

# **Economic Commission for Europe**

## **Committee on Environmental Policy**

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Item 3 (b) of the provisional agenda

### **The Ninth Environment for Europe Ministerial Conference: Substantive thematic documents**

Information paper No.2

5 May 2022

## **Greening the economy in the pan-European region: working towards sustainable infrastructure**

### **Background thematic document**

#### **Note by the secretariat**

#### *Summary*

The ECE Committee on Environmental Policy at its twenty-fifth session (Geneva, 13–15 November 2019) agreed on the following two themes for the Ninth Environment for Europe Ministerial Conference (Nicosia, 5-7 October 2022):

- (i) Greening the economy in the pan-European region: working towards sustainable infrastructure.
- (ii) Applying principles of circular economy to sustainable tourism.

At its twenty-seventh session (Geneva and online, 3-5 November 2021), the Committee considered the drafts of two background thematic documents on the themes for the Ninth Environment for Europe Ministerial Conference and asked:

- The Committee to make concrete suggestions and proposals on the first drafts of the two background thematic documents on the themes for the Ninth Environment for Europe Ministerial Conference and to send them to the secretariat, preferably by the end of November but no later than 31 December 2021.
- The Bureau, with support from the secretariat and in cooperation with relevant stakeholders, to further develop the two drafts and submit them to the special session of the Committee in May 2022.

Comments on the first draft of the background thematic document “Greening the economy in the pan-European region: working towards sustainable infrastructure” were received from three countries (Czechia, Hungary and Sweden).

A consultant was contracted by the UNECE to assist the secretariat to revise and further develop the first draft of the background thematic document.

The Committee will be invited to consider the paper, as appropriate, and guide the secretariat to finalize it and process as an official document of the Ninth Environment for Europe Ministerial Conference (5-7 October, Nicosia, Cyprus).

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## Introduction: setting the scene

### Driving forces for sustainable infrastructure<sup>1</sup>

1. Greening the economy is increasingly becoming a strategic priority for governments around the world.<sup>2</sup> As an effort to promote the green economy in the pan-European region, the United Nations Economic Commission for Europe (UNECE) Committee on Environmental Policy (CEP) with support from UNECE and the United Nations Environment Programme (UNEP), and in cooperation with other key actors, such as the Organization for Economic Cooperation and Development (OECD) and the European Environment Agency (EEA) developed the Pan-European Strategic Framework for Greening the Economy. This framework is the foundation for an integrated regional vision, objectives and outcomes to promote the green economy. The Batumi Initiative on Green Economy is the implementation mechanism proposed for the framework in the period 2016–2030, through voluntary commitments by interested countries and organizations, both public and private, in the form of green economy actions.<sup>3</sup> So far, 87 commitments have been made by 28 countries, and 37 commitments by participating organizations.<sup>4</sup>

2. Sustainable infrastructure plays an important role for the green economy transition, as it sits at the heart of the Sustainable Development Goals (SDGs), cutting across all 17 Goals and influencing 92 per cent of the 169 targets.<sup>5</sup> The fourth Session of the United Nations Environment Assembly<sup>6</sup> (UNEA 4) held in March 2019, addressed the theme of innovative solutions for environmental challenges and sustainable consumption and production. In this context, the UNEA 4/5 resolution on sustainable infrastructure focused particularly on sustainable infrastructure, acknowledging its importance and calling to different actions towards sustainable consumption and production patterns, sustainable investments, capacity building, development and maintenance of infrastructure within a sustainable framework, among many others.<sup>7</sup>

3. UNECE has contributed to greening the economy and making infrastructure more sustainable through promoting the implementation of its relevant legal instruments, including the Convention on Environmental Impact Assessment in a Transboundary

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<sup>1</sup> Sustainable infrastructure (sometimes also called green infrastructure) systems are those that are planned, designed, constructed, operated and decommissioned in a manner that ensures economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire infrastructure lifecycle. Sustainable infrastructure can include built infrastructure, natural infrastructure or hybrid infrastructure that contains elements of both. UNEP, <https://wedocs.unep.org/bitstream/handle/20.500.11822/34853/GPSI.pdf>

<sup>2</sup> A green economy results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It is characterized by substantially increased investments in economic sectors that build on and enhance the Earth's natural capital or reduce ecological scarcities and environmental risks. UNEP, [https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Driving\\_a\\_GE\\_through\\_public\\_finance\\_and\\_fiscal\\_policy\\_reform\\_UNEP.pdf](https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Driving_a_GE_through_public_finance_and_fiscal_policy_reform_UNEP.pdf)

<sup>3</sup> The Pan-European Strategic Framework was adopted by the Committee on Environmental Policy and endorsed by UNECE ministers at the Eighth Environment for Europe (Efe) Ministerial Conference, held in Batumi, Georgia, from 8 to 10 June 2016. <https://unece.org/pan-european-strategic-framework-greening-economy>

<sup>4</sup> Based on UNECE's preliminary progress reports

<sup>5</sup> Progress in the implementation of resolution 4/5 on sustainable infrastructure, UNEP/EA.5/7, November 2020.

<sup>6</sup> The United Nations Environment Assembly (UNEA) is the highest-level decision-making body on the environment. UNEA meets biennially to set priorities for global environmental policies and develop international environmental law. Through its resolutions, the Assembly provides leadership and catalyses intergovernmental action on the environment, <https://www.unep.org/environmentassembly/about-united-nations-environment-assembly>

<sup>7</sup> UNEP, <https://wedocs.unep.org/bitstream/handle/20.500.11822/28470/English.pdf?sequence=3&isAllowed=y>

Context<sup>8</sup> and the Protocol on Strategic Environment Assessment (SEA)<sup>9</sup>. Impact assessments generate evidence on the environmental and health impacts of planned strategies and activities, and propose mitigation measures and more sustainable alternatives, taking due account of comments from the relevant authorities and the public, including in a transboundary context - all of which is determinant to make progress on the green economy and thereby relevant for sustainable infrastructure planning. Both Environmental Impact Assessment (EIA) and SEA are relevant to the work envisioned in the context of the Pan-European Strategic Framework for greening the economy, especially due to the extreme effects of climate change that make it urgent to systematically and effectively scrutinize and address adverse and often cumulative impacts of economic development planning. Well-designed SEA processes are particularly important because they can help address sustainability early in the process, when there are more opportunities still possible to make more sustainable planning, the cost of integrating sustainability is lower, and there are diverse investment choices. An institutional framework, guidance and assistance have been made available to facilitate implementation of impact assessment in the UNECE region and beyond. UNECE also promoted the key enablers of sustainable infrastructure, namely the rule of law, transparency and effective, safe and inclusive public participation in decision-making on the related policies, plans and projects through the Aarhus Convention and its Protocol on Pollutant Release and Transfer Registers (Protocol on PRTRs) that grant the public rights and impose on governments the related obligations, including in the transboundary context.<sup>10</sup>

4. In addition, UNECE has – under the auspices of its Convention on the Transboundary Effects of Industrial Accidents - also been engaging in making infrastructure more resilient, by managing technological disaster risks arising from industrial hazardous activities and reducing the exposure and vulnerability of the population and the environment - notably through risk assessments, land-use plans and project-related siting decisions, in a transboundary context. In this context, UNECE has supported countries' efforts to enhance climate resilience, in particular in relation to hazards and risks, such as those arising from mine tailings management facilities, which could cause vast transboundary consequences e.g. through accidental water pollution in case of failure. These efforts minimize the risk of occurring technological or natural disasters, or a combination of both, which could significantly impede progress towards the green economy transition.<sup>11</sup>

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<sup>8</sup> The 1991 (Espoo) Convention on Environmental Impact Assessment in a Transboundary Context sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries, UNECE, <https://unece.org/environment-policy/environmental-assessment>

<sup>9</sup> The 2003 Protocol on Strategic Environmental Assessment entered into force in July 2010 and augments the Espoo Convention by ensuring that Parties assess the environment, including, health effects of their plans and programmes, and possibly also policies and legislation, at the earliest stages – so helping to lay the groundwork for sustainable development. The Protocol applies at domestic and transboundary levels, and provides for extensive public participation in the governmental decision-making process. UNECE, op.cit.

<sup>10</sup> The Aarhus Convention and its Protocol on Pollutant Release and Transfer Registers (Protocol on PRTRs) grant the public rights, and impose on Parties obligations, regarding access to information and public participation and access to justice in environmental matters. The Convention was adopted on 25 June 1998 and entered into force on 30 October 2001. The Protocol was adopted on 21 May 2003 and entered into force on 8 October 2009. The Protocol's objective is to enhance public access to information through the establishment of coherent, nationwide pollutant release and transfer registers. In October 2021, Parties to both treaties along with stakeholders adopted Geneva Declaration, focusing specifically on the large infrastructure projects and spatial planning: <https://unece.org/documents/2021/10/geneva-declaration-environmental-democracy-sustainable-inclusive-and-resilient-0>

<sup>11</sup> The Convention on the Transboundary Effects of Industrial Accidents entered into force on 19 April 2000. It strengthens industrial accident prevention, preparedness and response, with a focus on transboundary cooperation, among its Parties and the beneficiary countries of its Assistance and Cooperation Programme. The Convention also

5. The need to green infrastructure investments is becoming increasingly urgent because of the ongoing low-carbon economy transition and the post COVID-19 recovery effort. Both issues have put more pressure on governments in the region to achieve collective tangible progress for the green economy beyond individual actions, especially with regards to sustainable infrastructure development<sup>12</sup>, due to the current economic changes, market dynamics and shocks affecting infrastructure systems. In addition, scarce resources and the need for increased resilience have made governments act fast and introduce strategic decisions that help recover from the new reality. According to the report of the Global Recovery Observatory “Are we building back better?”, the fifty largest economies announced USD 14.6 trillion in fiscal spending in 2020, of which USD 1.9 trillion (13.0%) was for long-term economic recovery; of this recovery spending, less than 20% was earmarked for sustainable investments. Even if this sense of urgency lead to a belief of abandoning sustainability in interest of rapid economic stimulus and job creation, investments in sustainable infrastructure are in fact one of the best ways for recovery.<sup>13</sup>

### **Trends for sustainable infrastructure in the pan-European region**

6. Before the pandemic, the pan-European region was already conducting efforts to foster the green economy and in concrete for the development of infrastructure in a more sustainable way. However, even if the new reality has exacerbated gaps such as gender equality and access to essential services, it has also enhanced the opportunity to promote innovative solutions that make infrastructure investments a vehicle for faster progress towards a more sustainable future, thereby fostering economic prosperity. Thus, the following three key trends have been identified in the region.<sup>14</sup>

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covers natural hazard-triggered technological accidents, so-called “Natech” events, which are increasing in the wake of climate change. UNECE, [www.unece.org/env/teia](http://www.unece.org/env/teia). Through Decision 2020/1 on strengthening mine tailings safety in the UNECE region and beyond, which has been adopted at the eleventh meeting of the Conference of the Parties (Geneva, 7-9 December 2020), Parties and other countries committed “to increase their efforts to strengthen tailings safety and prevent failures, in view of the elevated risk of such accidents posed by the increasing frequency and severity of extreme weather events as a result of climate change.” UNECE, [https://unece.org/sites/default/files/2021-04/Decision%202020\\_1-.pdf](https://unece.org/sites/default/files/2021-04/Decision%202020_1-.pdf). Through its Joint Expert Group on Water and Industrial Accidents, the Industrial Accidents Convention and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) cooperate in preventing accidental water pollution, and mitigating the impact of related accidents. A joint guidance on land-use planning, the siting of hazardous activities and related safety aspects was prepared under the auspices of the Industrial Accidents Convention, in cooperation with the Espoo Convention and its Protocol on SEA as well as the Aarhus Convention and the Committee on Urban Development, Housing and Land Management. UNECE, <https://unece.org/info/Environment-Policy/Industrial-accidents/pub/21647>.

