Building a resilient future

Climate-proof design of infrastructure for generations to come

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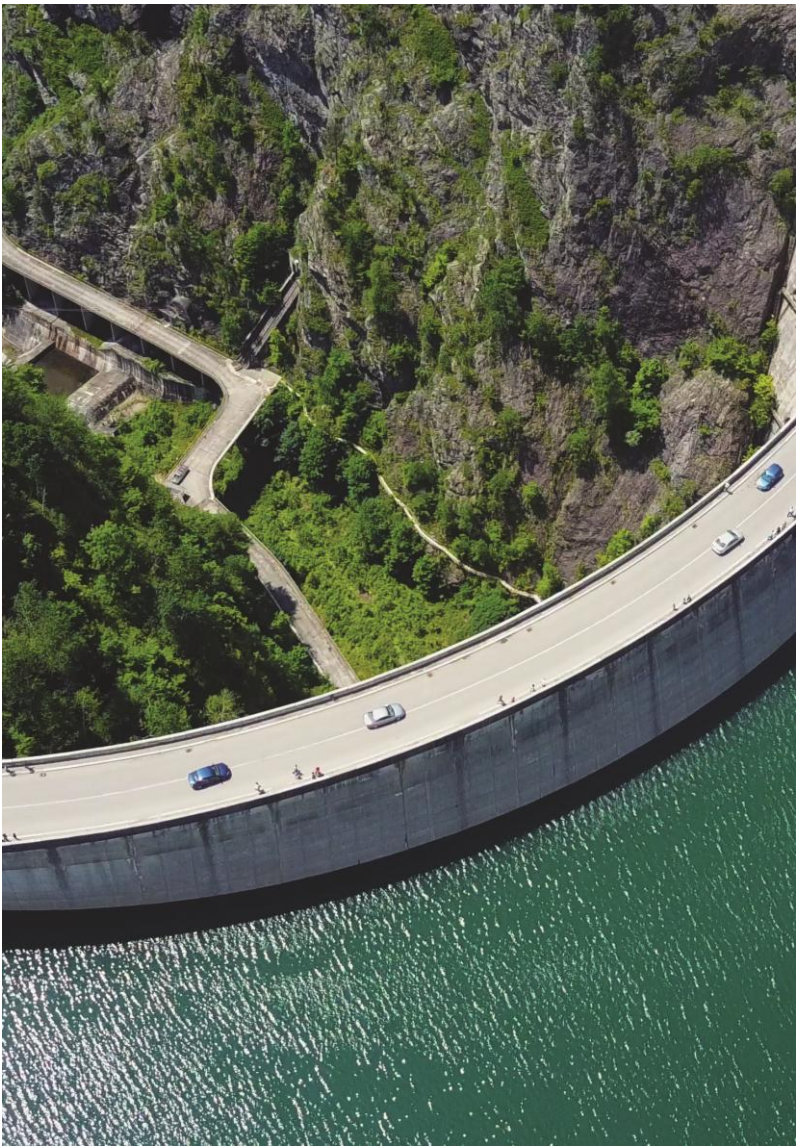


Building a resilient future

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 24 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 2021 and on 2023, the United Nations' Intergovernmental Panel on Climate Change released very important reports warning that climate change "is widespread, rapid, and intensifying." Prepared by 234 scientists from 66 countries, the IPCC report declared that human-induced climate change "is already affecting many weather and climate extremes in every region across the globe in the atmosphere, in the oceans, ice floes, and on land."

U.N. Secretary-General António Guterres described the report **as "a code red for humanity,"** adding that the "alarm bells are deafening, and the evidence is irrefutable."

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 cities, 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 civil engineering profession has a significant role to play in helping the world adapt to these new conditions.**

Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming.

