

Link between United Nations Sustainable Development Goals and CSA S478:19 Durability in Buildings – Industry Perspective

Enabling Sustainable Development through Standards



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



13 CLIMATE ACTION



United Nations Sustainable Development Goals Addressed:

SDG 9 – Industry, Innovation and Infrastructure and
SDG 13 – Climate Action

Authors

Ruben Burga, Ph.D., MBA, P.Eng., University of Guelph

Tristyn Wylie, B. Comm., University of Guelph

Project Advisory Panel

Ana-Maria Tomlinson, Ph.D., CSA Group (Project Leader)

Michael Leering, P.Eng., CSA Group

Scott Lindsay, CSA Group

Financial Support

Funded by the Government of Canada's Sustainable Development Goals (SDG) Funding Program.

Canada

Disclaimer

This work has been produced by the University of Guelph and is owned by Canadian Standards Association. It is designed to provide general information in regards to the subject matter covered. The views expressed in this publication are those of the authors and interviewees. The University of Guelph and Canadian Standards Association are not responsible for any loss or damage which might occur as a result of your reliance or use of the content in this publication.

The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Government of Canada.



Summary

The objective of this study is to show a linkage between CSA Group standard CSA S478:19 *Durability in Buildings* and the United Nations Sustainable Development Goal (SDG) 9 – Industry, Innovation and Infrastructure and SDG 13 – Climate Action. This study presents information gathered from employees of three consulting firms based in Canada focused primarily on building engineering structures, as well as from a Canadian federal government employee. These private and public organizations use CSA S478:19 and through a series of interviews we identified linkages between the standard and the intentions of SDG 9 – Industry, Innovation and Infrastructure and SDG 13 – Climate Action.

1 Introduction

CSA S478 was first published in 1995 as a guideline. In 2019, a new edition of the document was published, which included several enhancements as well as updates to address climate change adaptation and resilience. At that time, the document was converted from a guideline into a standard, partially with the aim of allowing CSA S478:19 to be referenced in the main body of the National Building Code of Canada (NBC). This standard aims to help increase the durability of buildings and building sustainability by providing users with direction on which materials to use to satisfy environmental or design factors that impact durability. This standard is very relevant to climate change because it considers how the creation of buildings both impact the environment and how the

environment impacts the durability of buildings. Our industry interview participants described the standard as being filled with “tips and strategies to deal with how we expect the climate to change” and “listed systems and examples which have a proven track record of durability”; which showcases the importance of this standard in creating durable buildings. A participant and user of the standard stated that “durability is the cornerstone of sustainability”; indicating that users of this standard believe in the need for sustainability and in the potential of this standard in helping achieve that need. Another interview participant noted that it is only as people consider what climate change is, what it means, and what tools they have to combat it, that they have “become increasingly aware of it [CSA S478:19], its use, and potential use in climate change”.

Through a robust mapping process, connections between the use of CSA S478:19 and the following UN SDGs were identified:

 <p>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</p>	SDG 9 – build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
 <p>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</p>	SDG 12 – ensure sustainable consumption and production patterns.
 <p>13 CLIMATE ACTION</p>	SDG 13 – take urgent action to combat climate change and its impacts.

SDG 9 and SDG 13 are the SDGs that are most relevant to CSA S478:19, and this will be further explored throughout this study.

In order to obtain information for this study, interviews were held with four industry experts from three different organizations and one government expert to understand how their organizations interpret and use CSA S478:19. Additionally, the standard and relevant SDGs were thoroughly analyzed to ensure a developed understanding of content and to highlight linkages between the standard and the SDGs.

2 Results and Impact

2.1 Industry Use of CSA S478:19

The interviews conducted for this study provided a clearer understanding of how CSA S478:19 is used, which will be further explored within this section. As learned from the participants, CSA S478:19 is considered relatively new since it was not deemed a standard until 2019 and, as a result, it is not yet widely used. Currently, the standard is mainly being used by those who were involved in the development of the standard or in its preceding guideline. Primarily, it is used to ensure durability in buildings and to create a sustainable life cycle of the building with an extended life cycle where applicable. The standard is utilized during discussions surrounding the design service life expectation of a building to see what steps can be taken to improve different components of its construction, such as its structural frame or window systems.



Currently, the CSA S478-95 edition (guideline) is referenced in the NBC Appendix but is not a requirement within the NBC, which means that the guideline was not mandated to be used within the building industry. Due to growing climate change concerns, there was a need to update the guideline to a standard, such that it could be referenced more strongly in the NBC. The government employee interviewed explained that, although “durability is inherent in the National Building Code [of Canada] ... it’s not explicitly stated”. One industry expert explained that the Technical Committee that developed CSA S478 is striving to have the CSA S478:19 edition (standard) referenced as a requirement rather than just as a recommendation in the NBC by 2025. The government interviewee stated that it was important to “have a standard to point to ... to make issues related to durability something that’s enforceable down the road”. The government interviewee added that the intent is to “ensure that buildings that are going to be put together are going to be able to resist the effects that come about because of climate change itself”. The CSA S478:19 standard enables sustainable benefits. The government interviewee believes that as the need to combat sustainable issues increases, more individuals and companies will become knowledgeable about the standard and its potential benefits related

to sustainability and climate change. Initial indications suggest that having this standard included in the NBC would likely create an insignificant increase in design and construction costs associated with building different structures but, more importantly, would establish a level of accountability and harmonization among users. This accountability would force engineers, builders, architects, and contractors to design and build more sustainable buildings.

