



CIGRE Reference Paper : Sustainability – At the Heart of CIGRE's Work

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Sustainability is a key driver of many developments world-wide, and quite notably for power systems, thanks to the December 2015 Paris Agreement on climate protection with its actionable worldwide consensus and the Sustainable Development Goals (SDGs) adopted by the United Nations in September 2015. CIGRE, as the 'global expert community for electric power systems', is engaged in supporting the SDGs, the Paris Agreement, and sustainability in general, and pursues sustainable electricity for all.

This Reference Paper describes how CIGRE contributes to global sustainability and the SDGs, partly by adhering to sustainable organizational practices itself, but even more importantly by supporting many SDGs through its global work related to energy, emissions, and climate change. This paper thus lays the foundation to focus CIGRE's work more systematically on sustainability; and for the Technical Council to include further aspects of sustainability in the next strategic plan on which CIGRE's work should focus.

The paper thus means to clarify both for CIGRE Members, its Councils and Study Committees, and for external parties - governments, regulators, industry, academia -how CIGRE already supports the sustainability goals, and how we will take sustainability into account when defining our future work.

For the same reasons outlined above, most worldwide organizations related to energy are clarifying and emphasizing their contributions to sustainability; as one example we cite here the International Energy Agency (IEA), whose Executive Director Fatih Birol has published "Energy is at the heart of the sustainable development agenda to 2030" in March 2018, with the IEA website since tracking the energy contributions to the SDGs.

The 17 SDGs designated by the United Nations are:



Just looking at these titles it becomes clear that power systems – and thus the expertise CIGRE contributes worldwide to well developed and managed power systems – are of direct relevance to several of these. In analysing our contributions to the SDGs, CIGRE's Technical Council identified nine SDGs for which CIGRE's contributions are especially relevant, and these can be grouped into the four dimensions of climate protection, efficiency, global cooperation, and development. Sections 2 through 5 of this reference paper describe CIGRE's contributions through global power system expertise to the nine SDGs, structured along the four

dimensions. Section 6 describes how CIGRE's current and evolving organizational practices support the SDGs (including a check and adjustment of CIGRE bylaws to further improve our sustainable practices). Section 7 provides conclusions, including a summary how certain CIGRE activities might be prioritized over the coming years towards even stronger sustainable impact. The remainder of this introduction describes in general terms how CIGRE, as an association of experts, universities, electrical equipment manufacturers, and electric utilities, contributes to a world evolving towards better sustainability.

With over 14,000 members across 90 countries, CIGRE aims to develop and implement tangible benefits in electric power systems for all its stakeholder and society in general. As CIGRE's Strategic Plan states, "*Electricity is vital for the development and well-being for all people of the world. As the Earth's population continues to increase, so too does pressure on the planet's key resources, especially food, clean water and energy. Global development and peace will in part be dependent on equitable access to these key resources. The demand for energy in the world will continue to grow while at the same time traditional carbon-based energy resources are under increasing scrutiny due to environmental considerations. As well as maintaining existing infrastructure, development of sustainable energy resources, often widely dispersed, will be essential to meet this growing demand. We must also endeavor through our collaborative efforts to further the global community of electricity for all in the world who do not benefit from electricity today.*"

In this context of increasing electricity's global relevance for the society and sustainability, CIGRE's purpose is to foster engagement and knowledge sharing, enhancing expertise among power system professionals globally to enable the sustainable provision of electricity for all. The outcome of the collaboration of – at any given time – over 3,500 active experts within 240 active working groups that produce approximately 45 technical brochures a year is the creation and distribution of unbiased and authoritative technical reference resources that contribute to the betterment of the industry and the expertise of the people working within it. In particular, we synthesize state-of-the-art and worldwide best practices; develop guidelines and information to aid the development of new technologies and techniques. By applying the knowledge generated in the CIGRE reference resources, manufacturers build better electrical equipment that contributes to more sustainable energy systems, academics educate engineers with better understanding how to improve electric systems and sustainability throughout their careers, and utilities develop and operate their systems more economically, more reliably and more sustainably.

CIGRE and climate protection



IN SDG 13, Climate Action is the key issue of this dimension: "**Take urgent action to combat climate change and its impacts**".

It is about strengthening resilience and adaptability from hazards and natural disasters that are climate related.