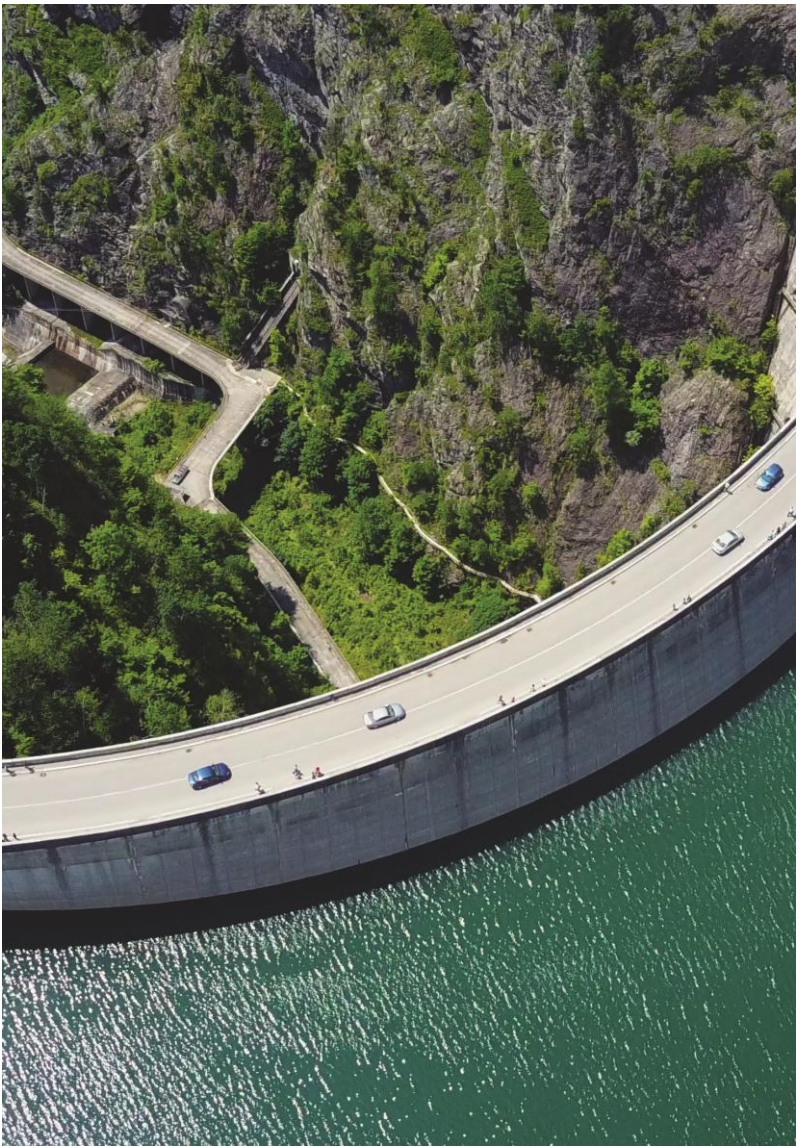
Global greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals.

The increasing frequency and severity of extreme weather events, **underscore the need for climate-resilient infrastructure.**

Civil engineers **must move beyond traditional design parameters and anticipate the impacts of a changing climate, ensuring that infrastructure can withstand** unprecedented conditions **and protect communities from the devastating effects of climate change.**

So, Civil Engineers must: adapt, improve, improvise, and

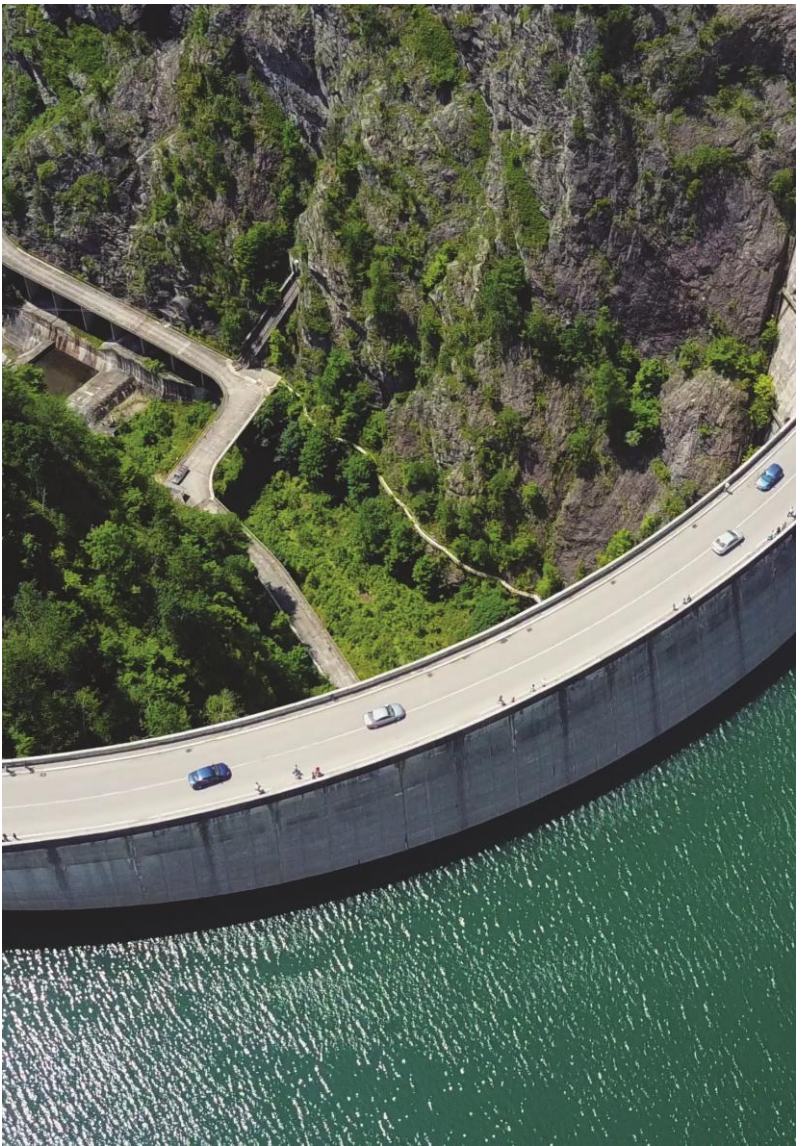
- **Design for Adaptability and Flexibility**
- **Prioritise Nature-Based Solutions for Resilience**
- **Promote for Climate Resilient Infrastructure**