<sup>12</sup> Sustainable infrastructure systems are those that are planned, designed, constructed, operated and decommissioned in a manner that ensures economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire infrastructure lifecycle. UNEP, <https://wedocs.unep.org/bitstream/handle/20.500.11822/34853/GPSI.pdf>

<sup>13</sup> UNEP, <https://wedocs.unep.org/bitstream/handle/20.500.11822/35281/AWBBB.pdf>

<sup>14</sup> More concrete actions from ECE region are listed in Annex I.

Regional and national efforts to promote circularity and the green economy are gaining force in Europe and beyond.

7. The circular economy<sup>15</sup> is critical to meet long-term climate change policies, and to reduce the carbon, water and resource footprint of infrastructure projects. Due to the high-material intense nature of Infrastructure development, it plays a central role in achieving circular economy principles and targets<sup>16</sup>. The circular economy is backed strongly by the European Commission and other EU institutions, as well as by a growing number of cities and countries across Europe. It is also attracting the business community and public and private investors. It is estimated that the circular economy has added around 35 million jobs, EUR 126 billion in economic value and EUR 15 billion in private finance.

8. The European Investment Bank (EIB) has a long track record of lending to projects that focus on recycling and the recovery of waste and by-products in various sectors. The Bank aims to increase financing for innovative circular economy projects in the EU and other countries that systematically design out waste, extend the life of assets and include new business models, supporting the European Commission's new Circular Economy Action Plan.<sup>17</sup> The EIB has also supported other efforts on land-use planning and Disaster Risk Reduction and Natural Hazards Triggering Technological Accidents (Natech).

9. The European Union's multi-stakeholder "EU4 Environment" Programme was developed for the period 2019-2022 to follow-up to the preceding EaP GREEN Programme (2013-2018).<sup>18</sup> It is financed mainly by the European Union with a total contribution of about EUR 20 million, following a regional approach in six countries (Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova and Ukraine). The aim is to help partner countries preserve their natural capital and increase people's environmental well-being by supporting environment-related action, demonstrating and unlocking opportunities for greener growth, and setting mechanisms to better manage environmental risks and impacts. To further that aim, the countries have been supported by the implementing organizations in: (a) greening their decision-making, including through the further operationalization of strategic environmental assessment and environmental impact assessment, and by boosting cross-sectoral cooperation and awareness (b) circular economy and new growth opportunities, e.g. through scaling up sustainable production and public procurement; (c) creating an environment level playing field, e.g. by strengthening environmental compliance assurance and liability regimes and mobilizing means for green investment; (d)

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<sup>15</sup> According to the Ellen MacArthur foundation, the Circular Economy is "a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources"., [https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail?gclid=CjwKCAjwoNuGBhA8EiwAFxomA71XXmB5aYg32WcHpNWQoxwxJKrfGML2YYLA3pEhZcEKNEr0y5WJbBoCnmoQAvD\\_BwE](https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail?gclid=CjwKCAjwoNuGBhA8EiwAFxomA71XXmB5aYg32WcHpNWQoxwxJKrfGML2YYLA3pEhZcEKNEr0y5WJbBoCnmoQAvD_BwE)

<sup>16</sup> The circular model builds economic, natural and social capital. It is based on three principles: Design out waste and pollution, keep products and materials in use, and regenerate natural systems., [https://www.ellenmacarthurfoundation.org/circular-economy/concept?gclid=CjwKCAjwoNuGBhA8EiwAFxomA85B\\_35vtUn28wZESwVEmrvzShvzYob8G1JGCIFCu9c-L-w\\_kT2tQxoCmloQAvD\\_BwE](https://www.ellenmacarthurfoundation.org/circular-economy/concept?gclid=CjwKCAjwoNuGBhA8EiwAFxomA85B_35vtUn28wZESwVEmrvzShvzYob8G1JGCIFCu9c-L-w_kT2tQxoCmloQAvD_BwE)

<sup>17</sup> European Investment Bank (EIB), [https://www.eib.org/attachments/thematic/circular\\_economy\\_guide\\_en.pdf](https://www.eib.org/attachments/thematic/circular_economy_guide_en.pdf)

<sup>18</sup> UNECE (Espoo Convention and Protocol on SEA secretariats), OECD, UNEP, UNIDO and the World Bank are implementing partners of the EU4Environment programme, <https://www.eu4environment.org/about/>. The 2013-2018 EaP GREEN programme was implemented by OECD, UNECE, UNEP and UNIDO (<http://www.green-economies-eap.org/>)

Ecosystems services and livelihoods; and (e) regional knowledge sharing and coordination.

Sustainable infrastructure investment is considered a mechanism for COVID-19 recovery strategies.

10. Even before the pandemic, environmental damage (e.g. ecosystem degradation) has been linked to many infrastructure sectors including the oil and gas industry.<sup>19</sup> Countries around the world have undertaken efforts to decarbonize the sector to address these threats and other climate change burdens. The energy sector especially brings the opportunity for more sustainable economic recovery and a just transition. In fact the renewable energy sector is likely to recover quickly after the COVID-19 crisis due to investments across local and national scales.<sup>20</sup> For instance, based on analysis on green spending made by the Global Recovery Observatory, green energy has been identified as a priority for recovery investments in 2021.<sup>21</sup> An estimated USD 2.9 trillion global investment gap in the energy sector illuminates an opportunity for investors to mainstream greener infrastructure alternatives to fossil fuels.<sup>22</sup> The current energy investment gap in Europe alone amounts to USD 250 billion. According to the Global Recovery Observatory, a total of USD 66.1 billion in green energy spending was announced as COVID-19 recovery packages in 2020. Much of this investment (USD 25.3 billion) was directed towards new or refurbished renewable energy generation facilities.<sup>23</sup> Even though progress has been made in redirecting and reprioritising green investments, there is still a long way to go.

11. The 2021-2027 Multiannual Financial Framework and “NextGeneration EU” encompass a recovery plan that will be the largest stimulus package ever financed in Europe. A total of EUR 1.8 trillion will be destined to re-build a greener, more digital and more resilient Europe.<sup>24</sup> Around EUR 374 billion will be allocated to natural resources and the environment.<sup>25</sup> In addition to this, several Mayors from European Cities like Berlin, Bristol, Oslo and London have pledged to shift from fossil fuels into green energy, buildings, transport and other investments, as a recovery strategy, covering around USD 295 billion in assets.<sup>26</sup> Similarly, Mayors from the UNECE region adopted the *Geneva Declaration of Mayors* in 2020, committing to strengthen the resilience of cities, take ambitious climate action, accelerating the transition towards sustainable energy and ensuring sustainable transportation among other targets<sup>27</sup>. These examples show the unprecedented opportunity to allocate current resources efficiently and build back better to address infrastructure investment gaps with clean energy, or infrastructure solutions that restore ecosystems.

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<sup>19</sup> WWF,

<https://www.worldwildlife.org/threats/infrastructure#:~:text=Increased%20Pollution,every%20year%2C%20mostly%20by%20road.>

<sup>20</sup> <https://www.swissre.com/institute/research/sigma-research/Economic-Insights/green-infrastructure.html>

<sup>21</sup> <https://wedocs.unep.org/bitstream/handle/20.500.11822/35281/AWBBB.pdf>

<sup>22</sup> Global Infrastructure Hub, <https://outlook.gihub.org/sectors/energy>

<sup>23</sup> The countries included in this figure are Australia, Canada, China, Germany, Denmark, Spain, Finland, France, South Korea, Poland, Norway, the United Kingdom, and other small spender countries,

<https://wedocs.unep.org/bitstream/handle/20.500.11822/35281/AWBBB.pdf>

<sup>24</sup> European Commission, <https://op.europa.eu/en/publication-detail/-/publication/0252fa70-65cf-11eb-aeb5-01aa75ed71a1/language-en/format-PDF/source-search>

<sup>25</sup> “Natural resources and the environment” is the second biggest heading of Multiannual Financial Framework (MFF) Long-Term EU Budget (2021-2027). This includes programmes and funds supporting agriculture and maritime policy, environment and climate change,

[https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS\\_BRI\(2021\)690543](https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI(2021)690543)

<sup>26</sup> [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/658186/IPOL\\_BRI\(2020\)658186\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/658186/IPOL_BRI(2020)658186_EN.pdf)

<sup>27</sup> UNECE, <https://unece.org/housing/publications/geneva-declaration-mayors-2020>

Digitalisation and data-driven solutions are at the core of sustainable infrastructure development and for the integration of systems, sectors and stakeholders.

12. COVID-19 has forced regions around the world to mainstream digital tools, smart solutions and anticipate decisions with data. For instance, governments are devoting more attention to emerging digital technologies such as Artificial Intelligence (AI), blockchain and 5G infrastructure, the latter of which is critical to support enhanced mobile broadband, Internet of Things (IoT) devices and AI applications. Digital innovation and digital transformation are fundamental drivers of new business models and digital technologies that strengthen the science, research systems, and data transparency required for COVID-19 responses and recovery.<sup>28</sup> The need for innovation to unexpected challenges is gaining strategic importance in the pan-European region, especially due to the strong pressure in health systems and other interrelated sectors (both social and economic infrastructure)<sup>29</sup> and infrastructure systems<sup>30</sup> (natural, built and hybrid infrastructure).<sup>31</sup> The pandemic has for instance overwhelmed health systems, making strategic planning and coordination actions hard to balance and prioritize. Market effects from healthcare pressures can directly or indirectly affect other infrastructure sectors. For instance, transport infrastructure is critical for effective logistics of medical supplies, while travel bans indirectly affect the sector (e.g. airport management and planning). In this context, smart technologies can support the nature and economics of infrastructure systems, by reducing costs of data information and enhancing strategic planning and operational optimization for governments and key stakeholders.<sup>32</sup> Data management and digital infrastructure are thus key aspects for infrastructure resilience and risk management, accessibility to beneficiaries, and for better security, governance and transparency between key stakeholders through integrated solutions and knowledge-sharing.

13. The “Smart Cities Marketplace” is an initiative supported by the European Commission that brings together cities, industry, small businesses, banks, research and others. The initiative’s goal is to improve urban life through more sustainable integrated solutions and address city-specific challenges from different policy areas such as energy, and transport, and ICT. It builds on the engagement of the public, industry and other key stakeholder groups to develop innovative solutions and participate in city governance.<sup>33</sup>

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<sup>28</sup> OECD, <https://www.oecd.org/digital/digital-economy-outlook-covid.pdf>

<sup>29</sup> Social infrastructure is infrastructure (mostly facilities in the form of buildings) that accommodates social services. For example, hospitals, schools and universities, prisons, social housing, law courts, etc. Economic infrastructure is infrastructure that makes business activity possible, such as communications and transportation (for passengers and freight), as well as utilities’ networks, and systems and plants such as in water, waste and energy supply systems. Source: [https://ppp-certification.com/ppp-certification-guide/4-where-ppps-are-used-%E2%80%93-infrastructure-sectors#\\_ftn30](https://ppp-certification.com/ppp-certification-guide/4-where-ppps-are-used-%E2%80%93-infrastructure-sectors#_ftn30)

<sup>30</sup> Infrastructure systems comprise physical assets (also referred to as hard infrastructure) plus the knowledge, institutions and policy frameworks (also referred to as soft infrastructure) in which they exist and that enable them to function. These include both built, or grey, infrastructure in all sectors, and natural, or green, infrastructure. UNEP, <https://wedocs.unep.org/bitstream/handle/20.500.11822/34853/GPSI.pdf>

<sup>31</sup> UNEP, [https://www.greengrowthknowledge.org/sites/default/files/uploads/SI%20Good%20Practice%20Guidance\\_Review%20Draft\\_ENG.pdf](https://www.greengrowthknowledge.org/sites/default/files/uploads/SI%20Good%20Practice%20Guidance_Review%20Draft_ENG.pdf)

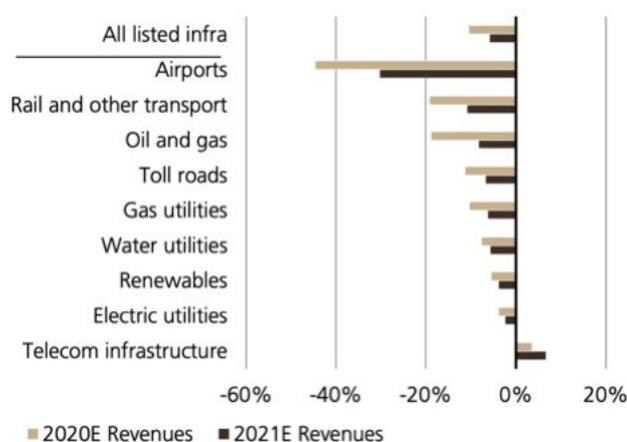
<sup>32</sup> McKinsey, <https://www.mckinsey.com/~media/McKinsey/Industries/Public%20and%20Social%20Sector/Our%20Insights/Smart%20cities%20Digital%20solutions%20for%20a%20more%20livable%20future/MGI-Smart-Cities-Executive-summary.pdf>

<sup>33</sup> [https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities\\_en](https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en)

14. All these trends towards circular economy, financial innovation and digitalization, represent different elements or components of sustainable infrastructure. However, no common definition still exists across the region that help standardize the data gathering process and ensure the comparison between countries and subregions.