It is about developing and promoting mechanisms to increase the capacity of effective climate change-related planning and management.

What does SDG 13 mean for CIGRE?

The electric industry and climate mutually influence each other. The industry faces outages due to hazards or natural disasters, a more volatile balance, a variable supply and demand, yet we are developing electric vehicles that will help protect the climate through their efficiency. Climate change and its necessary actions have many effects on our industry; from a changing market to integrating renewable energy sources (RES), or from innovation in storage to off-grid solutions, every aspect of CIGRE's work will be influenced by this changing world.

Our industry is contributing more and more to climate change protection. The Paris Agreement and the worldwide targets of reducing CO₂ emissions have enormous influence on our industry: integrating RES into the grid, looking for off-grid solutions, increased emphasis on storage: it all provides improvement for climate protection.

The CIGRE work contributes to the following SDG 13 actions:

- > Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries;
- > Integrate climate change measures into national policies, strategies and planning;
- > Improve education, awareness-raising, and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

A side effect of these actions will be attention to:



SDG 14 and SDG 15 - Mostly this concerns actions about environmental issues, obligatory by law, but sometimes on a more voluntary basis, to achieve more stakeholder engagement.

SDG 14: "life below water": CIGRE addresses in several Study Committees and Working Groups (WGs) offshore developments for the power sector. Offshore wind has proven its worth in many parts of the world and underwater turbines are also a fast developing sector. All our colleagues working offshore have to deal with the environmental protection of sea life when installing sea cables and offshore platforms. In many situations, laws are in place requiring that care is given to sea life but the engagement to protect life below water benefits all stakeholders.

SDG 15: "life on land": A lot of the work of CIGRE Study Committees and WGs relates to infrastructure on land. Like SDG 14, this mainly concerns the environmental issues related to our work such as noise and visual pollution. Around the world, our industry takes care to protect our biodiversity through bird and animal protection, landscape and corridor management, reducing the use of greenhouse gases like SF₆ and so on. As with SDG 14, there are often legal requirements but more often companies undertake actions to support the SDG and/or to gain more public trust.

CIGRE and efficiency



SDG 7 is at the heart of what CIGRE does.

It is about providing universal access to affordable, reliable, and modern energy services.

It is about increasing the share of RES in the global energy mix.

It is about expanding infrastructure and developing technology to be able to supply modern sustainable energy services to all countries and all people around the world.

It is about increased cooperation that facilitates access to research and technology of clean energy, including renewables.

What does SDG 7 mean for CIGRE?

SDG 7, "affordable and clean energy", addresses one of the most basic needs of society: access to affordable, reliable, sustainable, and new energy sources. Without any doubt, this is a goal where CIGRE plays a major role. CIGRE is the world's most recognised international non-profit association for promoting expert collaboration through knowledge sharing to improve the electric power systems of today and tomorrow. CIGRE has long embraced the challenges of integrating sustainable and new energy sources without compromising the reliability of supply.

CIGRE is acting in a fast-changing sector. While in the past we only transported electricity from a fixed number of land-based fossil-fuel plants, now we are faced with multiple onshore and offshore energy sources, and a complex, cross-border energy market. Some consumers are now producers as well, feeding energy from their solar panels or e-cars back into the system. In this exceptionally fast-evolving market it can be hard to plan for the long term. We need to make sure we keep the lights on at all times, while facilitating the integration of present and new market players. Above all, we must ensure that our investments are not providing society with expensive assets that could soon become obsolete.

The CIGRE work contributes to the following SDG 7 actions:

- > By 2030, increase substantially the share of RES into the global energy mix
- > By 2030, ensure universal access to affordable, reliable, and modern energy services
- > By 2030, double the global rate of improvement in energy efficiency
- > By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and cleaner, and more innovative fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology
- > By 2030, expand infrastructure and upgraded technology for supplying modern and sustainable energy services for developing countries, in particular lesser-developed countries, small island developing states, and land-locked developing countries, in accordance with their respective programmes of support.

By supporting these actions, CIGRE work will also have a major influence on:



SDG 9, "industry, innovation and infrastructure": CIGRE facilitates sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African, Latin American, and certain Asian countries, and other lesser developed countries. Advanced systems that have been tested in mainstream networks can be deployed in areas [where none even exist now](#).