UN climate summit

The climate crisis necessitates urgent and decisive action from all sectors, including civil engineering. The critical priorities and actions required to ensure sustainable and resilient infrastructure development in the face of a changing environment, may be summarised as:

- **Emission Reductions**
- **Protection of Vulnerable Populations**
- **Transitioning from Fossil Fuels**
- **Enhancing Climate Resilience**
- **Securing Financial Resources**
- **Civil Engineering's Role**

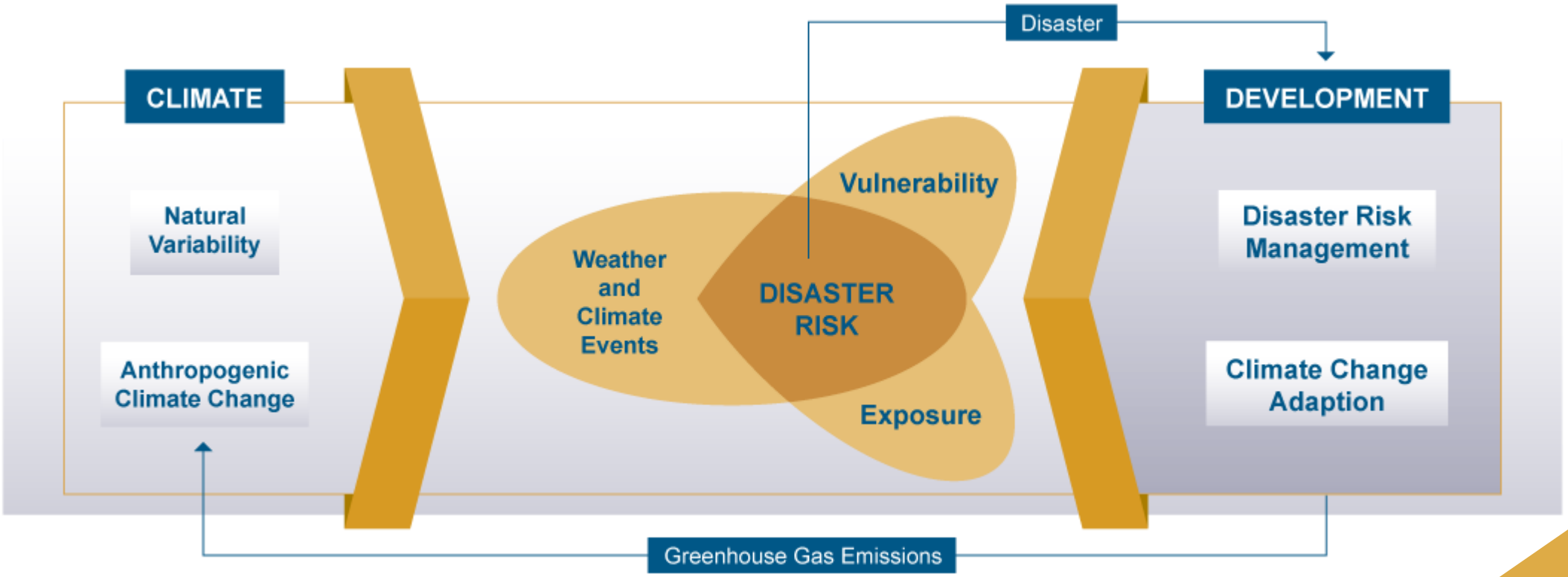


For ensuring this, the EU has aimed to achieve a range of milestones and agreements including:

- ➔ 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.

Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability and Resilience



The figure schematically illustrates ***the key concepts related to disaster risk management and climate change adaptation, along with their interaction with sustainable development.***

Figure referenced from: Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability and Resilience document.

