Water;
- *SDG 15* Life and Land;
- *SDG 16* Peace, Justice, and Strong Institutions;
- *SDG 17* Partnerships for the Goals

The United Nations acknowledges the construction industry as having an essential role in delivering the SDGs and their associated targets [9]. The contribution includes significant economic, environmental and social impacts and benefits associated with construction products, buildings and infrastructure throughout their lifecycles.

For this research project, the definition of Sustainable Development consists of sustainable practices that are involved in achieving sustainability objectives as understood by the three pillars of sustainability and detailed by the United Nations with the 17 SDGs.

Hence, the scope of sustainability in the construction industry, introducing the sustainability targets of the three pillars of sustainability, is an essential reference for sustainable development management in this sector.

### **3. Scope of Sustainable Development in the Construction Industry**

This study focused on the following international and American standards and rating systems used in the construction industry and business focusing on the three pillars of sustainability (social, economic, environment) to identify the scope of sustainable development in the construction industry:

UN-SDGs – The 17 goals and 169 targets focus on five main critical areas for humanity and the planet: people; planet; prosperity; peace; partnership [4].

OECD – Organization for Economic Co-Operation and Development is an international organization that works on establishing international norms with the participation of governments, parliaments, policymakers, businesses and citizens to elaborate policies focus on prosperity, equality, opportunity and well-being for all [10].

ICC – International Chamber of Commerce is the world's largest business organization with a global network to assist businesses of all sizes to operate both internationally and responsibly and represent business interests at the highest levels of intergovernmental decision-making such as World Trade Organization and United Nation [11].

WBCSD – World Business Council for Sustainable Development is a global network with more than 200 leading businesses and almost 70 national business councils that work together to bring best practices to accelerate the implementation of sustainable development into the business activities [12].

GRI – Global Reporting Initiative is an independent international organization that helps businesses, governments, and other organizations to identify and report their impacts on issues such as climate change, human rights and corruption [13].

BREEAM – Building Research Establishment's Environmental Assessment Method is a rating system and the world's first established method of sustainability assessment for buildings that reflect the performance achieved by a project and its stakeholders measuring [14].

LEED – Leadership in Energy and Environmental Design is an internationally recognized third-party certification program and the most common green

building rating system developed by the non-profit U.S. Green Building Council (USGBC) [15].

ENVISION – Envision Rating System for Sustainable Infrastructure is a framework that provides a consistent, consensus-based assessment of sustainability and resilience in all types and sizes of infrastructure projects [16].

LBC – Living Building Challenge is a philosophy, certification, and advocacy tool for projects to be not only less harmful but truly regenerative, coming from negative environmental impacts to positive environmental impacts. The standard is a performance-based on the indicator’s outcome [17].

SPeAR – Sustainable Project Appraisal Routine is a sustainability appraisal tool developed to monitor and evaluate project performance and informed decision making throughout the project life cycle [18].

Green Globe – Green Globes is an on-line assessment and user-friendly assessment protocol with chiefly three main phases: a self-assessment through a questionnaire-based, the submittal requirements, and the formal certification request utilized primarily in Canada and the USA [19].

ISO – International Organization for Standardization is the world’s largest developer of voluntary international standards, an independent, non-governmental international organization with standards for business, government and society as a whole [20].

FSDS – Federal Sustainable Development Strategy is the Canadian Government plan and reports for sustainable development, setting sustainable priorities and establishing goals and targets [21].

Table 1: Sustainability targets analyzed for each standard and certification.

Standard/ Certification	Sustainability Targets Analyzed
UN-SDGs	17
OECD	64
ICC	10
WBCSD	17
GRI	93
BREEAM	54
LEED	55
ENVISION	60
LBC	20
SPeAR	24
Green Globe	47
FSDS	13

It was analyzed 474 targets to elaborate a consolidated list with sustainability targets for the construction industry.

#### 4. Results and Discussions

Through a meta-analysis, this research identified a set of 99 sustainability targets for the construction industry

calling the *100 Sustainable Development Indices (100 SDI)*.

This research performed a meta-analysis of the sustainability indicators from different codes and standards for the construction industry to identify the consolidated list of sustainable targets for the building construction industry. It was analyzed more than 800 indicators from the 474 sustainability targets of the 12 codes and standards mentioned in the previous section, cross-listing them to identify the lack and overlapping between the references.

Table 2: 100 SDI categorized and the number of sustainability targets for each one

Category	Subcategory	Targets	%
Environmental	Soil	4	45%
	Air Emission	11	
	Biodiversity	4	
	Energy	6	
	Local Impact	7	
	Resource Consumption	6	
	Waste	1	
	Water	6	
Social	Social Development	17	27%
	Human Rights	10	
Economic	Economy Growth	5	9%
	Business Growth	4	
Governances	Innovation	2	18%
	Social Development	7	
	Environment	2	
	Management	7	
<b>100 SDI</b>		<b>99</b>	<b>100%</b>

#### 5. Conclusions and Outlook

Sustainable Development spans an extensive range of issues. To identify which topic areas need to be managed within the domain of Sustainable Development for construction, this research reviewed several relevant Sustainable Development codes, certification systems, and frameworks, identifying the common and overlapping indicators. The result was a consolidated list of 100 Sustainable Development Indices (100 SDI).



Fig 1: 100 SDI Relationship with UN-SDGs

The ongoing research is validating the 100 SDI and the connection with the UN-SDGs. The 100 SDI give the construction industry a set of targets to contribute to the UN-SDGs. You can contact the author for more information.

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