SDG 11, "sustainable cities and communities": One of the major impacts foreseen will be the power requirement for electric vehicles. The necessary strengthening and reinforcement of long-line transmission and distribution systems to import necessary power to cities, as well as the developing structure of microgrids, will reinforce the sustainable nature of cities. The knowledge CIGRE experts share contributes to reducing the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

SDG 12, "responsible consumption and production": CIGRE work can encourage companies, especially large and transnational ones, to adopt sustainable practices and to integrate sustainability information into their reporting cycle, and it can assist developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production. The integration of storage systems, on-demand power generation, and more advanced network management can reduce the worldwide reliance on older generation options.

CIGRE and global cooperation

Global cooperation is the backbone of CIGRE's principles and leads us clearly to:



It is about strengthening international cooperation on science, technology, and innovation, and easing access to this information. It is about sharing knowledge and facilitating technologies.

What does SDG 17 mean for CIGRE?

SDG 17; "partnerships for the goals" is in the heart and in the genes of CIGRE. A successful sustainable development agenda requires partnerships between governments, the private sector, and civil society. These inclusive partnerships, built upon principles and values, a shared vision and shared goals, that place people and the planet at the centre, are needed at the global, regional, national and local level. The inherent ideologies of CIGRE lend our global base of expertise to lead all levels of decision makers.

SDG 17; "partnerships for the goals" is CIGRE's call to act. Urgent action is needed to mobilize, redirect, and unlock the transformative power of trillions of dollars of private funding to deliver global sustainable development objectives. Long-term investments are needed in critical sectors, such as developing countries, but also in under maintained ageing networks that can no longer keep up with technological advances. These include sustainable energy, infrastructure and transport, as well as information and communications technologies. Review and monitoring frameworks, regulations and incentive structures that enable such investments must be retooled to attract investments and reinforce sustainable development. Supreme audit institutions and oversight functions by legislatures must be strengthened.

That CIGRE lives and promotes global cooperation does not need much explanation, as CIGRE is a worldwide organization, with connections to all types of companies in the electricity sector: utilities, generation companies, manufacturers, governments, science, consultancies, civil society, and CIGRE collaborates with several similar global institutions including IEEE and the World Bank.

CIGRE and development

There are several SDGs partly related to economic and societal development:



What do these mean for CIGRE?

SDG 4: "quality education" is one of the main conditions to fulfil all the UN's sustainability goals. Obtaining a quality education is the foundation for improving people's lives. It is not in the scope for CIGRE to organize worldwide access to affordable and qualitative technical, professional education. It is also not a task for CIGRE to make sure that by 2030, all young men and women around the world are literate. However, even if education is not CIGRE's primary business, the way CIGRE acts and is organized, contributes strongly to better education in the world: CIGRE is about sharing knowledge and working together with colleagues from all over the world.

Electrification is crucial for community development and for personal empowerment. These ideologies are essential for an improved quality of education. CIGRE is working on a number of educational improvements: more women in the power industry, encouraging young people to become CIGRE members. Universal access to electricity is also high on the list of CIGRE priorities, e.g. the Africa dissemination and lesser-developed countries, in cooperation with the World Bank.

In this context, CIGRE also contributes to SDGs 5 and 9:

SDG 5, "Gender equality": CIGRE facilitates and encourages women in CIGRE and thus also in their role in their companies and countries.

SDG 9, "industry, innovation and infrastructure": CIGRE facilitates sustainable and resilient infrastructure development in evolving countries through technological support to African countries and other less industrialised countries.

CIGRE bylaws and practices for our own organisational sustainability

CIGRE's own practices already address sustainability related to the following SDGs:



SDG 5; "gender equality", through the project "Women in CIGRE".

SDG 16; "peace, justice and strong institutions", by CIGRE's own "Antitrust Guidelines for Meetings" which exclude any corruption or bribery from CIGRE work. In general, CIGRE developed itself as an effective, accountable, and transparent institution, and ensures responsive, inclusive, participatory, and representative decision-making at all levels.

As further attention to these and other SDG's is needed, section 7 specifies how CIGRE's practices as well as CIGRE's overall contributions to sustainability through its work products can be further improved.

