

Link between United Nations Sustainable Development Goals and CSA C22.1:21 Canadian Electrical Code Part I, Safety Standard for Electrical Installations – Industry Perspective

Enabling Sustainable Development through Standards



7 AFFORDABLE AND CLEAN ENERGY



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



13 CLIMATE ACTION



United Nations Sustainable Development Goals Addressed:

SDG 7 – Affordable and Clean Energy,
SDG 9 – Industry, Innovation and Infrastructure,
SDG 13 – Climate Action

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Summary

CSA Group is a leader in standards research, development, education, and advocacy with the goal of enhancing the lives of Canadians through the advancement of standards in the public and private sectors. The purpose of this study is to determine the potential support towards achieving the UN Sustainable Development Goals (UN SDGs) through the use of the Canadian Standard Association's C22.1:21 *Canadian Electrical Code Part I - Safety Standards for Electrical Installations* - by typical standard users. Additionally, the study aims to assess whether there are strong linkages between the code and UN SDG 7 - Affordable and Clean Energy; UN SDG 9 - Industry, Innovation and Infrastructure; and UN SDG 13 - Climate Action, as identified through a mapping procedure. This study describes perspectives from a variety of users, including two provincial electrical regulators, an electrical engineering firm, and an electrical product manufacturer. Many of the people interviewed have additional experience working on the Technical Committees that develop and consider recommendations for change to the Canadian Electrical (CE) Code, including the most recent revision to CE Code Part I. These interviews shed light on how sustainability and environmental issues are addressed within the individual companies and within the code itself, which supports connections to the SDGs mentioned above.

1 Introduction

Since their creation in 2015, organizations, companies, and governments across the globe have started to implement and create projects surrounding the 17 UN SDGs. The Canadian Standards Association (CSA Group), as a standards development organization whose standards have been referenced in federal and provincial regulations and legislation, has identified an opportunity to help Canadian businesses become more aware of the SDGs and how they can be part of driving progress towards achieving these goals by 2030. The C22.1:21 Canadian Electrical (CE) Code Part I was selected as a good representative code from CSA Group’s Electrical Program, to form the basis of this SDGs study due to its long history of use within Canada, almost 100 years in some provinces, and because connections to the SDGs are not obvious at first glance due to its primary use as a safety code.

Through a robust mapping process, connections to the following UN SDGs have been identified:

 <p>7 AFFORDABLE AND CLEAN ENERGY</p>	SDG 7 – ensure access to affordable, reliable, sustainable, and modern energy for all.
 <p>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</p>	SDG 9 – build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
 <p>13 CLIMATE ACTION</p>	SDG 13 – take urgent action to combat climate change and its impacts.

These have been identified to be the most relevant goals to the CE Code Part I and this study will explore these connections.

The CE Code Part I is a National Standard of Canada that is referenced in legislation across Canada and is correlated with the National Building Code of Canada (NBC). Specifically, the CE Code Part I provides the requirements for performing safe and good quality electrical installations by electrical professionals, and it cannot be deviated from unless required or permitted by the authority having jurisdiction and only if the



modifiers can prove that the installation is safe and produces no potential harm to a user of the electrical system. There are five additional parts to the Canadian Electrical Code that focus on product standards and utilities among other subjects; however, the CE Code Part I is the only part with requirements for the safety of electrical installations. Each province and territory adopts the CE Code Part I in different ways, with some adding deviations. At first glance, the CE Code Part I may not seem to have an obvious connection with sustainability and environmental issues as that is not the code’s primary purpose; however, as one example, the newest edition of the code includes provisions for climate change adaptation that are intended to increase the resilience of the electrical installation in the case of flooding that may result from climate change or severe weather.

Information for this study was obtained from CSA Group and the UN SDGs website, additional published material about the CE Code Part I, with the majority of information coming from the interviews with four code users. Furthermore, the CE Code Part I was reviewed to confirm findings and to identify any additional information.

2 Results and Impact

2.1 Industry Use and Perspectives of CSA C22.1:21

Though interviews took place with users working in a wide range of fields that relate to electrical safety and electrical professionals, they all had similar perspectives and views of the code. As the CE Code Part I is referenced in regulations, it is top of mind no matter the project being carried out. While each province and territory has a different way of implementing the CE Code Part I in its laws and bylaws, the intent is the same across Canada – that electrical systems that are installed are safe and meet a certain level of quality. While the expectations and perspectives surrounding what the goal of the CE Code Part I is or should be were consistent among interviewed stakeholders, there were differences in perspectives regarding the environmental impacts of the CE Code Part I and how it could further address sustainability issues.

Interview participants discussed the effect that U.S. and international electrical codes had on the development of the code as well as how they were used and how they interacted with the CE Code Part I. They also noted the impact of having the code correlated with the NBC. The CE Code Part I has been influenced by the National Electrical Code in the U.S. and the suite of standards developed by the International Electrical Commission, in which several of the users had been involved. There is a similar and uniform application of electrical safety across North America and across the globe in some sense, due to these connections and crossovers in standard development membership. The interconnectedness of the electricity framework has both positive and negative impacts from a sustainability perspective. It does apply some pressure to keep up with the rest of the world as more sustainable and environmentally friendly technologies are adopted globally. The object of the CE Code Part I is to help prevent fire and shock, and facilitate the safe operation and maintenance of electrical equipment; therefore, the potential for direct innovation for sustainability is somewhat limited.