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 safe and sustainable built environment, and protect the natural environment.**

Manifesto key themes

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

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

CHAMPIONING SUSTAINABLE FINANCING & INVESTMENT

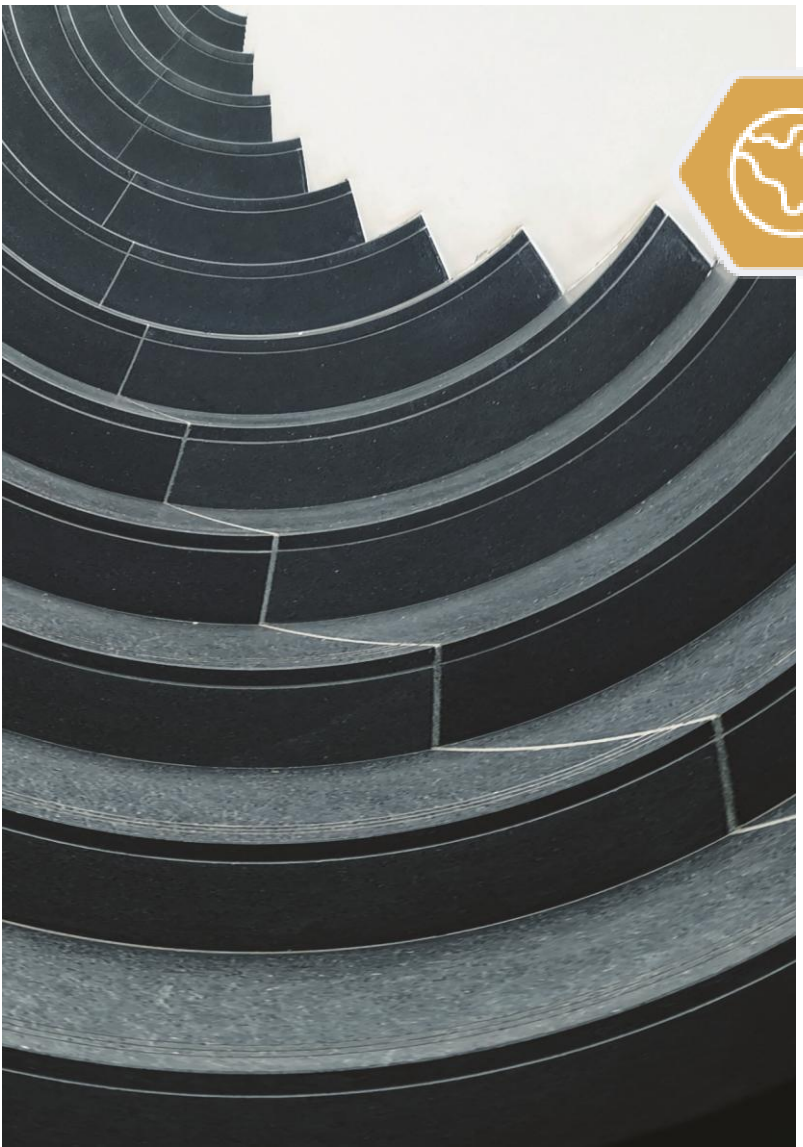
STRENGTHENING CARBON ACCOUNTING & TRANSPARENCY

FOSTERING COLLABORATION & KNOWLEDGE EXCHANGE

PROMOTING SOCIAL EQUITY & COMMUNITY ENGAGEMENT

EDUCATION & CAPACITY BUILDING

CHANGING THE CODES



1. Enhancing Climate Resilience in Infrastructure Design

Forward-Looking Design:
Integrate climate projections into infrastructure planning.

Updated Standards:
Adapt building codes for future climate challenges (sea level rise, extreme weather).

Adaptability & Flexibility:
Design infrastructure that can evolve with changing conditions.

Nature-Based Solutions:
Use green roofs, permeable pavements, and urban forests for resilience and co-benefits.