### Pressures of infrastructure development

15. The current pandemic has demonstrated once more how dependent is our current economy on the adequate functioning of existing infrastructure functions. In particular most sectors exposed to an economic shock are those with GDP-correlated assets such as airports, ports and toll roads. Social infrastructure, renewables and electric utilities have seen less of an impact, but are still affected.<sup>34</sup> In contrast, telecom infrastructure has experienced positive results due to strong demands of mobile and communication networks.<sup>35</sup>



**Figure 1: Year to date Estimated Revenues 2020 and 2021. Source Image UBS (Bloomberg November 2020)**

16. Therefore, there is an increasing need to develop infrastructure that is sustainable but that is also intelligent and interconnected with other infrastructure assets and planning networks from different regions. A better understanding of the synergies between different projects and networks helps ensure more climate resilient projects and prevents cascading failure events. The following three pressures highlight the breadth of challenges that infrastructure planners must navigate and consider.

#### Environmental pressures

17. Given the long lifespan of infrastructure, failure to invest in clean, sustainable and resilient infrastructure result in long-term greenhouse development pathways with irreversible risks of environmental damage and persons.<sup>36</sup> Pollution (air, water, soil, noise etc.), carbon and other greenhouse emissions, land use change, damage to biodiversity and ecosystems, and use of limited raw materials and resources are some of the negative environmental impacts.<sup>37</sup> These negative results can in turn threaten the viability and resilience of infrastructure systems themselves (e.g. forest fires, floods, landslides can cause damages to roads, dams, buildings, among other

<sup>34</sup> UBS, Key themes for 2021, Infrastructure Outlook

<sup>35</sup> PWC, <https://www.pwc.com/us/en/library/covid-19/coronavirus-telecommunication-impact.html>

<sup>36</sup> OECD, <https://www.oecd.org/g20/summits/osaka/OECD-Reference-Note-on-Environmental-and-Social-Considerations.pdf>

<sup>37</sup> INTOSAI, [https://environmental-auditing.org/media/2949/4-eng11pwp\\_research-project\\_on\\_infrastructure.pdf](https://environmental-auditing.org/media/2949/4-eng11pwp_research-project_on_infrastructure.pdf)

types of infrastructure, high temperature extremes increase the risk of fires in industrial plants; low temperature extremes can cause the freezing and bursting of pipelines; heavy snowfall and rainfall can lead to the overflow and eventual breach of tailings management facilities).). For instance, natural (storms, pests) and human-induced disturbances (forest fires, infrastructure and tourism) are threats to pan-European forests. Climate change is also expected to trigger even more increased frequencies and intensities of natural disturbances such as the loss of permafrost and biodiversity loss due to forest fragmentation.<sup>38</sup> Increasing natural disasters, in the wake of climate change, can cause direct damage to infrastructure, as a result of natural-hazard triggered technological accidents (“Natech” events) – compound disasters with often unpredictable effects. The changing nature of risk thus needs to be better understood (e.g. through risk assessments) and managed (by government institutions and industry), in order to make all possible efforts to prevent disasters and mitigate their impacts. Therefore, infrastructure in the region should aim to be resilient, restorative, promote zero negative impact, and protect biodiversity, while applying circularity principles in the development cycle of infrastructure systems. Low carbon investments are critical in order to offset the risk of a rebound in carbon emissions after the pandemic.

### Social pressures

18. While infrastructure programmes are designed to target social requirements and deliver essential services, these sometimes do not end up achieving this. Quite the contrary, if infrastructure programmes and projects are not adequately planned and implemented to take into account social aspects, negative social pressures can be generated (e.g. displacement, unemployment, gender inequalities, etc.). For instance, the pandemic demonstrated how socio-demographic issues can affect infrastructure systems across various European regions. Aging populations, depopulation in remote, rural and/or border regions, and migration of economically productive people to cities are some of the main issues. Therefore, it is crucial to take into account these changes and perspectives of beneficiaries and key stakeholders right from the beginning, by conducting social impact assessments.<sup>39</sup> If more and better inclusive and sustainable infrastructure is designed taking into account public participation and stakeholder engagement process, the outcome can actually result in infrastructure projects that generates benefits for all citizens, especially those with lower incomes. Additionally, beyond direct economic benefits of infrastructure projects, the integration of social considerations in projects and programs can likewise serve to enhance human capital development, especially for the youth and labour force, while innovating for better services to the increasing aging population.<sup>40</sup>

### Economic pressures

19. Even before the pandemic, the world has faced an infrastructure investment gap amounting to a total of USD 15 trillion.<sup>41</sup> According to estimates from EIB, economic infrastructure investment needs for energy, transport, water and sanitation, and telecoms in EU countries are as much as EUR 688 billion per year. Additional estimates for social infrastructure suggest that the investment gap for health, education and social housing is at EUR 142 billion per year.<sup>42</sup> These figures highlight

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<sup>38</sup> European Environment Agency, <https://www.eea.europa.eu/publications/soer-2020>

<sup>39</sup> EU, <https://ec.europa.eu/futurium/en/system/files/ged/eprs-briefing-633160-demographic-trends-eu-regions-final.pdf>

<sup>40</sup> [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/658186/IPOL\\_BRI\(2020\)658186\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/658186/IPOL_BRI(2020)658186_EN.pdf)

<sup>41</sup> Global Infrastructure Hub, <https://outlook.gihub.org/>

<sup>42</sup> EIB, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/628245/EPRS\\_BRI\(2018\)628245\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/628245/EPRS_BRI(2018)628245_EN.pdf)

the fact that investments should be efficient, effective and sustainable, by offering circular and integrated solutions that have a positive impact on economic, environmental and social dimensions for all types of infrastructure sectors and systems. Besides investment requirements, infrastructure can have either positive or negative economic effects. According to the International Monetary Fund (IMF) for advanced economies, investing an extra 1% of GDP in infrastructure will yield, on average, a 1.5% increase in GDP within four year. In emerging economies this economic benefit can be even larger<sup>43</sup>

## I. Infrastructure and sustainability: Challenges and opportunities

### Key enablers of sustainable infrastructure

20. The development of sustainable infrastructure starts well before the definition of a given project or program. As such it is important to create an enabling environment that is conducive to the integration of sustainability practices in the decision-making process for infrastructure-related policies, plans and projects. As defined at the Sustainable Infrastructure Tool Navigator platform, “*Enabling Environment refers to the policy, regulatory, and institutional conditions that enable the integration of sustainability practices into infrastructure planning and development throughout the entire lifecycle. These conditions may differ depending on the context*”. Some specific aspects that are traditionally considered enablers of sustainable infrastructure include but are not limited to i) sound investment climate, ii) regulatory frameworks and rule of law, iii) adequate levels of technical and institutional capacity as well as iv) well-defined sustainability policies, and v) transparency, effective, safe and inclusive public participation.

21. All these considerations are necessary to ensure the right investment climate, technical conditions, and political willingness to deploy sustainability at scale.

### Infrastructure sectors and impact on sustainability

22. Globally, infrastructure construction and operation accounts for around 70% of all GHG emissions<sup>44</sup>. According to evidence from EEA, energy supply, industry and transport are the sectors that have had most impact on emissions during the past and current years in the European Union.<sup>45</sup> Economic infrastructure is also responsible for most of CO<sub>2</sub> emissions in other countries of the Euro zone and Central Asia, especially those related to electricity and heat production. Besides air pollution, infrastructure can cause environmental fragmentation, biodiversity loss, water and soil contamination, among others. For this reason, technology and innovation are critical in the region to achieve net zero emissions or low-carbon impacts on the energy systems, land-use, industry, among other economic activities associated with infrastructure development.<sup>46</sup> This is critical for environmental, economic, social

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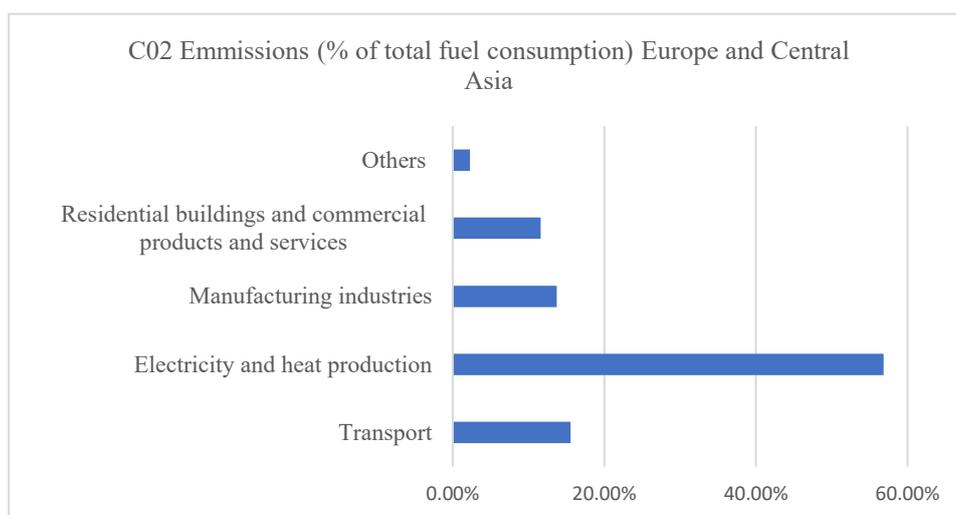
<sup>43</sup> IMF, (2014). World Economic Outlook, October 2014. USA: International Monetary Fund. Retrieved May 3, 2022, from <https://www.elibrary.imf.org/view/books/081/21398-9781498331555-en/21398-9781498331555-en-book.xml>

<sup>44</sup> The World Bank (2018). Low-Carbon Infrastructure Private Participation in Infrastructure (PPI) 2002 TO H1 2017. [https://ppi.worldbank.org/content/dam/PPI/documents/2017\\_Low\\_Carbon\\_Infrastructure\\_PPI.pdf](https://ppi.worldbank.org/content/dam/PPI/documents/2017_Low_Carbon_Infrastructure_PPI.pdf)

<sup>45</sup> EEA, <https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-aggregated-sector-5#tab-dashboard-02>

<sup>46</sup> <https://www.mckinsey.com/business-functions/sustainability/our-insights/how-the-european-union-could-achieve-net-zero-emissions-at-net-zero-cost>

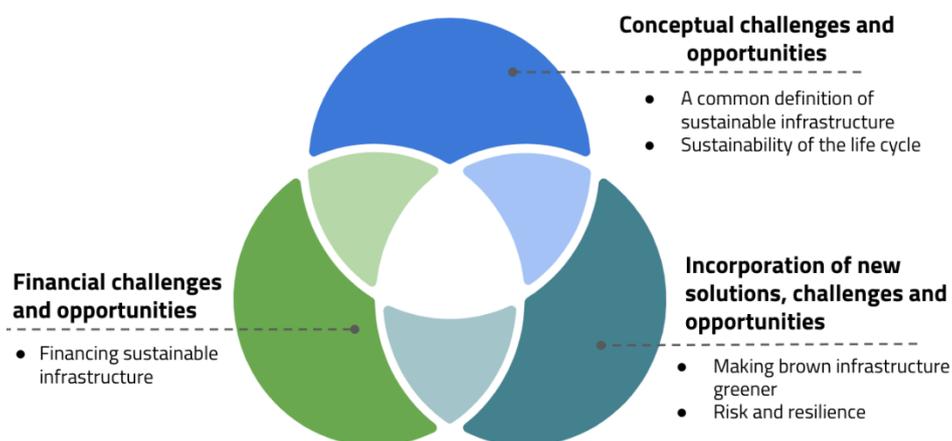
and financial sustainability and towards the achievement of the SDGs in the medium and long-term.<sup>47</sup>



**Figure 2: Emissions in Europe (excluding high-income countries) and Central Asia by Sector (Source World Bank 2014)**

### Challenges and opportunities in key factors for sustainable infrastructure

23. There are key factors that can mainstream sustainable infrastructure and help reduce the impact of different infrastructure sectors on the environment for the pan-European region. Accordingly, these factors face both challenges and opportunities to achieve a tangible impact (See Figure 3).



