



ECCE MANIFESTO

**Building
a resilient future:
Climate-proof design of
infrastructure
for generations to come**

NOVEMBER 2024

Executive Summary

This manifesto underscores the urgent need for the civil engineering profession to transition from climate pledges to concrete actions.

It emphasizes the pivotal role of civil engineers in shaping a sustainable and resilient future by incorporating climate considerations into every facet of infrastructure design, construction, and operation. This aligns with the ECCE Strategic Plan 2023-2030, which focuses on enabling European civil engineers to advance a more sustainable built environment and protect the natural environment.

Key areas of action for ECCE members highlighted in this manifesto include:

• Enhancing Climate Resilience in Infrastructure Design:

Civil engineers must adopt a forward-looking approach, incorporating climate projections into design standards to ensure infrastructure can withstand future climate impacts. This includes:

- Updating design standards and building codes to reflect future climate scenarios, such as sea level rise, increased rainfall intensity, and extreme temperature fluctuations.
- Designing for adaptability and flexibility, allowing for future adjustments as climate conditions evolve.
- Prioritizing nature-based solutions, such as green roofs, permeable pavements, and urban forests, to enhance resilience and provide environmental and social co-benefits.

• Championing Sustainable Financing and Investment:

The transition to climate-resilient infrastructure requires significant financial investment. Civil engineers should advocate for and secure funding by:

- Engaging with investors and financial institutions, effectively communicating the environmental and social returns of climate-conscious projects.
- Exploring innovative financing mechanisms, such as public-private partnerships and green bonds, to mobilize capital for sustainable infrastructure development.
- Advocating for supportive policy frameworks that incentivize sustainable infrastructure investments.

• Strengthening Carbon Accounting and Transparency:

Rigorous carbon accounting is essential for tracking progress and ensuring accountability. Civil engineers must:

- Implement whole-life carbon assessments to evaluate the carbon footprint of projects from material extraction to decommissioning.
- Utilize standardized reporting frameworks to enhance transparency and enable comparisons across projects and sectors.
- Integrate carbon data into decision-making processes, informing material selection, construction methods, and operational strategies.

• Fostering Collaboration and Knowledge Exchange:

The global scale of the climate crisis necessitates a collaborative approach. Civil engineers should:

- Engage in international networks and forums to connect with peers, share knowledge, and stay abreast of the latest innovations in sustainable infrastructure.
- Contribute to capacity building initiatives, sharing expertise with engineers in developing countries to accelerate the global adoption of climate-resilient practices.
- Promote open-source resources and data sharing to facilitate innovation and accelerate progress in climate-conscious infrastructure development.
- Addressing climate change in civil engineering and transitioning to sustainable infrastructure necessitates a collaborative approach from policymakers, industry, and academia. Policymakers should establish targets, funding, and incentives like carbon pricing, while the industry adopts sustainable materials and technologies and transparent carbon accounting. Academia contributes through research, education, and climate impact assessments, all working together for progress.

• Promoting Social Equity and Community Engagement:

Infrastructure projects should prioritize social equity, ensuring that the needs of vulnerable communities are met. This includes:

- Encouraging inclusive engineering practices that amplify community voices and incorporate their perspectives into the planning and implementation of infrastructure projects.
- Advocating for infrastructure designs that prioritize the well-being of all members of society, particularly those most vulnerable to climate change impacts.

• Education and Capacity Building:

The transition to sustainable infrastructure requires a skilled workforce. ECCE must:

- Provide training, resources, and platforms to empower engineers with the knowledge and skills necessary to design, construct, and operate climate-resilient infrastructure.
- Advocate for integrating sustainability principles into engineering education curricula, preparing future generations of engineers to address the climate challenge.
- Climate change preparedness for civil engineers requires moving beyond technical skills to encompass social and ethical implications for equitable infrastructure.

• Changing the Codes:

Existing codes and standards often fail to adequately address the impacts of climate change. ECCE should advocate for:

- Revising existing codes and standards to incorporate climate projections and resilience considerations.
- Implementing standards and guidelines specifically for climate-resilient infrastructure design and construction.

In this manifesto, “infrastructure” refers to the fundamental physical and organizational structures and facilities essential for the functioning of society. These include, but are not limited to, buildings, roads, bridges, railways, airports, seaports, power generation and distribution systems, water supply and sanitation networks, etc.

By embracing these principles and actively working towards their implementation, ECCE and its members can play a leading role in shaping a more sustainable and resilient future for Europe and beyond.

By taking the lead in decarbonizing infrastructure and promoting climate adaptation, ECCE members will not only contribute to Europe’s sustainability but also set an example for the global engineering community, encouraging wider adoption of these crucial principles.

ECCE MANIFESTO

Building a resilient future: Climate-proof design of infrastructure for generations to come

The European Council of Civil Engineers (ECCE) since its establishment in 1985, promotes the cooperation of European civil engineers as being of significant value not only to engineers but also for European society.