Enhancing Climate Resilience in Infrastructure Design

Continuous Adaptation Process for Resilient Infrastructure

Current Infrastructure Design

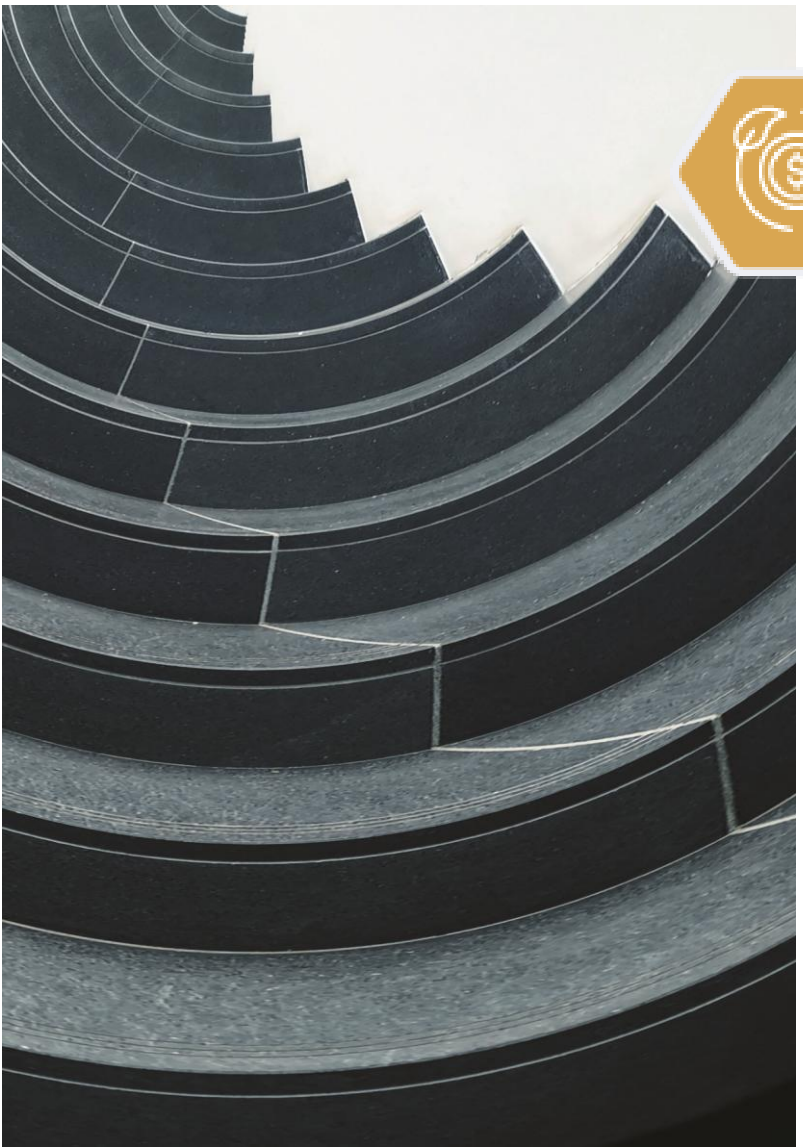
"Infrastructure based on past climate data, often lacking flexibility to cope with emerging climate impacts like heat, flooding, and sea-level rise."

Design Adaptation for Immediate Future

"Infrastructure designed to adapt to near-term climate changes, with flexible, modular systems and upgrades for increased resilience."

Future-Proof Infrastructure (Long-Term Design Flexibility)

"Advanced, flexible infrastructure designed to evolve with future climate changes, using smart systems and nature-based solutions for long-term resilience."



2. Championing Sustainable Financing and Investment

Securing Investment:
Advocate for funding climate-resilient infrastructure.

Engaging Investors:
Communicate environmental and social returns of sustainable projects.

Innovative Financing:
Utilize public-private partnerships and green bonds to mobilize capital.

Policy Support:
Push for frameworks that incentivize sustainable infrastructure investments.

Championing Sustainable Financing and Investment

Investor Engagement Pathway

Communicating Returns

Securing Investment

Innovative Financing

Policy Support

3. Strengthening Carbon Accounting and Transparency

Rigorous Carbon Accounting:
Track emissions for accountability and progress.

Whole-Life Carbon Assessment:
Evaluate carbon footprint from material extraction to decommissioning.

Standardized Reporting:
Enhance transparency and comparability across projects.

Data-Driven Decisions:
Use carbon data to guide materials, construction, and operations.

Strengthening Carbon Accounting and Transparency

Carbon Accounting Flowchart

Whole-Life Carbon Assessment

Evaluate carbon emissions at every stage, from material sourcing to decommissioning.

Standardized Reporting

Use reporting frameworks to standardize carbon data, ensuring transparency and enabling comparison across sectors and projects.

Carbon Data in Decision-Making

Integrate carbon data to guide material choices, construction methods, and operational strategies.