**Figure 3: Challenges and opportunities in key factors for sustainable infrastructure**

### A common definition for sustainable infrastructure criteria and indicators

24. A common definition for sustainable infrastructure and the definition of Indicators and measurement of data are critical for the success of the design and implementation of sustainable infrastructure in the pan-European region. This information is important for countries to be able to benchmark progress in the region, share good practices, compare projects and ultimately deploy sustainability at scale.

<sup>47</sup> UN, [https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/2015wess\\_ch5\\_en.pdf](https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/2015wess_ch5_en.pdf)

25. *Challenges*: Even though all countries in the region recognize the importance of GHG emission reduction, social inclusion, mobilization of financing and the need of a green transition, the information that exists at the moment is fragmented. One of the key reasons is the lack of a common definition for sustainable infrastructure. The harmonization of a common definition and ultimately the development of criteria and indicators is a challenging aspect for data analysis, since countries use different methodologies or impact indicators at the national, sectoral or even at the project level (e.g. small or large-scale city projects). Additionally, not all of the countries in the Pan-European region have the same amount of data, digitalization maturity, or the right governance structures to measure information, making the accountability process more difficult. Even if indicators already exist, what is missing is a common understanding of what is sustainable infrastructure, and the frameworks for measuring sustainability of infrastructure at the aggregate or portfolio level (e.g. measuring the sustainability of a country's overall infrastructure mix). Project level indicators and measurement frameworks cannot, for example, be used to effectively measure progress towards SDG target 9.1. In this context, there is also room for UNEP, UNECE, and other partners to work together to develop a framework for measuring sustainability of infrastructure at the systems-level, which would enable countries to do better strategic planning of sustainable infrastructure investments.

26. *Opportunities*: There is already a substantial number of existing principles, methodologies and indicators applicable at the national/sub-national level, programme/sector and project level. For example, the Multilateral Development Banks (MDBs) have issued a short list of 16 common indicators for infrastructure projects, by harmonizing and mapping existing approaches.<sup>48</sup> There are likewise indicators applicable at the city level. For instance, the EU has common indicators for cities or urban areas.<sup>49</sup> There are efforts at the country level as is the case of the Czech Republic with the recent publications of a methodology to support the development of Territorial Impact Assessment, to better understand and quantify the territorial impacts of a new development<sup>50</sup>. UNEP released in February 2021 the "International Good Practice Principles for Sustainable Infrastructure" which set out ten guiding principles that policymakers can follow to help integrate sustainability into infrastructure planning and delivery. They provide a framework for integrated approaches and systems-level interventions that governments can make to create an enabling environment for sustainable infrastructure.<sup>51</sup> There is an opportunity for UNEP and UNECE to collaborate with other UN agencies, the OECD, MDBs, the European Commission and other key organizations to apply existing methodologies and tools with the purpose of implementing UNEP's International Good Practice Principles for Sustainable Infrastructure. This exercise could include identifying or selecting key categories, indicators and measurement approaches at the system level, while supporting benchmark exercises in the pan-European region. This could facilitate regional harmonization, while aligning with the Pan-European Strategic Framework for greening the economy, and ultimately to the UN SDGs.<sup>52</sup>

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<sup>48</sup> The mapping exercise covers indicators from the Green, Resilient, Inclusive and Sustainable (GRIS) Indicators by the Asian Development Bank (ADB); the Infrastructure Indicators within the Compendium of Indicators developed by the European Bank for Reconstruction and Development (EBRD); The Sustainable Infrastructure Framework (SIF) developed by the Inter-American Development Bank (IDB); the Quality Infrastructure Indicators Framework (QII), by the International Finance Corporation (IFC); and the Aligned Set of Sustainability Indicators (ASSI) developed by the Public-Private Infrastructure Advisory Facility (PPIAF)., IDB, <https://publications.iadb.org/publications/english/document/MDB-Infrastructure-Cooperation-Platform-A-Common-Set-of-Aligned-Sustainable-Infrastructure-Indicators-SII.pdf>

<sup>49</sup> Eurostat, [https://ec.europa.eu/eurostat/cache/metadata/en/urb\\_esms.htm](https://ec.europa.eu/eurostat/cache/metadata/en/urb_esms.htm)

<sup>50</sup> Visit [www.tiammr.cz](http://www.tiammr.cz) for more information in this methodology (in Czech language only)

<sup>51</sup> UNEP, <https://www.unep.org/resources/publication/international-good-practice-principles-sustainable-infrastructure>

<sup>52</sup> Annex III provides an outline of the existing methodologies and principles aimed at measuring sustainable impact of infrastructure.

Additionally, digitalization agendas in pan-European countries could be as well an opportunity to improve management of data.

27. Due to the proliferation of different tools and frameworks for the quantification of sustainable infrastructure in the last years, an online platform called “Sustainable Infrastructure Tool Navigator<sup>53</sup>” was recently launched by GIZ in collaboration with UNEP. This platform helps users navigate the different existing tools to identify the ones that best fits their needs.

#### Sustainability of the infrastructure lifecycle

28. Good infrastructure management requires systematic and integrated planning, financing, prioritization, design, construction, maintenance, operation, and evaluation to sustain public infrastructure assets.<sup>54</sup> Sustainability principles, management and assessment strategies should be integrated in each of the phases of the infrastructure lifecycle.

29. *Challenges:* Infrastructure development is complex in nature. It requires a significant amount of resources and capacity, especially for large scale and long-term projects. Planning and selecting the right programmes and investments becomes a challenge if governments do not have i) the right capacity, ii) a long term development strategy or national infrastructure plan, iii) knowledge and resources to sustain infrastructure systems and iv) most importantly a monitoring plan in place that ensures performance in the long term.

30. *Opportunities:* Capacity building efforts in the pan-European region for each of the management and process phases of sustainable infrastructure development could support countries to effectively prepare and manage infrastructure programmes and projects either at a city level, municipal or federal levels. Case studies that showcase good practices and lessons learned at regional, national, subnational and project levels at the different development stages could support knowledge-sharing and replicability in these countries, especially in the context of the government commitments from the Batumi Environment for Europe (EfE) conference. A joint UNECE/UNEP publication on these cases could help exemplify the process, policy instruments and management approaches and technological solutions followed by both public and private stakeholders, following existing initiatives with OECD and UNEP. For instance, OECD is currently leading an upstream capacity building project in Central and Southeast Asia and it is envisaged to be implemented in cooperation with the Partnership for Action on the Green Economy (PAGE)<sup>55</sup> as appropriate in selected countries. This could be linked to UNEP and UNECE’s<sup>56</sup> work in the pan-European region.

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<sup>53</sup> This new initiative provides access to a comprehensive database of sustainable infrastructure tools that users can navigate by keyword or filter by types of tools, sectors, and infrastructure lifecycle phases, amongst other things. See link for more information: <https://sustainable-infrastructure-tools.org/>

<sup>54</sup> <https://www.rics.org/globalassets/rics-website/media/knowledge/research/insights/infrastructure-management-current-practices-and-future-trends-rics.pdf>

<sup>55</sup> PAGE, <https://www.un-page.org/>

<sup>56</sup> In 2017–2021, the UNECE secretariat to the Espoo Convention and its Protocol on Strategic Environmental Assessment has supported legislative reforms and/or capacity building for the effective implementation of the two treaties in Kazakhstan Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, in cooperation with the Organization for Security and Cooperation in Europe (OSCE) and funding from the European Union, Germany and Switzerland. See: <https://unece.org/central-asia>. Multilateral capacity-building activities under the Aarhus Convention and its Protocol on PRTRs strengthen expert capacity of Parties and other interested States to implement infrastructure-related policies, plans and projects through effective, safe and inclusive public participation.

## Financing sustainable infrastructure.

31. Financing infrastructure is a critical component, as it implies effective budgetary planning and management by both governments, the private sector and investors. Investments, resources and risks should be carefully evaluated, while following principles that prioritize sustainable outcomes.<sup>57</sup>

32. *Challenges:* The financing aspect of infrastructure is determinant for a government's development plan. Even if the public sector is responsible for the planning and prioritization of infrastructure investments, it requires into some extent complementary financing and innovation especially from the private sector. Public-private partnerships (PPPs) have been a mechanism in Europe to mainstream long-term financing models (e.g. Project Finance Initiative in the UK) for different types of infrastructure, following more sustainable or circular approaches (e.g. retrofit or technology upgrades). However, if PPPs are not correctly planned and executed, they can result in negative economic or fiscal consequences, since full fiscal implications of PPPs are sometimes overlooked in the short-term. The fiscal implications become clear once PPP-related payment obligation is conducted, affecting the budget during operation.<sup>58</sup> Additionally, financing by public entities has not been necessarily always prioritized for sustainable investments nor incentivized.

33. *Opportunities:* Governments have been collaborating with Multilateral Development Banks, UN Agencies and other financial institutions not only for financing access, but also for strategic guidance from legal, technical and governance angles throughout the entire infrastructure development cycle. Continuous collaborative work and agendas can enable smart investments and the opportunity to finance sustainable infrastructure initiatives that result in environmental, economic and social benefits. In addition, partnerships with the private sector should be channelled to finance projects for innovative business models<sup>59</sup>, technologies and solutions that enhance high quality performance for each sustainability dimensions. Stimulus packages for countries that promote sustainable infrastructure as part of their economic recovery plans could be a strategy to attract private financing, innovate and prioritize investments. For example, under the current EU stimulus package the Just Transition Mechanism provides targeted support to help mobilise at least EUR 65-75 billion over the period 2021-2027 for the transition to climate neutral economy in most affected regions. This includes mobilization of private sector investments.<sup>60</sup> The EU Taxonomy likewise serves as a standardized approach to assess sustainability of assets, and it is thereby an incentive for infrastructure investments to meet the challenges posed by Europe's transition to a greener and more resilient economy.<sup>61</sup> However, more can and should be done to promote investments in sustainable infrastructure by governments in the pan-European region, while avoiding carbon-intensive and resource-inefficient pathways. Economy-wide decarbonization and resource efficiency are essential to achieving the SDGs and meeting the Paris Agreement targets.

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<sup>57</sup> An international group of institutional investors developed "The Principles for Responsible Investment" by reflecting the increasing relevance of environmental, social and corporate governance issues to investment practices. The process was convened by the United Nations Secretary-General, <https://www.unpri.org/pri/what-are-the-principles-for-responsible-investment>

<sup>58</sup> World Bank, <https://blogs.worldbank.org/ppps/fiscal-risk-ppps-whats-problem-what-do>

<sup>59</sup> An example of an innovative business model in the health sector is the Managed Equipment Service model, where digital technologies, consulting, financing and management tools are delivered by the private sector over the long-term.