ECCE supports and enables European civil engineers to advance a more sustainable and resilient built environment and to protect the natural environment. It does this by working with its national member organizations from 23 countries and partner organizations at the European level to promote the highest technical and ethical standards for engineers, to positively influence the development of the profession and the construction industry, and to be a force for good in European society.

ON THE OCCASION OF THE 29TH SESSION OF THE CONFERENCE OF THE PARTIES TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

The urgency of the climate crisis demands immediate and decisive action from all sectors, particularly civil engineering. Clear priorities have been identified for the future of infrastructure development, emphasizing emission reductions, protection of vulnerable populations, transitioning from fossil fuels, enhancing climate resilience, and securing financial resources. This document outlines key actions ECCE members can take to support these goals and contribute to a sustainable and resilient future.

United Nations Secretary-General António Guterres describes the latest Intergovernmental Panel on Climate Change report on global warming as “a code red for humanity.” ECCE is urging Civil Engineers to work in order to limit the emission of greenhouse gases, preserve resources, and promote resiliency to ensure that the infrastructure they design and build today will withstand the impacts of a changing environment tomorrow. The world’s climate is changing — and those changes are bringing significant impacts that will affect the way infrastructure is designed and constructed. The effects of climate change may be globally magnified especially in coastal and riverside cities as well in mountainous regions, which could face increasing heat and heavy precipitation. Extreme sea level events that previously occurred once in 100 years could happen much more often by the end of this century. The same may be said for flooding, permafrost thaw, mass movements, rockfalls and other natural disasters. The civil engineering profession has a significant role to play in helping the world adapt to these new conditions. In ensuring this, the EU has helped to achieve a range of milestones and agreements including:

- reducing greenhouse gas emissions by 43% by 2030
- establishing new funding to assist developing countries that are particularly affected by climate change
- encouraging major emitters to set new emission reduction targets
- proposing new rules to boost international carbon markets

As the European Council of Civil Engineers, we recognize the critical role civil engineers play in shaping resilient, sustainable, and equitable infrastructure. Guided by our Strategic Plan, we are committed to principles that support these objectives. This manifesto reflects the ECCE Strategic Plan 2023–2030, which empowers European civil engineers to advance a sustainable built environment while safeguarding the natural world.

1. ENHANCING CLIMATE RESILIENCE IN INFRASTRUCTURE DESIGN, CONSTRUCTION, MAINTENANCE AND OPERATION

The increasing frequency and severity of extreme weather events underscores the urgent need for climate-resilient infrastructure. Civil engineers must go beyond traditional design parameters to account for the impacts of a changing climate, ensuring that infrastructure can withstand unprecedented conditions and safeguard communities from the devastating effects of climate change.

→ **Incorporate Climate Projections into Design Standards:** Design standards and building codes must be updated to reflect future climate projections, including sea level rise, increased rainfall intensity, extreme temperature and others. This will ensure that new infrastructure is built to withstand the challenges of a changing climate.

→ **Designing for Adaptability and Flexibility:** Infrastructure should be designed with adaptability in mind, allowing for adjustments and modifications as climate conditions evolve. This might involve modular designs, adjustable components, and the use of materials that can withstand a wider range of environmental conditions.

→ **Prioritizing Nature-Based Solutions for Resilience:** Nature-based solutions, such as green roofs, reused materials, permeable pavements, and urban forests, can provide multiple benefits, including flood mitigation, heat island reduction, and improved air quality. Integrating these solutions into infrastructure design can enhance resilience while providing co-benefits for the environment and communities.

→ **Promotion of Climate Resilient Infrastructure:** We will prioritize engineering solutions that enhance the resilience of infrastructure to the increasing risks of climate change, including extreme weather events, rising sea levels, and resource scarcity.

2. CHAMPIONING SUSTAINABLE FINANCING AND INVESTMENT

Climate finance plays a crucial role in achieving global climate goals. Civil engineers must actively advocate for and secure the resources needed to develop sustainable and resilient infrastructure. This requires understanding the evolving landscape of climate finance and effectively communicating the value and impact of climate-conscious projects to investors.

→ **Engaging with Investors and Financial Institutions:** Civil engineers should develop strong communication skills to effectively articulate the environmental and social benefits of climate-resilient infrastructure projects. This will help attract investments from institutions increasingly prioritizing sustainable projects aligned with net-zero goals.

→ **Exploring Innovative Financing Mechanisms:** Public-private partnerships, green bonds, and other innovative financing mechanisms can play a key role in mobilizing the capital needed for climate-conscious infrastructure development. Civil engineers should be knowledgeable about these options and advocate for their utilization.

→ **Advocating for Supportive Policy Frameworks:** Government policies that incentivize sustainable infrastructure development are essential. Civil engineers can contribute to shaping these policies by providing technical expertise, engaging in advocacy efforts, and highlighting the economic and societal benefits of climate-resilient infrastructure.

→ **Circular Economy and Resource Efficiency:** ECCE supports integrating circular economy principles into engineering practices, emphasizing sustainable resource use, waste minimization, and lifecycle design approaches.