4. Fostering Collaboration and Knowledge Exchange

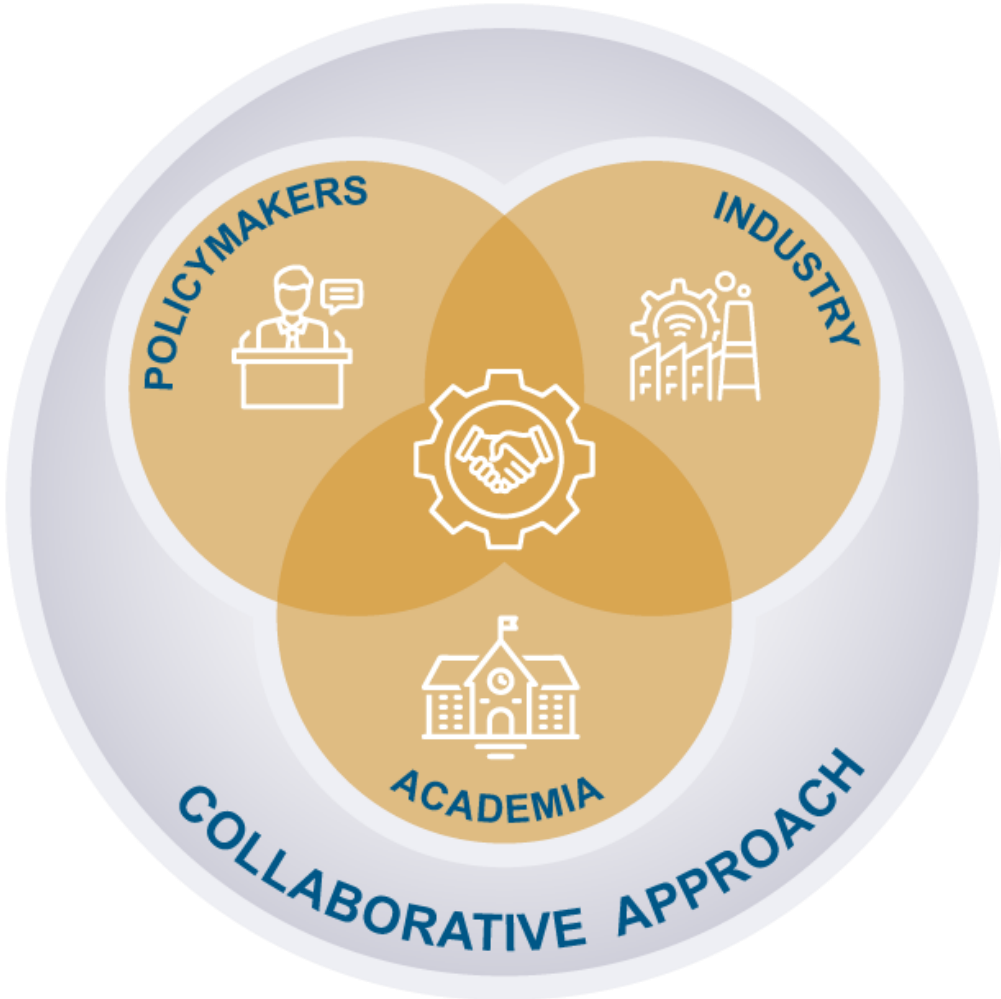
Engage globally:
Connect with international networks to share knowledge on sustainable infrastructure.

Capacity building:
Train engineers to promote climate-resilient practices.

Open-source collaboration:
Share data and resources to drive innovation in sustainable infrastructure.

Collaborative transition:
Policymakers, industry, and academia must work together—setting targets, adopting sustainable materials, and advancing research.

Fostering Collaboration and Knowledge Exchange



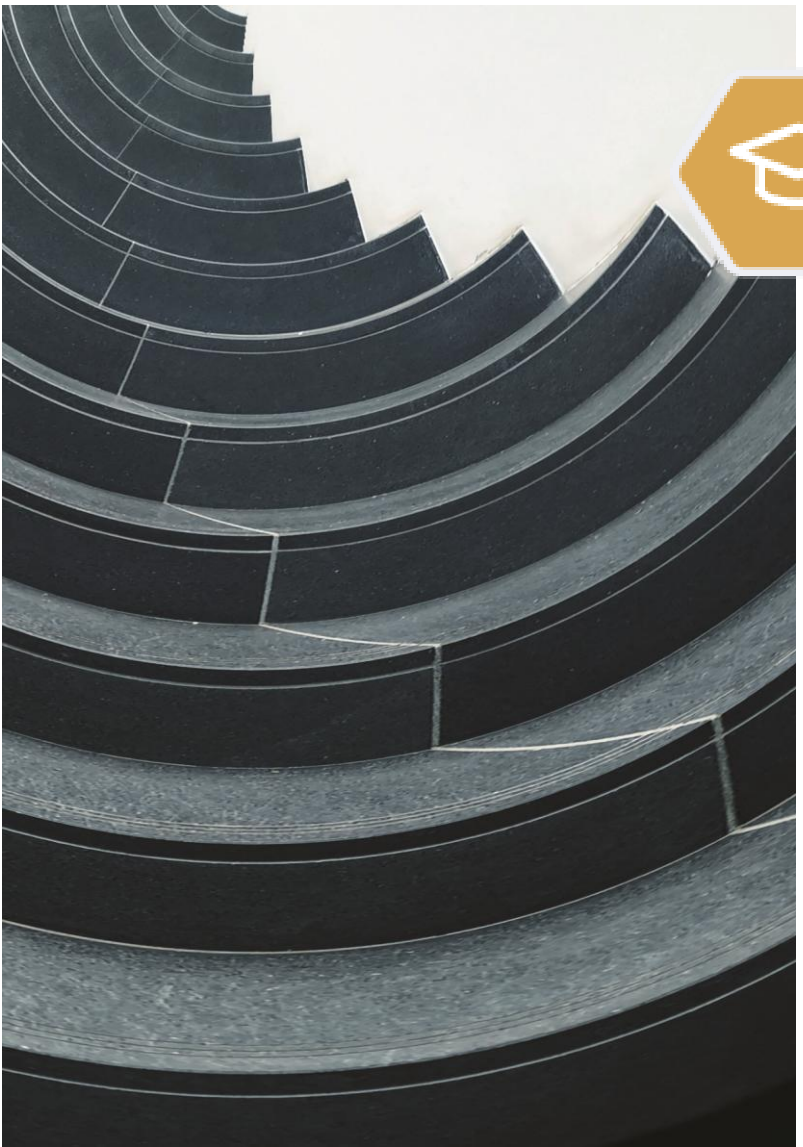
5. Promoting Social Equity and Community Engagement