<sup>60</sup> European Union, [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism_en)

<sup>61</sup> Novethic, <https://www.novethic.com/sustainable-finance/isr-rse/greening-european-infrastructure-a-challenge-the-eu-taxonomy-is-not-prepared-to-meet-149436.html>

Making brown<sup>62</sup> infrastructure more sustainable and integrating grey<sup>63</sup> and green<sup>64</sup> infrastructure.<sup>65</sup>

34. A just sustainable transition of brown or grey infrastructure and deploying Nature-based Solutions (NbS) are both critical aspects of focus, especially due to climate change threats. Considering nature and NbS in infrastructure systems is more resource efficient, resulting in more resilient services, and the creation of positive externalities such as the creation of recreational areas. Focusing on effectively integrating both grey and green infrastructure to deliver essential services can help address the mitigation and adaptation need towards climate change, while addressing other different challenges such as biodiversity protection.

35. *Challenges.* Shifting away from traditional hard infrastructure towards solutions that work to adapt to natural conditions is a challenging task for governments. Brown or “unsustainable” infrastructure encompass projects that often damage or destroy natural habitats, and negatively impact biodiversity. It can also encompass sites where the expansion, redevelopment, or reuse may be difficult by the presence of a hazardous substance, pollutant or contaminant. Making brown infrastructure more sustainable comes with certain risks and responsibilities that may lead to increasing costs, new technology requirements, cross-sectoral linkages (e.g. clean energies required to green other sectors), among others.<sup>66</sup> Moreover, the complexity of natural systems makes the assessment of interactions between grey or “built” and green or NbS infrastructure more difficult. This can be time-consuming, costly in the beginning, requiring as well new skillsets. However, the efficiency gains of greening brown or grey infrastructure and deploying green infrastructure have a long-term positive impact, rather than relying on short-term economic benefits of built infrastructure practices followed in the past.

36. *Opportunities.* Sustainable infrastructure has gained momentum for governments, development agencies, and multilateral banks, among others. Policies and investments that aim at mainstreaming harmonized approaches for grey and green infrastructure assets, where nature-based solutions<sup>67</sup> are feasible can be advantageous for the transition of new and existing infrastructure. Furthermore, environmental benefits of developing sustainable projects in unsustainable sites include clean-up or containment to prevent exposure, thereby reducing the threat to human and ecological health. It can also help reduce the runoff of toxics into water bodies, leading to overall improvement of water quality. In general terms, when viable it is preferably better to develop in existing sites and preserve undeveloped land.<sup>68</sup> Even if more evidence of good practices is required, investments can be

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<sup>62</sup> For the purposes of this section brown refers to unsustainable infrastructure.

<sup>63</sup> For the purposes of this section “Grey” refers to “built” as opposed to “green” or “natural” infrastructure. “Grey” infrastructure could be considered to be more or less sustainable, based on its social, environmental, and economic impacts. UNEP, <https://www.unep.org/resources/publication/international-good-practice-principles-sustainable-infrastructure>

<sup>64</sup> Green is in this case referred to as “natural” infrastructure (since it is sometimes called ecological infrastructure, environmental infrastructure or green infrastructure) It refers to a strategically planned and managed network(s) of natural lands, such as forests and wetlands, working landscapes, and other open spaces that conserves or enhances ecosystem values and functions and provides associated benefits to human populations. UNEP, <https://www.unep.org/resources/publication/international-good-practice-principles-sustainable-infrastructure>

<sup>65</sup> World Bank, <https://openknowledge.worldbank.org/handle/10986/31430>

<sup>66</sup> Envision Sustainable Infrastructure Framework Guidance Manual

<sup>67</sup> Nature-based solutions are actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, while providing human well-being and biodiversity benefits. (Source: World Bank)

<sup>68</sup> Envision Sustainable Infrastructure Framework Guidance Manual

deployed towards pilot demonstration projects, and to foster knowledge, technologies and innovative engineering approaches that deliver environmental, economic and social benefits. Existing technology has proven to improve technical performance of cross-sector projects that follow a systemic approach, combining both grey and green infrastructure. For instance, some technologies can serve to meet environmental standards (e.g. water systems), while new technologies (e.g. Systems for Business Intelligence) can promote cost-effective data collection and improve the performance of monitoring and modelling tools. Governments should aim overall to increase adaptive and regenerative capacity, long-term viability, climate resilience, community participation and cost-effective investments with increased monetary values.

### Risks and resilience

37. A resilient infrastructure system is characterized to be as resource efficient as possible, following an inclusive and integrated systems approach. It is also a system which effectively manages the hazard posed by the infrastructure system itself and seeks to minimize related risks, such as those of critical infrastructure failure or industrial accidents for the population and the environment. This means the right collaboration between key stakeholders, where every project contributes to a resilient infrastructure system and a more resilient community as a whole.<sup>69</sup> For example, this implies preparing off-site contingency plans between industry operators, authorities and the surrounding, potentially affected population of the country of origin and any affected country.

38. *Challenges.* Establishing clear resilience goals and strategies is critical when developing infrastructure. However, challenges arise during their development. Resilience strategies could include vulnerability reduction, reduction of impacts or consequences to the potential threat or even no action if the risks are acceptable.<sup>70</sup> However, risk assessment and management are challenging without conducting the right risk evaluation of acute shocks (e.g. hurricanes, health epidemics) or chronic stressors (e.g. aging infrastructure, global warming). Climate change, the global pandemic, among other regional or local shocks or stressors are threatening infrastructure at the system level. Pan-European countries are facing the challenge to define resilience goals, strategies and the right evaluation approaches when designing or restoring infrastructure.

39. *Opportunities.* The benefits of increased resilience include avoided losses of life, health, assets, and/or operating time and their associated costs. Countries in the pan-European region should aim to increase resilience, life-cycle system performance, and the ability to withstand hazards while maximizing durability. Since governments themselves cannot bear all potential risks, cooperation with the private sector and the right instruments can support a faster and better recovery to build back better infrastructure. PPPs have been so far instruments for risk transfer, however risks should be assessed and managed effectively. In this regard, financial institutions developed the “Equator Principles” as a risk management framework to provide a standard for responsible risk decision-making when determining, assessing and managing environmental and social risks of infrastructure projects. Accordingly, these principles also converge with Multilateral Development Banks, Export Credit Agencies and the OECD.<sup>71</sup>

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<sup>69</sup> Envision Sustainable Infrastructure Framework Guidance Manual

<sup>70</sup> Envision Sustainable Infrastructure Framework Guidance Manual

<sup>71</sup> <https://equator-principles.com/about/>

## II. Practice and experience for sustainable infrastructure in the region

### Global policy actions for infrastructure that deliver the SDGs<sup>72</sup>

40. Global Agendas are increasingly targeting specific elements that are characteristic of sustainable infrastructure projects such as GHG emission reduction. In June 2021, the G7 agreed for a global action to build back better with strong focus on climate and the environment for a transition to Net Zero economies, by increasing energy efficiency, accelerating renewables, and promoting industrial and transport system decarbonization.<sup>73</sup>

41. The implementation of principles and tools are individually chosen by governments according to their own needs and possibilities. This leads unfortunately to a lack of consensus or more harmonized approaches, especially with regards to the implementation of recommendations and actions required. However, the Resolution 4/5 on Sustainable Infrastructure adopted at the Fourth United Nations Environment Assembly (UNEA 4) in March 2019, could function as a strategic mechanism for consensus in the Pan-European region, as it recognizes the important role of infrastructure to achieve the SDGs. Approximately 90% of the resolution's targets are influenced by infrastructure.<sup>74</sup>

42. UNEP has made progress on this resolution by collaborating with partners to host events and publish knowledge products relating to various aspects of sustainable infrastructure, including social inclusiveness, climate, biodiversity, resource efficiency infrastructure, sustainable public procurement, the role of the private sector, the integration of green and grey infrastructure, and sustainable infrastructure's role in a green post-COVID-19 recovery. UNEP has been also engaged in capacity building and country support by partnering with the World Conservation Monitoring Centre, the University of Oxford, among others. At a regional level, with financial support from the government of China, UNEP has developed three week-long regional capacity-building workshops for policymakers on sustainable infrastructure in Central Asia.<sup>75</sup>

43. Furthermore, the progress report on the implementation of the resolution 4/5 on sustainable infrastructure highlights recommendations to the Environment Assembly by recognizing the importance of sustainable infrastructure to “building back better” and a green post-COVID-19 recovery, and to consider how investments in social, economic and ecological infrastructure can support economic recovery. Additionally, it fosters the adoption of guidelines that together with associated policies and regulatory incentives promote compliance to the UNEA resolution 4/5 on sustainable infrastructure. This by including the development and strengthening of national and regional systems-level strategic approaches to infrastructure planning, and by promoting nature-based solutions as key components of such approaches.<sup>76</sup>

44. UN Agencies and other international organizations have made efforts to provide guidance on sustainable infrastructure development. Principles have followed existing practices and consultations from project practitioners and policy makers. Some key guidelines from selected organizations are listed as follows:

(a) UNECE: has also led several efforts in relation to sustainable infrastructure, including the support on implementing different resolutions across programmes.

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<sup>72</sup> Annex II outlines a list of global policy actions for infrastructure that delivers the SDGs

<sup>73</sup> G7, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/13/carbis-bay-g7-summit-communicue/>

<sup>74</sup> UNEP, <https://wedocs.unep.org/bitstream/handle/20.500.11822/28470/English.pdf?sequence=3&isAllowed=y>

<sup>75</sup> Progress in the implementation of resolution 4/5 on sustainable infrastructure, UNEP/EA.5/7, November 2020.

<sup>76</sup> Progress in the implementation of resolution 4/5 on sustainable infrastructure, UNEP/EA.5/7, November 2020.

Examples include Sustainable energy in the United Nations Economic Commission for Europe Region<sup>77</sup>, published in 2020, As well as the Housing and Land Management Unit (HLM) and its Working Party on Land Administration (WPLA) and the Real Estate Market Advisory Group (REM)<sup>78</sup>. This committee aims to promote adequate and climate- neutral housing; compact, inclusive, circular, resilient smart and sustainable cities; as well as transparent and efficient land use and property registration<sup>79</sup>.

(b) UNEP: As part of the implementation of the UNEA resolution 4/5 on sustainable infrastructure, UNEP released the “International Good Practice Principles for Sustainable Infrastructure” that include guidelines for integrated systems-level approaches to sustainable infrastructure planning, delivery and management. It is complemented by a report called “Integrated Approaches in Action: A Companion to the International Good Practice Principles for Sustainable Infrastructure” which includes a selection of cases on how environmental, social and economic sustainability must be integrated right across infrastructure policymaking at the systems-level. Both publications aim to inform the forthcoming wave of global infrastructure investment.<sup>80</sup> These guidelines are identified as the strategic framework for implementation in the pan-European region. At the cities level, UNEP has also developed the “Integrated Guidelines for Sustainable Neighbourhood Design”. The guidelines broaden the scope of urban planning and design to incorporate four core objectives: Making more efficient use of natural resources; accelerating climate plans and targeting climate neutral cities by 2050; and protecting biodiversity and the natural environment and making cities more resilient. Accordingly, these guidelines could be followed for urban planning.<sup>81</sup>

(b) Multilateral Development Banks (MDB): Since the 90’s when institutions such as the World Bank (WB) and the International Financial Corporation (IFC) among others, started developing safeguard policies and defining environmental and social requirements for due diligence purposes, the MDBs have been at the forefront of the sustainability agenda. This is also true during the last years with the definition of sustainable infrastructure frameworks that have served as reference for policy makers and financiers interested in integrating sustainable infrastructure practices in infrastructure projects and programs. Most recently the MDB Infrastructure Cooperation Platform (a coalition of different MDBs from around the world) has worked on the analysis and consolidation of the different approaches used by different MDBs. This work allows to enhance a common framework of indicators, applicable to governments around the world when developing sustainable infrastructure projects and thereby help mobilize public and private investment. The publication developed “MDB Infrastructure Cooperation Platform: A Common Set of Aligned Sustainable Infrastructure Indicators (SII)”<sup>82</sup> represents an initial step for a common language and consistency across the infrastructure project cycle. The indicators cover topics like environmental sustainability, climate change and resilience, social inclusion, institutional governance, among others.