2.2 SDG Relevance

The purpose of the interviews conducted for this study were not only to understand how CSA S478:19 is used but also to identify a linkage between CSA S478:19 with SDG 9 and SDG 13. Although none of the experts interviewed or their organizations have formally declared a connection between CSA S478:19 and SDG 9 or SDG 13, the interviews did establish a relationship between the standard and the SDGs.

2.2.1 SDG 13 - Climate Action

Each of the industry participants expressed their company's goals of reducing greenhouse gas emissions with one specifically sharing, "I'm very happy to say the CSA [S478:19] standard is totally in-line with Canada's climate change commitment and ambitions". Being committed to reducing greenhouse gas emissions and stating that CSA S478:19 is climate-change oriented shows that implementation of CSA S478:19 would link organizational efforts to SDG 13's targets and indicators. With regards to reducing greenhouse gas emissions, interviewees focused on the value of the CSA S478:19 standard in helping to reduce embodied carbon in construction by reducing the need for more frequent replacements of building components, such as roofs, or even replacement of the entire building. One interview participant explained that there is a big difference between buildings built to last 15 years versus 50 or 100 years in terms of the fixed or embodied carbon. The interview participant highlighted that "the [CSA S478:19] durability standard really pushes out the serviceability of the fixed carbon". Similarly, one interview participant also highlighted the value of the CSA S478:19 with regards to climate change adaptation and resilience: "Now that we know that we have climate change ... we've tried to predict where some of the loads are going, because if I'm going to try to build something that's going to last 25, 30, 35 years, whatever



it is, I have to know where my loads are going so that I can know that my assembly is going to be able to withstand those loads. So that standard [CSA S478:19] is the first time that a notion has been introduced into a standard...of knowing where your loads are going so that you can design to accommodate those loads". The interviewee explained that the CSA S478:19 standard's annex includes "tips and strategies to deal with how we expect the climate to change", including considerations for "higher wind loads, higher drive, driving rains, more solar exposure, which means more UV degradation on potential materials".

2.2.2 SDG 9 - Industry, Innovation and Infrastructure

In terms of SDG 9, CSA S478:19 emulates the key components of this goal - to build resilient infrastructure and promote sustainable infrastructure. This is evident based on one industry participant's statement that "durability is the cornerstone of sustainability" in addition to the specific content of CSA S478:19. One interview participant highlighted that one of the most beneficial aspects of the standard is the tables providing information on design service life expectations, as well as "listed systems and examples, which have a proven track record of durability". As the interviewee added, "that in itself provides a good reference to providing direction on the appropriate materials, to help realize your design service like the expectations". Overall, the interviewee stated that "there is a lot of documented evidence that buildings that are built at CSA S478 [are] going to be durable buildings".



3 Discussion

The industry experts that were interviewed admitted that they had little knowledge of the SDGs, expressed that their organizations had not publicly aligned with any SDGs, and that the standard had not previously been discussed as having a connection with any SDGs. However, the impact of using CSA S478:19 clearly aligns with and positively impacts SDG 9 and SDG 13 as evidenced by the interviews conducted. There was a deep appreciation for the value of the CSA S478:19 standard, and one interviewee was able to confirm that their company aims to “reflect the goals of CSA S478”.

The government employee interviewed noted that the organization, and specifically the construction branch of the organization, has not established an explicit alignment with any specific SDG. The government organization conducts its business with a sustainable mindset and with the UN SDGs in mind but it has not directly connected the SDGs with its construction division. As such, this government agency has not considered a connection between CSA S478:19 with SDG 9 and SDG 13. Nevertheless, throughout the interview, our participant made connections between the organization, the CSA S478:19 standard, and sustainability, stating that “construction is all about ensuring that the buildings and the built environment are sustainable”. This demonstrates that, although the organization has not noted a connection between CSA S478:19 with an SDG, there is a clear underlying motive to using this standard to enable the targets defined by

SDG 9 – Industry, Innovation and Infrastructure and SDG 13 – Climate Action. The government interviewee strongly believes that this standard is climate-change oriented (SDG 13) and that there is an interconnection between durability and sustainability, meaning that durable buildings are truly sustainable buildings (SDG 9).

4 Conclusions and Next Steps

CSA S478:19 is a newly developed standard, superseding the 1995 CSA guideline on the same topic, and the long-term benefits of its use remain to be quantified. Currently, its usage is limited within the industry, therefore the ensuing benefits to date are expected to be minimal. However, there are several opportunities available to increase the usage of CSA S478:19 within the industry. For example, if CSA S478:19 is included in the NBC in the future, knowledge and usage of this standard will be immensely escalated, which can be expected to result in an influx of sustainable practices to be implemented within the building industry, and therefore an increase in the significance of the benefits associated with this standard.

There is also an opportunity to improve the linkage between CSA S478:19 and SDG 9 or SDG 13 in future revisions of the standard. If support for these SDGs were to be required or recommended within CSA S478:19, it would encourage organizations not only to learn about the SDGs but also to change their practices to align with both the standard and the SDGs.