Socially Equitable Infrastructure:
Prioritize the needs of vulnerable communities.

Inclusive Engineering:
Amplify community voices in planning and implementation.

Well-Being Focused Design:
Ensure infrastructure benefits all, especially climate-vulnerable populations.

Promoting Social Equity and Community Engagement



6. Education and Capacity Building

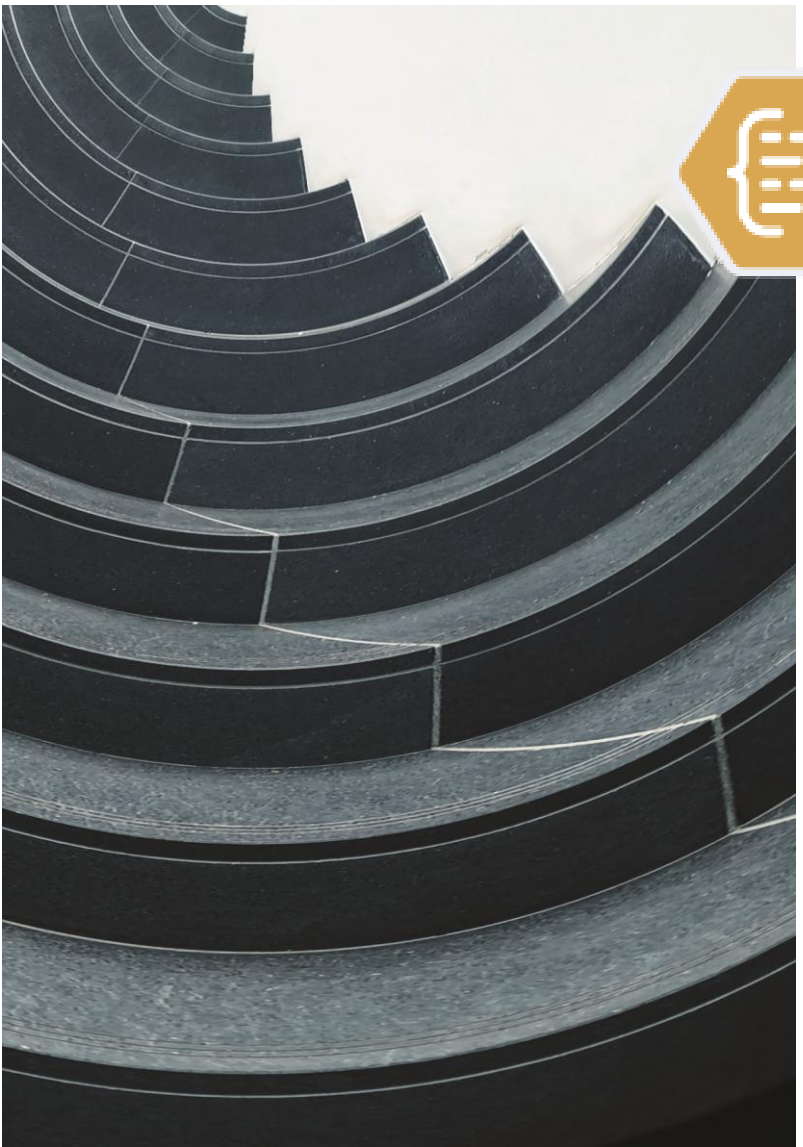
Skilled Workforce for Sustainability:
Equip engineers for climate-resilient infrastructure.

Training & Resources:
Provide knowledge platforms for sustainable design and construction.