Summary and recommendations

This Reference Paper has shown that CIGRE contributes to 9 out of the 17 United Nation's Sustainable Development Goals. Through the efforts of 3,500 experts in 240 working groups, producing an average of 45 new power industry reference documents per year, CIGRE helps thousands of readers in 90 countries to improve and operate their electricity systems better, which often means in a more sustainable way. The nine primary SDGs affected by CIGRE's work are:

- > First and foremost, SDG 13, "take urgent action to combat climate change and its impacts": many of the CIGRE WGs study how electric system equipment, subsystems, and the entire system can be developed, improved, and operated reliably with ever increasing RES. Renewable energy is one of the most important ways to combat climate change.
- > Equally important, SDG 7, "clean and affordable energy", is supported by numerous CIGRE WGs, by describing how equipment, subsystems, and the overall electric system work efficiently, how environmental impacts are reduced, and how RES make the overall system cleaner.
- > And at the heart of all CIGRE's work as a global cooperative association is SDG 17, "partnerships for the goals".
- > Also supported through CIGRE's effort are innovations in SDG 9, "industry, innovation and infrastructure", SDG 11, "sustainable

cities and communities" and SDG 12, "responsible consumption and production" (all related to the power system efficiency effects of CIGRE's work), SDG 14, "life below water" and SDG 15, "life on land" (related to the environmental effects by some CIGRE WGs), and SDG 4, "quality education", SDG 5, "gender equality", and SDG 9, "industry, innovation and infrastructure" (related to CIGRE's contributions to an innovative, non-discriminative, and productive power industry work environment).

Constant contributions to global energy systems are made through CIGRE's reference documents and to CIGRE's own organizational practices however further improvements for sustainability are possible and should be pursued systematically.

The following activities in CIGRE should be strengthened, to turn what are now very general parts of the SDGs into more electric system-relevant parts:

- > **SDG 5, "gender equality"**: ensure women's full and effective participation and equal opportunities for leadership at all decision making levels within CIGRE.
- > **SDG 7, "affordable and clean energy"**: increase the focus of CIGRE WGs on ensuring universal access to affordable, reliable, and modern energy services; on energy efficiency; on facilitating access to clean energy research and technology, including renewable energy, energy efficiency, and advanced and cleaner fossil-fuel technology (also with more focus on pollutants and particulates from generation and networks); on investment cases for energy infrastructure and clean energy technology; and on expanding infrastructure and upgrading technology for supplying modern and sustainable energy services for all in developing countries.
- > **SDG 9: "industry, innovation and infrastructure"**: enhance technological and technical support to lesser-developed countries.
- > **SDG 11: "sustainable cities and communities"**: increase attention (in certain WGs) on sustainable and resilient buildings utilizing local raw materials; to protecting and safeguarding the world's cultural and natural heritage; and to reducing the adverse per capita environmental impact of cities, including by paying special attention to air quality, and municipal and other waste management.
- > **SDG 12: "responsible consumption and production"**: promote public procurement practices that are sustainable, in accordance with national policies and priorities, and encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle. Improve CIGRE's publication practices to contribute to people everywhere having the relevant information and awareness for sustainable development and lifestyles in harmony with nature, and to support developing countries to strengthen their scientific and technological development to move towards more sustainable patterns of consumption and production. Some CIGRE WGs may also be able to address inefficient fossil-fuel subsidies that encourage wasteful consumption.
- > **SDG 13: "climate action"**: More CIGRE WGs will need to address resilience and adaptive capacity to climate-related hazards and natural disasters on all continents, and the integration of climate change measures into national policies, strategies, and planning. CIGRE's work should systematically bear in mind the need to improve education, human awareness, and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning signs.
- > **SDG 14: "life below water"**: especially for connecting offshore windfarms, wave and subsea turbines, CIGRE needs to launch more WG's about the effects of these connections on life below water.
- > **SDG 15: "life on land"**: although this topic is well covered in WG's, CIGRE needs to ensure that this topic remains a priority.
- > **SDG 17: "partnerships for the goals"**: By design, most of CIGRE's work promotes the development, transfer, dissemination, and diffusion of environmentally sound technologies to developed and developing countries, and this should be made more explicit in CIGRE's global communications efforts. Multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology, and financial resources can also be used to support the achievements of the sustainable development goals in all countries while encouraging and promoting effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships.

In the coming months, the CIGRE TC will decide how to drive these recommendations into action, and how to monitor and ensure their progress.