→ **Advocacy for Green Innovation and Technologies:** ECCE commits to fostering the adoption of innovative green technologies and practices, supporting research, and facilitating knowledge-sharing across the European engineering community.

3. STRENGTHENING CARBON ACCOUNTING AND TRANSPARENCY

The push for transparency and accountability in emissions reporting remains a key focus. Civil engineers must adopt rigorous carbon accounting practices to accurately measure and report the emissions associated with their projects, contributing to a data-driven approach to emissions reduction.

→ **Implementing Whole-Life Carbon Assessment:** Assessing the carbon footprint of a project throughout its entire lifecycle, from material extraction to decommissioning, is essential for identifying opportunities to reduce emissions.

→ **Utilizing Standardized Reporting Frameworks:** Adopting internationally recognized standards for carbon accounting and reporting will enhance transparency and allow for comparisons across projects and sectors.

→ **Integrating Carbon Data into Decision-Making:** Carbon emissions data should be integrated into project design and decision-making processes, informing material selection, construction methods, and operational strategies.

→ **Commitment to Net-Zero Carbon Emissions:** ECCE will advocate for the design and construction of infrastructure projects that actively reduce greenhouse gas emissions, aiming for carbon neutrality in alignment with the global target of limiting temperature rise to 1.5°C above pre-industrial levels.

→ **Adapting to Climate Risks in Design:** Civil engineers must design resilient infrastructure to address escalating climate impacts at different temperature rises. At 1.5°C, heatwaves and altered rainfall challenge materials and water systems, while 2°C brings severe heat extremes and flooding. Coastal areas face rising sea levels, requiring adaptive designs like flood defenses and elevated structures.

4. FOSTERING COLLABORATION AND KNOWLEDGE EXCHANGE

The global nature of the climate crisis demands a collaborative approach. Civil engineers can play a crucial role in facilitating knowledge exchange and sharing best practices across regions and sectors, contributing to a global network of expertise in climate-conscious infrastructure development.

→ **Engaging in International Networks and Forums:** Participating in professional organizations, conferences, and workshops provides valuable opportunities to connect with peers, share knowledge, and stay informed about the latest innovations in sustainable infrastructure.

→ **Contributing to Capacity Building Initiatives:** Sharing expertise and knowledge with engineers in developing countries can help accelerate the adoption of climate-resilient infrastructure practices globally.

→ **Promoting Open-Source Resources and Data Sharing:** Making data, tools, and best practices readily accessible can facilitate innovation and accelerate progress in climate-conscious infrastructure development.

→ **Social Equity and Community Engagement:** Infrastructure solutions must promote social equity, ensuring that the needs of vulnerable communities are addressed. ECCE will encourage inclusive engineering practices that amplify community voices in planning and implementation.

→ **Education and Capacity-Building:** ECCE will provide training, resources, and platforms to empower engineers with the skills and knowledge necessary to lead the transition to sustainable infrastructure development.

→ **Changing the Codes:** One obstacle that every civil engineer encounters in trying to design infrastructure that will remain operational in the face of the impacts of climate change is the fact that most codes and standards do not take climate change into account. Consequently, improving codes and standards is the most important single activity that will have a huge impact across Europe. If considerations of the impacts of climate change can be added to codes and standards, engineers will be obliged to use them in their decisions.

→ **Education and Preparedness:** Preparing for climate change in civil engineering requires a more holistic approach that goes beyond technical skills like resilient design and carbon assessment. Educating engineers to understand the broader social and ethical implications of climate change, including the disproportionate impacts on vulnerable communities is of utmost importance. This more comprehensive preparedness will equip engineers to design and implement sustainable infrastructure that serves all communities equitably, fostering a just and resilient future.

CONCLUSIONS

The global response to climate change is at a critical turning point, offering civil engineers an opportunity to lead in creating sustainable and resilient infrastructure. Despite the challenges, the potential for meaningful environmental impact is immense. Through innovation, collaboration, and a commitment to sustainability, ECCE members can develop infrastructure that balances human needs with planetary health. Clear priorities for sustainable development provide a pathway forward, aligning with ECCE's strategic focus on leadership in infrastructure that harmonizes societal needs with ecological responsibility. The road ahead is demanding, but the chance for transformative progress is extraordinary. Through innovation, collaboration, and dedication to sustainability, ECCE members can shape infrastructure that balances human needs with planetary health. ECCE's strategic priorities emphasize leadership in sustainable infrastructure that harmonizes societal demands with ecological stewardship. The journey ahead is demanding, but the opportunity for transformative progress is unparalleled.

ECCE therefore reaffirms its commitment to a sustainable and equitable future, recognizing that the civil engineering profession is pivotal in achieving global climate goals. Together, we will build infrastructure that is not only robust and efficient but also environmentally and socially responsible.

ECCE calls upon all member organizations, individual engineers, and stakeholders to embrace this shared vision and to collaborate in transforming these principles into actionable outcomes.

So, as ECCE we declare that all Engineers must innovate, be pioneers and create new designs, and improve existing techniques, for a better, safer, greener, more sustainable and more resilient Europe, in safeguarding a better future for all.



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