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<sup>77</sup> UNECE, (2020), [https://unece.org/sites/default/files/2020-12/ECE\\_ENERGY\\_133\\_Add.1%20SE%20in%20ECE%20region\\_0.pdf](https://unece.org/sites/default/files/2020-12/ECE_ENERGY_133_Add.1%20SE%20in%20ECE%20region_0.pdf)

<sup>78</sup> UNECE, <https://unece.org/housing>

<sup>79</sup> Ibid.

<sup>80</sup> These publications were financed by the support of the Global Environment Facility, the Swiss Federal Office for the Environment, and the Partnership UNEP, <https://wedocs.unep.org/bitstream/handle/20.500.11822/34853/GPSI.pdf>

<sup>81</sup> UNEP, <https://www.neighbourhoodguidelines.org/why-guidelines>

<sup>82</sup> IDB, <https://publications.iadb.org/en/mdb-infrastructure-cooperation-platform-common-set-aligned-sustainable-infrastructure-indicators>

(c) OECD: The organization released both the G20 Principles for Quality Infrastructure Investment and Indicators, as well as a compendium with a unique set of existing integrated and multidisciplinary international good practices that policymakers and practitioners in both developed and developing economies can use on a voluntary basis. This compendium has more than 340 good practices and measures drawn from over 50 OECD standards and other guidance developed across more than 20 substantive committees and their subsidiary bodies in quality infrastructure.<sup>83</sup>

(d) The Global Infrastructure Hub: The Hub under the arm of the G20 has introduced the Inclusive Infrastructure and Social equity tool. It presents a practical evidence-based framework for practitioners to maximise the impact of infrastructure investment on reducing inequality and promoting shared prosperity. The framework is divided into six action areas with the relevant guidance, real-life examples and case studies.<sup>84</sup> Additionally, the Hub has commenced an initiative in response to the G20's priorities to examine the role that infrastructure can play in the transition to a circular economy. Discussion workshops and a circular economy roadmap are envisioned.<sup>85</sup>

### **Rating systems for sustainable infrastructure**

45. Both public and private organizations, among other finance institutions develop their own rating systems to measure the impact of projects on sustainability and resilience. In addition, other research organizations have as well-developed voluntary standards and certification schemes to rate the sustainable impact across the entire project cycle. Normally these ratings are conducted on a project basis and mostly for economic infrastructure following different methodologies. Even if there are sources of infrastructure analysis by countries and sectors, there is an absence of rating systems in place to assess indicators beyond the project level.

46. UNECE's People-first Infrastructure Evaluation and Rating System (PIERS). The methodology aims at scoring infrastructure projects against the SDGs and the UNECE's People-first Public-Private Partnership (PPP) criteria, integrating resilience, circularity and sustainability considerations. The methodology is currently in a testing phase and available online for self-assessments.<sup>86</sup> This rating system in particular could be a potential instrument for the pan-European region to assess infrastructure projects.

### **Measuring progress towards SDGs for harmonized approaches in the region**

47. Even if SDG 9 explicitly refers to building sustainable, inclusive and resilient infrastructure, its development has an impact across all the SDGs.<sup>87</sup>

48. The United Nations Office for Project Services (UNOPS) and the University of Oxford-led Infrastructure Transitions Research Consortium (ITRC) developed a tool called "SustainABLE" that integrates practical actions and examples of

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<sup>83</sup> OECD, <https://www.oecd.org/finance/OECD-compendium-of-policy-good-practices-for-quality-infrastructure-investment.pdf>

<sup>84</sup> The Global Infrastructure Hub, <https://inclusiveinfra.gihub.org/>

<sup>85</sup> The Global Infrastructure Hub, <https://www.gihub.org/infrastructure-and-the-circular-economy/>

<sup>86</sup> UNECE, <https://unece.org/ppp/piers>

<sup>87</sup> UNOPS, [https://content.unops.org/publications/The-critical-role-of-infrastructure-for-the-SDGs\\_EN.pdf?mtime=20190314130614&focal=none](https://content.unops.org/publications/The-critical-role-of-infrastructure-for-the-SDGs_EN.pdf?mtime=20190314130614&focal=none)

infrastructure projects that support the achievement of the different targets of the SDGs.<sup>88</sup>

49. A consultation report with evidence from the pan-European region on SDG 9, and its implications to other SDGs could be a way to showcase good practices and measure progress. Hybrid (or mixed) approaches, methodologies, and surveys with Member States could help retrieve both qualitative and quantitative information of the inputs, processes, and outputs already attained or required for sustainable infrastructure in the region, and the implications of outcomes and impacts of an integrated approach in infrastructure systems. This could be done by following UNEP’s International Good Practice Principles for Sustainable Infrastructure and considering other initiatives (e.g. the 10 Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP)), while mapping to SDG targets, similar to the “SustainABLE” example of UNOPS.

**Table1: Chart of potential information to be retrieved for consultation on inclusive and green infrastructure (only for exemplification purposes)**

Evidence Category	Definition <sup>89</sup>	Potential example UNECE context (SDG 9.1) <sup>90</sup>
Input	Measures the material and immaterial pre-conditions and resources - both human and financial - provided for an activity, projects, programmes or interventions.	<ul style="list-style-type: none"> <li>- Regional budget for green and inclusive infrastructure</li> <li>- National budget</li> <li>- Total budget (sum of regional and national budgets)</li> </ul>
Process	Measures the progress of processes or actions that use inputs and ways in which program services and goods are provided.	<ul style="list-style-type: none"> <li>- Political engagement and implementation mechanism for green and inclusive infrastructure</li> <li>- Policy work and commitments</li> <li>- Scope of finance: Regional/transboundary/national investments</li> <li>- Form of finance and type of support: Grants (number) / Financial instruments (number)</li> <li>- Projects supported (mega/large/small-scale) (number)</li> </ul>
Output	Measures the quantity, quality, and efficiency of production of goods or services as a result of an activity, project, programme or intervention	<ul style="list-style-type: none"> <li>- Physical output: Surface of rehabilitated land (square metres) by green infrastructure.</li> <li>- Intangible output (e.g. technology and knowledge transfer especially following inclusive approaches)</li> </ul>
Outcome	Measures the intermediate broader results achieved through the provision of outputs	<ul style="list-style-type: none"> <li>- Larger protected areas</li> <li>- Larger population served</li> </ul>
Impact	Measures the quality and quantity of long-term results generated as a result of achieving specific outcomes	<ul style="list-style-type: none"> <li>- Improved condition of biodiversity and sustainability of ecosystem services</li> <li>- Improved access to essential services</li> <li>- Improved economic development</li> </ul>

<sup>88</sup> UNOPS, <https://sustainable.unops.org/>

<sup>89</sup> Definitions retrieved from OECD’s theory of change on biodiversity, OECD, <https://www.oecd.org/environment/resources/biodiversity/report-the-post-2020-biodiversity-framework-targets-indicators-and-measurability-implications-at-global-and-national-level.pdf>

<sup>90</sup> Hypothetical examples following a similar approach to EU’s system of common indicators for European Regional Development Fund and Cohesion Fund Interventions after 2020, European Commission, [https://ec.europa.eu/regional\\_policy/sources/docgener/studies/pdf/indic\\_post2020/indic\\_post2020\\_p1\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/indic_post2020/indic_post2020_p1_en.pdf)

## National experiences for sustainable infrastructure and stimulus for COVID-19 recovery

50. Pan-European countries as part of the Environment for Europe (Efe) process commitments have introduced either programmes, plans or strategies to promote the green economy covering into some extent sustainable infrastructure projects (e.g. energy efficiency)<sup>91</sup>. Additionally, some governments have also introduced COVID-19 related recovery stimulus packages through fiscal policies to support companies (e.g. additional health spending, loan and wage subsidies); support individuals (e.g. pensioners, low-income households); and increase social benefits (e.g. unemployment insurance and public works). For instance, in Russia and Turkey the government supported vulnerable employers in hard-hit sectors like tourism.<sup>92</sup> Other stimulus packages cover monetary policies or temporary control measures for exports and prices. However, countries in the region should work towards long-term measures that enhance economic transformation while promoting sustainable infrastructure.

51. Recovery, Transformation and Resilience Plan (2021-2023) in Spain: The country as part of its COVID-19 recovery plan includes specific investments for sustainable infrastructure. A total of 37% of the plan's total budget will be invested in a fair ecological transition, including sustainable infrastructure and resilient ecosystems and nature-based solutions.<sup>93</sup>

52. OECD issued a policy paper with a compilation of COVID-19 policy responses and recommendations in greening the economies of Eastern Europe, the Caucasus and Central Asia. This is a substantial contribution for the regional lens required to build back better, identifying examples of exiting practices that could potentially have either positive or negative environmental consequences. It is highlighted that further work has to be conducted to expand the inventory of information and assess the impact of measures. Some of the recommendations include among others, maintaining and increasing commitments to fund green measures when possible; sharing good practices on effective greening of economic stimulus packages among the countries in the region and beyond; and ensuring social and economic resilience to future shocks, including impacts on climate change.<sup>94</sup>

**Table 2: OECD's examples on government responses to COVID-19 with positive and potentially negative environmental implications**

Country	Number of potential positive measures	Type of recovery policies with potential positive impact	Sectors that include recovery measures with mixed environmental consequences
Armenia	3	<ul style="list-style-type: none"> <li>Green elements in COVID-19 response and recovery plans</li> <li>Green support to MSMEs</li> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Energy, waste management

<sup>91</sup> UNECE CEP 24 Status Report January 2019

<sup>92</sup> EBRD Regional Economic Prospects, Covid-19 from Shock to Recovery. April 2020, <https://icsb.org/fromshocktorecovery/>

<sup>93</sup> Information provided by UNECE

<sup>94</sup> OECD, <https://www.oecd.org/coronavirus/policy-responses/covid-19-and-greening-the-economies-of-eastern-europe-the-caucasus-and-central-asia-40f4d34f/>

Country	Number of potential positive measures	Type of recovery policies with potential positive impact	Sectors that include recovery measures with mixed environmental consequences
Azerbaijan	2	<ul style="list-style-type: none"> <li>Acceleration of green elements of pre-existing national plans</li> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Air quality, energy, waste management
Belarus	2	<ul style="list-style-type: none"> <li>Acceleration of green elements of pre-existing national plans</li> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Energy, waste management
Kazakhstan	4	<ul style="list-style-type: none"> <li>Acceleration of green elements of pre-existing national plans</li> <li>Green elements in COVID-19 response and recovery plans</li> <li>Green support to MSMEs</li> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Energy, agriculture and waste management
Kyrgyzstan	3	<ul style="list-style-type: none"> <li>Green elements in COVID-19 response and recovery plans</li> <li>Acceleration of green elements of pre-existing national plan</li> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Air quality, waste management
Moldova	4	<ul style="list-style-type: none"> <li>Acceleration of green elements of pre-existing national plans</li> <li>Green elements in COVID-19 response and recovery plans</li> <li>Green support to MSMEs</li> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Energy
Tajikistan	2	<ul style="list-style-type: none"> <li>Green elements in COVID-19 response and recovery plans</li> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Energy
Turkmenistan	1	<ul style="list-style-type: none"> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	
Ukraine	1	<ul style="list-style-type: none"> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Waste management Water, sanitation and hygiene
Uzbekistan	2	<ul style="list-style-type: none"> <li>Acceleration of green elements of pre-existing national plans</li> <li>Green elements in international initiatives in support of COVID-19 response</li> </ul>	Agriculture Water, sanitation and hygiene

### III. Measuring sustainable infrastructure in the region

53. In alignment with the different references and existing work identified in this document, as well as the Assessment Paper “Greening the economy in the pan-European region: working towards sustainable infrastructure”, eight indicators have been suggested around four main sustainable infrastructure categories. These categories include i) Environmental sustainability and resilience, ii) Social sustainability, iii) Institutional sustainability and iv) Economic and financial sustainability.