Sustainability in Education:
Integrate climate principles into engineering curricula.

Beyond Technical Skills:
Address social and ethical responsibilities for equitable infrastructure.

Education and Capacity Building



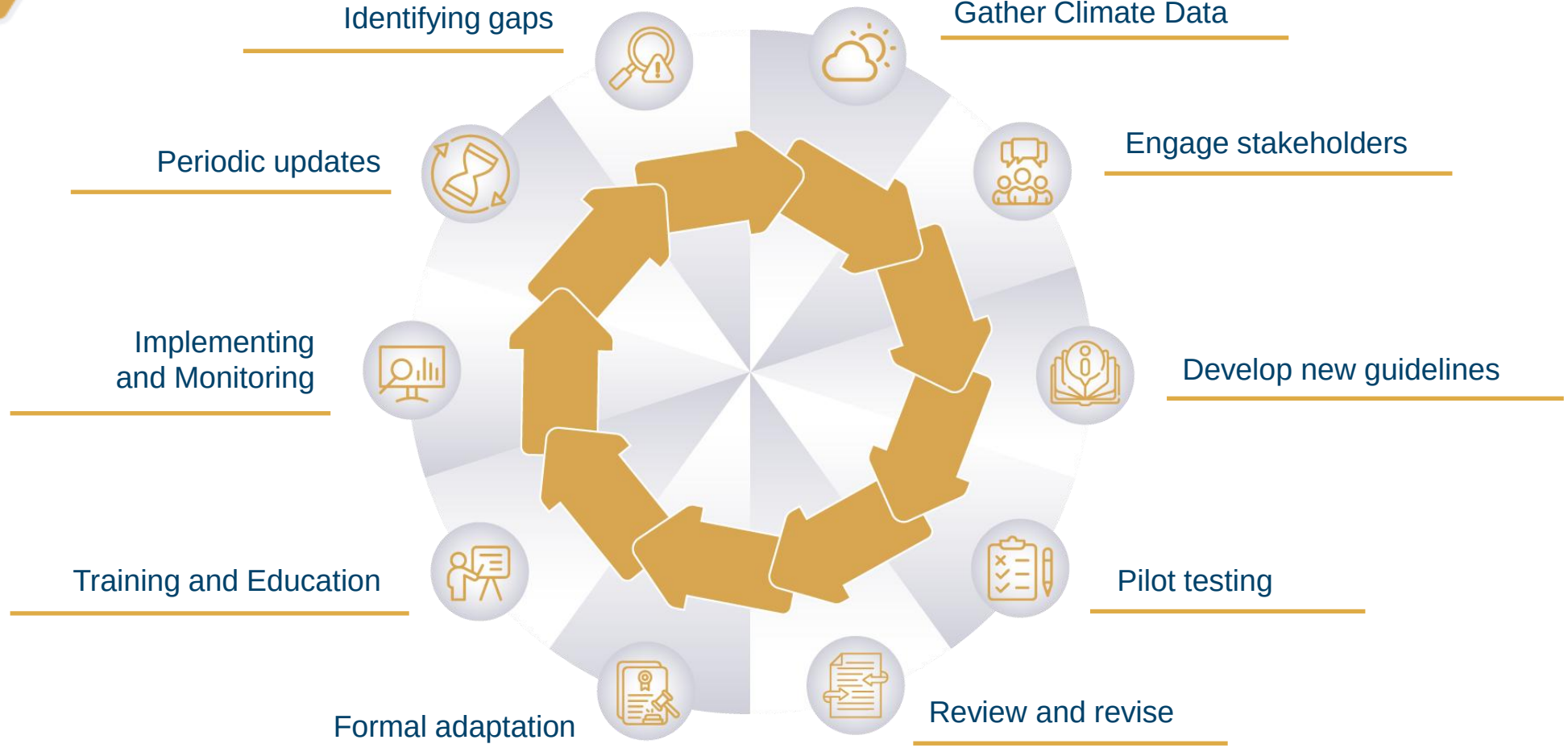
7. Changing the Codes

Updating Standards:
Adapt codes to address climate change impacts.

Climate Projections & Resilience:
Integrate future climate risks into regulations.

Dedicated Guidelines:
Develop standards for climate-resilient infrastructure.

Changing the Codes



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.

Conclusions

ECCE 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.

ECCE urges all member organizations, individual engineers, and stakeholders to embrace this shared vision and work together to turn these principles into tangible actions.

As the European Council of Civil Engineers, we affirm that engineers must be innovators, pioneers, and creators of new designs while also enhancing existing techniques. Their mission is to build a better, safer, greener, more sustainable, and more resilient Europe, ensuring a brighter future for all.

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THANK YOU

for your attention

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