Users noted that while the purpose of the CE Code Part I was technical in nature and that users implemented it because it was required not because they chose to be sustainable, the code had evolved over the last few revisions to include more elements of sustainability, and linkages to the SDGs were there.



2.2 Links to the UN Sustainable Development Goals

The interviews conducted within this study were used to highlight potential connections between the CE Code Part I and the UN SDGs through user experience of working with the code or being impacted by it, as well as from the interviewees' personal understanding of the SDGs. Interviews revealed that there was an uneven level of understanding within the industry regarding what the SDGs are and what their connections are to the CE Code Part I. While none of the organizations had direct interaction with the UN SDGs, one electrical regulator noted that their province was introducing a "Green Economic Plan" that was informed by the SDGs, which indirectly impacted their role as a regulator for the government. The organizations also had different levels of environmental consciousness that affected their work. Two companies had extensive environmental policies that affected the products that they made and how they designed projects for clients. Two companies used the Global Reporting Initiative (GRI) third-party carbon reporting scheme; one company already had environmental, social, and governance policies in place, and one was in the process of creating a new corporate social responsibility policy. Although the participants were not initially very familiar with the SDGs, through discussion they were able to identify and confirm the connections identified by CSA Group, based on their experience with the code, their own understanding of environmental issues, and the discussions that had occurred at the Technical Committee.



The four interviews with industry users expressed similar concerns and perspectives regarding the CE Code Part I and its potential connections to sustainability and climate change adaptation as addressed in the SDGs. This code has been in use for decades, and the wealth of knowledge surrounding it is immense, yet the understanding of how this code relates to environmental issues and sustainability varies. As one interviewee suggested through their own environmental journey, as environmental issues become increasingly discussed in this sphere, “there will be an increasing need for a paradigm shift in how users perceive the code from one that is focused just on safety to one that considers the effect a changing climate has on being able to maintain safety in a wider range of scenarios”. Based on the interviewees’ responses, it is clear that while some users are beginning to bridge that paradigm shift, others have not, and addressing the SDGs in the future will depend on contractors and professionals in the field being able to do so.

2.2.1 SDG 7 – Affordable and Clean Energy

The 2021 edition of the CE Code Part I included some substantial changes to facilitate sustainability. New and updated sections focused on renewable energy sources, such as solar photovoltaic installations and wind-generated electricity, and new requirements for electric vehicles, home-based vehicle charging stations, and energy storage systems. Further updates in the most recent document continue this trend. Participants recognized that while this code does not require professionals to install certain low carbon, sustainable, or efficient technologies, the code can play an important role in helping to promote efficiency and sustainability by continuously adding the requirements necessary for the safe installation of those technologies as they become marketable. The addition of these frameworks to the code creates a space where such emerging technologies are further legitimized and accessible to a greater population, thereby supporting targets 7.1, “By 2030, ensure universal access to affordable, reliable and modern energy services”, and 7.3, “By 2030, double the global rate of improvement in energy efficiency”.

2.2.2 SDG 9 – Industry, Innovation and Infrastructure

Similar to the information above, the users recognized that while the CE Code Part I doesn't prescribe the elements of SDG 9, it is very necessary to enable the move to resilient and sustainable infrastructure. Interestingly, the interview participants recognized a nuance that the code has in regards to efficiency and climate change adaptation, drawing the connection to both SDG 9 and SDG 13. If a code asks electrical professionals "How do you keep people who use electrical systems safe?" then it must also address in some way the conditions and context required to create and maintain safety in changing conditions. In other words, there may not be an obvious connection in its original intent, but the original intent of the code makes considering environmental issues necessary. The newest (2021) edition of the code recognizes that climate change is causing an increase in the number of flooding events in Canada, and it addresses the risk of flooding to electrical systems with new requirements for electrical systems installed within a flood hazard zone, which draw a clear linkage to targets 9.1, *"Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all"*, and 13.1, *"Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries"*.

2.2.3 SDG 13 – Climate Action

Users could see the linkage of the CE Code Part I to SDG 13 as noted above with respect to increasing resilience and adaptive capacity of electrical systems in the face of climate change, and mentioned that this was a discussion happening within the Technical Committee. This was also the area that users felt could most be improved with changes to the code going forward.

In general, this code easily displays the interconnectedness of the SDGs, as action towards achieving these three goals is enabled by this code in similar ways – by creating resilient, climate adaptive, and reliable infrastructure and energy systems that are available for all. The positive reflections of the users with respect to the importance of sustainability within this code showed that direct and indirect connections can be made between the CE Code Part I and the SDGs 7, 9, and 13, and that future revisions will include wording and requirements that strengthen these linkages.

3 Conclusions and Next Steps

It is clear that connections to the SDGs can be made using the CE Code Part I and that there are users interested in implementing the SDGs and working towards achieving their objectives. Refining the contextual language within the code to explicitly reflect its intended use and benefits would enable more direct connections to the SDGs to be drawn and make their impact clearer to users and the general public. Specifically, identifying the section/passage of the code that best reflects a particular SDG would be beneficial.

Lastly, while participants noted that the CE Code Part I had clear connections to the SDGs, all found that other parts of the Canadian Electrical Code had more numerous and overt connections to environmental issues and sustainability.