54. For the identification of the suggested indicators a thorough analysis was conducted of seven frameworks, these include: (i) The Pan-European Strategic Framework, (ii) MDB Common Set of Aligned Sustainable Infrastructure

Indicators (SII), (iii) UNEP International Good Practice Principles for Sustainable Infrastructure, (iv) The G20 principles for Quality Infrastructure Investment, (v) Finance to Accelerate the Sustainable Transition-Infrastructure (Fast – Infra), and (vi) EU Taxonomy for Sustainable Activities. The definition of the indicators has been constraint by the information currently available in the different counties of the region. As such the indicators provided represent a first step in the quantification of sustainable infrastructure in the region rather than the end goal. These indicators are presented below.

**Table 3: Sustainable infrastructure indicators**

Indicator	Definition	Sub-indicator	Quantification criteria
<b>CATEGORY: ENVIRONMENTAL SUSTAINABILITY AND RESILIENCE</b>			
<b>1. Climate change adaptation and mitigation</b>	Infrastructure projects should reduce/avoid Greenhouse Gas emissions, be climate-resilient and integrate adaptation and mitigation strategies through the full cycle.	Sub-Indicator 1.1: GHG emission reduction.	*Total greenhouse gas emissions in the pan-European region (without land use, land-use change, and forestry) by subregion, million tons of CO2 equivalent (2014-2018)
<b>1. Climate change adaptation and mitigation</b> <b>2. Environmental conservation and biodiversity protection</b>	Infrastructure projects should reduce/avoid Greenhouse Gas emissions, be climate-resilient and integrate adaptation and mitigation strategies through the full cycle. Infrastructure projects should avoid negative impacts and/or restore biodiversity, and the environment while preserving ecosystems and ecosystem services during the entire life cycle.	Sub-Indicator 1.2: Disaster risk reduction strategies.	*Score of adoption and implementation of national Disaster Risk Reduction strategies in line with the Sendai Framework in the pan-European region (2018)
		Sub-Indicator 2.1: Biodiversity protection.	*Number of countries in the pan-European region that established national targets in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020 in their National Biodiversity Strategy and Action Plans.
<b>2. Environmental conservation and biodiversity protection</b> <b>3. Circular Economy</b>	Infrastructure projects should avoid negative impacts and/or restore biodiversity, and the environment while preserving ecosystems and ecosystem services during the entire life cycle. Infrastructure projects should be planned, designed, constructed, operated, and decommissioned considering the efficient use of resources as well as principles of circular economy (including repurpose, recycle, reduce, reuse, repair, refurbish, remanufacture)	Sub-Indicator 2.2: Ecosystem services protection	*Proportion of land that is degraded over total land area, 2015.
		Indicator 3: Circular Economy	*Recovery rate of construction and demolition waste in the European Union (2014-2018). *Recovery rate of construction and demolition waste in other pan-European countries (non-European Union)
<b>CATEGORY: SOCIAL SUSTAINABILITY</b>			
<b>4. Gender equality and empowerment</b>	Infrastructure projects should promote social inclusion, gender equality, and human rights protection by fostering economic empowerment and social mobility, and equal opportunities	Indicator 4.: Gender equality and empowerment	*Gender employment gap across the pan-European region (2020)

	for all.		
<b>5. Life-cycle cost accounting</b>	Infrastructure projects should consider the net economic and social returns as well as the real cost of economic activities and natural capital over the entire project life cycle (including during the maintenance and decommissioning, where appropriate), taking into consideration both positive and negative externalities and life-cycle cost accounting.	Indicator 5: Life-cycle cost accounting	*Sectors in which countries usually perform Cost-Benefit Analysis (2014)
<b>6. Access to basic services</b>	Infrastructure projects should improve physical and economic access to basic services (including drinking water, sanitation, electricity, and digital technology) ensuring healthier living conditions, and well-being.	Indicator 6: Access to basic services	*Percentage of population using basic drinking water services by location (2020) *Percentage of population using basic sanitation services by location (2020) *Percentage of population with access to electricity by location (2020) *Proportion of population covered by at least 2G, 3G and 4G mobile network across the pan-European region (2018)
<b>CATEGORY: INSTITUTIONAL SUSTAINABILITY</b>			
<b>7. Transparency and anticorruption</b>	Infrastructure development should be planned and designed, constructed, and operated in a transparent manner, so as to guarantee that relevant information is available and accessible to all stakeholders. Projects should have anti-corruption and anti-bribery management systems in place, for long-term monitoring.	Indicator 7: Transparency and anticorruption	*Score for the pan-European subregions in the Corruption Perceptions Index 2020 *European Union performance on the Corruption Perceptions Index during the period 2016 - 2020
<b>CATEGORY: ECONOMIC AND FINANCIAL SUSTAINABILITY</b>			
<b>8. Financial sustainability and innovative finances</b>	Infrastructure development should guarantee the financial sustainability of the assets through the full lifecycle. This will include mobilization of innovative sources of capital at scale.	Indicator 8: Sustainable investment	*Contribution to the international 100bn USD commitment on climate related expending (2014 - 2019)

55. One of the main trends identify across the different indicators, it is the lack of information regarding how infrastructure impact the achievement of those indicators either positively or negatively. For instance, there may be specific information about environmental degradation and biodiversity disruption, however, it is not clear to what extent those challenges may be associated with infrastructure development. A similar example can be identified in the social indicators. For instance, gender equality and empowerment, has been deemed as a topic of key relevance, and a key consideration in the global agenda, however limited

information exist regarding the role of women in the infrastructure sector, or how the access to quality infrastructure could help bridge the inequality gap. As such, more detailed information should be gathered in the different indicators identified and the impact that infrastructure development plays in achieving them.

#### **IV. The Future, and our place in it**

56. *Collective response.* The current trends, actions, methodologies and principles outlined in this document show how organizations and countries are responding to the new reality in infrastructure development and that it should now be designed, implemented and maintained with a holistic perspective. From regional and national perspectives, it has been shown how EU Institutions and countries are developing stimulus packages that support innovation, making sustainable infrastructure a driving force for the green economy, which can also be seen as a COVID-19 recovery strategy. While COVID-19 recovery considerations may be less relevant in the medium-term, the Ninth Environment for Europe Ministerial Conference (5-7<sup>th</sup> October 2022) should still indeed contemplate this aspect to recovery, and maintain a focus on how sustainable infrastructure will remain a useful tool to build back better from a pandemic or another economic crisis. In this context of collective response, UNECE and UNEP are two leading agencies that can collaborate with and support Member States in developing the right regulatory frameworks, upstream planning and collective actions that drive cooperation with other key stakeholders such as the private sector, financing institutions, investors, OECD, among others.

##### **Next Steps EfE Process**

57. *Seize the opportunity to discuss a roadmap of next steps during the follow-up discussion of the Fifth United Nations Assembly (UNEA-5.2, in February 2022).* The UNEA resolution 4/5 on sustainable infrastructure already encourages the promotion of UNEP's existing guidelines and good practices based on current UNEP's relevant initiatives.<sup>95</sup> In this context, UNEP's International Good Practice Principles for Sustainable Infrastructure are identified as the strategic instrument to promote the Pan-European Strategic Framework for greening the economy, as it provides the relevant guidance to address knowledge gaps on integrated approaches and systems-level interventions required for sustainable infrastructure. Applying these principles could help assess the current regional situation, enable policy actions, gather further good practices and explore the potential for the definition of common indicators. Therefore, it is recommended that governments define implementation measures of the principles with demonstration projects and monitoring actions, considering a pan-European regional approach.

58. *Collaborate with key stakeholders on stimulus approaches and capacity building efforts to develop sustainable infrastructure and promote sustainability of grey and brown infrastructure.* Sustainable infrastructure systems require knowledge, innovation, financing and collaborative efforts to foster the right technologies and development strategies and investments. Inter-agency cooperation namely UNOPS, UNEP, and UNECE together with OECD, and in consultation with other key stakeholders such as the World Bank, EIB, and EBRD could work on collaborative projects that build capacity to define the right strategies, inputs and interventions required to make a shift towards sustainable infrastructure. By building capacity, existing commitments, policy actions and good practices can be identified and monitored at either national, subnational or project levels. For instance, a partnership

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<sup>95</sup> The 10-Year Framework Programmes on Sustainable Consumption and Production Patterns, the Sustainable Buildings and Climate Initiative and the Sustainable Public Procurement Programme (SIP) are the main initiatives to be considered for the UNEA 4/5 Resolution on Sustainable Infrastructure.

between UNEP and OECD could be enhanced to support Pan-European countries in their efforts to promote system- level approaches in sustainable infrastructure. Additionally, UNEP, the UNECE Committee on Environmental Policy, UNECE's working group on EIA and SEA and UNECE's Pan-European Assessment team should keep collaborating to promote the right policy recommendations. Moreover, from a project perspective the ECE region could use UNECE's PIERS methodology on infrastructure projects deployed specifically with PPP models.

59. *Develop a compendium of use cases, commitments and good practices across the region.* The above-mentioned steps could be integrated into a publication to describe progress with a structure that provides guidance and builds capacity in the pan-European region. Assessments and direct consultations with countries are highly encouraged to retrieve both qualitative and quantitative evidence. This will facilitate greater data harmonization to improve transparency and provide guidance to governments on the right instruments to deploy sustainable infrastructure and make it a vehicle for development in existing commitments, or upcoming strategies towards a green economy. These cases should reflect actions in the value chain process of infrastructure systems, as well as good practices that other countries can use for reference purposes.

## V. Conclusions and the way forward

*A holistic approach to sustainability.*

60. Traditionally when referring to sustainability or green recovery, more often than not, the approach taken is limited to environmental and climate change considerations. However, an infrastructure project to be considered sustainable has to ensure that is not just environmentally sustainable (including climate change), but also socially, instructionally and economically as well. For instance, environmental and health impacts of economic development planning should be systematically assessed and addressed early on. Effective, safe and inclusive public participation in decision-making shall be ensured at all stages from the outset in the conception of the related projects, plans, programmes and policies.

*A systemic, inclusive and resilient approach is required for different types of infrastructure planning and management*

61. Infrastructure planning, management and maintenance should from now follow a systemic and inclusive approach for it to be resilient to increasing shocks and stresses. Climate change and the COVID-19 pandemic has demonstrated that the previous economic model is no longer feasible. This applies as well the way that infrastructure was developed in the past, due to unsustainable consumption paths. Transformational approaches in infrastructure should be a priority for governments in the region and no longer an aspirational vision.

*A full lifecycle approach to infrastructure development.*

62. Infrastructure assets are complex and interconnected systems that would be in place for many generations to come. As such it is important to define the institutional frameworks, and policies that ensure that sustainability will be incorporated in all the different steps of the process. This starts during the upstream phase with the strategic planning, and prisonization of investments and continues at the project level with project planning and design, procurements, financing, construction, operation and finally decommissioning

*Development of a common definition for sustainable infrastructure.*

63. As clearly defined in this paper, during the last decades significant amount of work has been published regarding the importance of sustainable infrastructure, and quantification criteria to measure progress. However, the existing work is fragmented, and lacks the understanding of the context where that definition will be applied. As such it is of key relevance to ensure that the pan European region develops a common definition of sustainable infrastructure ensuring that it suits their specific need and long-term vision.

*The way forward- Responses should be collaborative and collective to enhance transparency and support effective policies, instruments and strategies for the upcoming transformation*

64. The way forward for the pan-European region should be collective with common goals, targets and criteria for policy-making, performance monitoring and replicability of practices that best suits to domestic needs, while following and promoting the implementation of existing guidance as established in the UNEA resolution 4/5 on sustainable infrastructure, as well as long-standing relevant legal instruments. Moreover, the current technological developments and digital trends are an advantage for countries in the region for both existing and new infrastructure assets. Policies, incentives and financial instruments should be continuously channelled to promote sustainable solutions. To that end, the region should make efforts to retrieve data for the entire infrastructure lifecycle.

*Sustainable infrastructure should be at the core of green economy policies and commitments and should play a central role for COVID-19 stimulus recovery plans*

65. Based on the above findings, it is clear that sustainable infrastructure plays a central role for COVID-19 recovery, not only in the pan-European region, but also across all countries. Sustainable infrastructure should be recognized by countries as a development mechanism and must be at the core of green economy action plans, instead of focusing only on concrete sectors individually. Even if programmes and projects should indeed address local, subnational or national needs, by paying focused attention to concrete sectors for the provision of essential services, these should take into consideration the entire infrastructure systems, especially to manage increasing pressures and enhance resilience.

### Annex I: List of Action examples ECE Region and abroad

Action Initiatives	Description	Scope	Country
<b>Recovery, Transformation and Resilience Plan (2021-2023)</b>	Roadmap for the modernisation of the Spanish economy, for the recovery of economic growth and job creation, for a robust, inclusive and resilient economic rebuilding after the Covid-19 crisis, and to respond to the challenges of the coming decade. This Plan includes specific investments for sustainable infrastructure. In concrete, 37% of the plan's total budget will be invested in a fair ecological transition, including sustainable infrastructure and resilient ecosystems and nature-based solutions.	National Level- <i>COVID-19 Stimulus</i>	Spain
<b>National Strategy for Sustainable Infrastructure and Ecological Restoration (October 2020)</b>	<p>The strategy comprises eight goals, namely:</p> <ul style="list-style-type: none"> <li>i) Identification and delimitation of spatial network at different scales of National Sustainable Infrastructure;</li> <li>ii) Reduce the fragmentation of habitats and ecological connectivity;</li> <li>iii) Restoration of habitat and ecosystem to foster biodiversity conservation, connectivity and ecosystem service through implementation of natural based solutions;</li> <li>iv) Conserve and improve ecosystems services and development of green infrastructure at different levels;</li> <li>v) Improve resilience of those elements directly linked with sustainable infrastructure in order to foster mitigation and adaptation to climate change;</li> <li>vi) Ensure the coherence of sustainable infrastructure along the national territory: definition of a clear governance model that ensures the coordination between all administrative levels;</li> <li>vii) Mainstreaming the concept of sustainable infrastructure in all political sectors;</li> <li>viii) Ensure an adequate communication, education and participation of all levels of society on the development of sustainable green infrastructure.</li> </ul> <p>The strategy also highlights the need for the development of “innovative investment mechanisms”, naming some instruments that may promote public and private investment:</p> <ul style="list-style-type: none"> <li>i) Incentives to reward positive externalities generated by ecosystem services;</li> <li>ii) payment of ecosystem services coherent with the conservation and sustainable use of biodiversity;</li> <li>iii) Development of systems based on negotiable credit, such as banking nature (<a href="https://www.miteco.gob.es/en/biodiversidad/servicios/banco-datos-naturaleza/default.aspx">https://www.miteco.gob.es/en/biodiversidad/servicios/banco-datos-naturaleza/default.aspx</a>);</li> <li>iv) Compensation mechanisms related to biodiversity protection;</li> <li>v) Development of certification and labelling mechanisms to indicate the effect above biodiversity of some products</li> </ul>	National level <i>Sustainable Infrastructure Strategy</i>	Spain

<b>Croatian Action Plan for Green Public Procurement</b>	The Government of the Republic of Croatia adopted the National Action Plan for Green Public Procurement 2015-2017 to target 50% of procurement in green contracts by 2020. This including infrastructure services (telecommunications) The Ministry of Environment Energy also promoted the use of EU Label	National level green procurement- (CEP commitment action)	Croatia
<b>Action Plan for Green Economy promotion 2018-2020 Republic of Moldova</b>	Establishment and activities of an Inter-ministerial Working Group on Sustainable Development and Green Economy in 2017 (co-chaired by the Ministry of Economy and Infrastructure and Ministry of Agriculture, Regional Development and Environment) with the following results:  i) Process of Green Economy promotion in Moldova, development of the national objectives, elaboration of policy documents in the domain, monitoring of indicators and reporting.  ii) Development and approval of the Program on the promotion of Green Economy in the Republic of Moldova and of the Action Plan for its implementation for the years 2018-2020.  iii) Elaborated and published the National Report on Green Growth Indicators and developed and promoted the Law on Strategic Environmental Assessment in 2017.	National green economy strategies with indicators- (CEP commitment action)	Republic of Moldova
<b>The Infrastructure Investment and Jobs Act</b>	The government of the United States approved in 2021 approved what is known as the “Infrastructure bill” aiming at stimulating the economy in the US, create jobs and upgrade the current conditions of the infrastructure in the country. This policy that aims to provide 1,2 trillion of investment in the next years <sup>96</sup> . According to The White House estimates, this bill will add 1,5 million jobs per year for the next 10 years <sup>97</sup> .  Some of the areas to be covered in this bill include:  i) No more leak pipes ii) High-Speed Internet Access iii) Better Roads and Bridges iv) Investment in Public Transit v) Upgrade Airports and Ports vi) Investing in Passenger Rail vii) Network of Electric Vehicle Chargers viii) Upgrade Power infrastructure ix) Resilient Infrastructure x) Investing in Environmental Remediation.	National level. Greening the economy, job creation and infrastructure development and upgrade.	USA

<sup>96</sup> EY. [https://www.ey.com/en\\_us/infrastructure-investment-and-jobs-act?WT.mc\\_id=10816686&AA.tsrc=paidsearch&gclid=Cj0KCCQiAweaNBhDEARIsAJ5hwbfc7ZKKU42i45ENjkGAQUz\\_tOonj6lqcJ\\_uXIMQq4LNuY301CwZZQaAtGvEALw\\_wcB](https://www.ey.com/en_us/infrastructure-investment-and-jobs-act?WT.mc_id=10816686&AA.tsrc=paidsearch&gclid=Cj0KCCQiAweaNBhDEARIsAJ5hwbfc7ZKKU42i45ENjkGAQUz_tOonj6lqcJ_uXIMQq4LNuY301CwZZQaAtGvEALw_wcB)

<sup>97</sup> The White House. <https://www.whitehouse.gov/bipartisan-infrastructure-law/>

## Annex II Principles, Indicators and Rating examples

Principles and Indicators	Organization	Applicability	Description
MDB Infrastructure Cooperation Platform: A Common Set of Aligned Sustainable Infrastructure Indicators (SII) ( <a href="#">Link</a> )	Inter-American Development Bank/ Multilateral Development Banks	Global	MDB’s insights for an aligned set of sustainable infrastructure indicators to mobilize both public and private sustainable investments and how key public and private players can incorporate/monitor them at various stages.
European Commission Indicators for Sustainable Cities ( <a href="#">Link</a> )	European Commission	EU/Global	The document comprises a set of existing instruments and tools of indicators for cities globally and in Europe.
UNECE’s Guiding Principles on People-first Public-Private Partnerships PPPs ( <a href="#">Link</a> )	UNECE	ECE Region/Global	The principles outline how PPPs should be “People-first” to meet the UN SDGs. The principles introduce five outcome-based criteria and they are complemented by an evaluation methodology.
The development and use of biodiversity indicators in business: an overview ( <a href="#">Link</a> )	IUCN	Global	The paper introduces an overarching process, acknowledging a full spectrum of business applications to help businesses use existing indicators or embark in developing new ones for biodiversity performance.
What is Sustainable Infrastructure? A Framework to Guide Sustainability Across the Project Cycle ( <a href="#">Link</a> )	Inter-American Development Bank	Americas/ Global	The document presents a framework for both public and private sectors to support planning, designing, and financing of infrastructure that is economically, financially, socially, environmentally, and institutionally sustainable, covering four main principles and 60 criteria.
Benchmarking Infrastructure Development 2020“ ( <a href="#">Link</a> )	World Bank	Global	The report assesses the regulatory quality of large infrastructure projects through both Public Private Partnerships (PPPs) and Traditional Public Investments (TPIs) in 140 and 40 economies respectively. The corresponding online platform highlights the key findings resulting from the data, organized around the infrastructure project cycle phases.
Swedish Four-Step Principle( <a href="#">Link</a> )	Swedish Transport Agency	Sweden	The Swedish Transport Agency has a four-step principle that might be of interest here (Re-think, Optimize, Re-build, and Build new). It is meant to ensure a sound resource management and contribute to a sustainable societal development

Other Rating systems at the Project level:

CEEQUAL is a sustainability assessment tool for both infrastructure projects and contracts. It offers five holistic assessment types, before construction or for the project as a whole. It targets the UK and Ireland, among other international projects.<sup>98</sup>

The voluntary standard SuRe introduced by Global Infrastructure Basel is globally applicable to infrastructure projects across different sectors and relies on independent verification and certification by third parties. A total of 175 Projects with a total of USD 52billion Capex in 47 countries have been already assessed with this methodology.<sup>99</sup>

ENVISION rating system. The Institute for Sustainable Infrastructure assesses sustainability and resilience of infrastructure projects awarding them verification levels. It has applied a holistic methodology of 64 criteria for 100 projects on its vast majority in North American projects, and Italy in Europe, collectively worth more than USD 106 billion.<sup>100</sup>

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<sup>98</sup> CEEQUAL, <https://www.ccequal.com/methodology/>

<sup>99</sup> Global Infrastructure Basel (GIB), <https://sure-standard.org/>

<sup>100</sup> Institute for Sustainable Infrastructure (ISI), <https://sustainableinfrastructure.org/wp-content/uploads/2021/03/Final-Envision-3-17-21-1.pdf>

### Annex III: Sustainable Infrastructure practices

Project	Scope	Main Impact
<p>Combining Green and Grey Infrastructure for Flood Risk Management at the River Basin Scale<sup>101</sup></p> <p>Odra and Vistula Basins</p> <p>Country: Poland</p>	<p>Odra and the Upper Vistula Rivers cover 54 percent of Polish territory cumulatively, leaving much of the country vulnerable to frequent and large floods experienced in these river basins.</p> <p>The scope covers two projects financed World Bank, Council of Europe Development Bank (CEB), European Union/European Commission, and the Government of Poland for a total of \$1.8 billion. The projects follow a systems approach combining grey and green infrastructure encompassing:</p> <p>Construction of dry polders to enhance flood retention capacity and mitigate peak flooding upstream;</p> <p>Opening space for the river, the modification of bridges, and the elevation of some areas, rather than the construction of embankments along river banks;</p> <p>Revitalizing urban riverfronts, constructing parks and walking paths along riverbanks to enhance urban green space and recreational use</p>	<p>Resettlement of two villages in Poland by:</p> <ul style="list-style-type: none"> <li>• Empowering the local authorities to lead the resettlement process, establishing a community committee with the involvement of local leaders, conducting a proper consultation process of the Resettlement Action Plan, and assisting landowners on an individual basis with free advisory services on their compensation package</li> <li>• Resettling 202 affected households and establishing a new village equipped with relevant municipal infrastructure.</li> <li>• The floodways system will safely pass a flow of 3,100 cubic meters/second (m<sup>3</sup>/s)</li> <li>• Securing flood safety in Polish economic centers and protect the lives of the 15 million people inhabiting the many cities, towns, and villages in the Upper, Middle, and Lower Odra River Valley and the Upper Vistula Basin</li> </ul>

<sup>101</sup> World Bank and World Resources Institute, Integrating Green and Grey: Creating Next Generation Infrastructure