IMPLEMENTATION OF THE GLOBAL GATEWAY STRATEGY THROUGH THE NEW EU CIRCULAR ECONOMY RESOURCE CENTRE

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Abstract
Circular economy is a crucial component within European Green Deal strategy that is continuously emphasized in various policies. Parallel to this, the management technologies on economic circularity related to standardization and digitalization takes on significance. Important to note that a new initiative on the establishment of a EU Circular Economy Resource Center is in process. The initiative prioritizes knowledge, policy-making, and business features as part of the circular economy ecosystem that is necessary to study. In this context, the EU enlargement and integration policy (such as The Global Gateway) refers to these priorities; that means the circular economy can be considered as a research object within the implementation of the Global Gateway and the development of the Circular Economy Resource Center.

The paper investigates the circular economy management ecosystem in the framework of the knowledge-driven, sustainability-oriented, and technology-based policy-making. Green deal, circularity approaches and bio-economy that are important components of EU policies are discussed within EU Circular Economy Resource Centre. In the paper, the policy interoperability with non-EU countries, which are interconnected with EU through strong documentary base, are considered. Integration of partners from geographical large areas like Neighborhood countries, Asia, Africa and Latin America through EU circular economy know-how, is a completely new policy that targeted networking rather than dependence. In this paper the peculiarities of this approach also is considered as a soft policy that brings common benefit.

The achievement of this interdisciplinary research is related to conceptualization of field-related policy documents, regulations, and cross-border cooperation in the circular economy

within sustainable development. In general, local initiatives contributing global tendences on sustainability through circular technologies is the main conclusion of the research.

Key words: *The Global Gateway, circular economy, green deal, bio-economy, technology*

Introduction

The Directorate-General for International Partnerships (DG INTPA), - which is responsible for formulating the EU's international partnership and development policy, with the ultimate goal to reduce poverty, ensure sustainable development, and promote democracy, human rights, and the rule of law across the world, - established the EU Circular Economy Resource Center (hereafter: CER Center) in 2024. The establishment of the CER Center under the Global Gateway strategy will facilitate peer-to-peer exchanges and partnerships between EU and third-country stakeholders, fostering the uptake of sound circular economy policies and business models worldwide. Additionally, the CER Center's activities align with the objectives of the Circular Economy Action Plan (CEAP) which aims to reduce consumption footprints and double Europe's circular material use rate within the next decade, in line with the goals of the European Green Deal. The aim of this paper is to explore the matching activities between the Global Gateway and the CER Centre, considering the European Green Deal and the New Circular Economy Action Plan.

The bio-economy and digital monitoring are another important directions of circularity and green agenda that are discussed in the study as a part of the CER Center's activity deriving from the Global Gateway implementation principles and priorities. Interdisciplinary specification of bio-economy related to energy, food, agriculture, forestry, and other sectors, as well as digitalization agenda for monitoring, are core components of the research promoting activities with the EU partner countries.

Waste electrical and electronic equipment (WEEE) is one of the fastest growing waste streams in the Union, currently growing by 2 % per year, resulting in severe risk for both human health and the environment, if not properly treated. Circular models such as reuse, repair or remanufacturing of small consumer electronics, as well as recycling the precious and critical raw materials contained in them, therefore contribute to waste prevention by reintroducing products, components, and secondary raw materials into the economy. Applying circularity principles to the entire lifecycle and extending longevity of small consumer electronics can therefore lead to significant benefits in terms of resource efficiency, decarbonization, and depollution, and in supporting a market for secondary raw materials. The Communication from the Commission of 2019 related to the European Green Deal highlights that the transition to a circular economy must focus on resource-intensive sectors such as the electronics sector.

Among the relevant actions proposed, was an assessment of the benefits of supporting take-back schemes to incentivize the return of unwanted devices, such as mobile phones, tablets and chargers (EU Recommendation 2023/2585). This is further detailed in the Commission Communication of 2020 on Circular Economy Action Plan, which calls for improving the collection and treatment of WEEE including by exploring options for take-back schemes to return used and waste mobile phones, tablets, and chargers.

The Directive 2012/19/EU on WEEE lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste from electrical and electronic equipment (WEEE) and by reducing overall impacts of resource use and improving the efficiency of such use (EU Directive 2012/19/EU on WEEE).

It is also necessary to update Union law on the management of waste batteries and to take measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste, by reducing the impact of resource use and by improving resource efficiency. Such measures are crucial for the transition to a circular and climate-neutral economy and toxic-free environment, and for the Union's long-term competitiveness and strategic autonomy. They can create important economic opportunities, increasing synergies between the circular economy and energy, climate, transport, industry and research policies, and protecting the environment and reducing greenhouse gas emissions (EU Regulation 2023/1542).

In general, the study concentrates on the CER Centre's activity derived by the Global Gateway logic within green deal, circular economy action plan, and bio-economy. However, there is a future research topic in this framework that is related to WEEE.

Key Objectives of the Global Gateway that Align with the Green Deal

The Global Gateway is an EU initiative designed to enhance global partnerships and drive sustainable investments, particularly in areas such as infrastructure, technology, and climate action. Key objectives of the Global Gateway that align with the Green Deal include:

- **Promoting green infrastructure and technology**: This includes supporting renewable energy projects, sustainable transportation, and digital technologies that reduce environmental impact. The Green Deal focuses on ensuring that all new infrastructure supports sustainability.
- **Climate resilience**: The Global Gateway aims to support developing countries in becoming more climate-resilient, particularly through green technologies, climate-smart agriculture, and infrastructure improvements aligned with the Green Deal's goal to reduce carbon emissions.
- **Sustainable development**: The initiative emphasizes investing in projects that meet the social, environmental, and economic needs of the Global South, ensuring projects are aligned with environmental sustainability goals.
- **Decarbonizing economies**: The Global Gateway focuses on initiatives that support a transition to cleaner energy, reduction of greenhouse gas emissions, and decarbonization of industries, which is central to the EU Green Deal's objectives for a climate-neutral economy by 2050.

All the above-mentioned components are related to the CER Center's Circular Economy Labs, in particular, the Promoting green infrastructure and technology can be considered within Business Lab, Climate resilience and sustainable development within Knowledge Lab, and Decarbonizing economies within Policy Lab.

The other focus of the study is to highlight the assessment of the environmental, social, and economic impacts of the Global Gateway that could be emphasized in the framework of CER Center. Exploring the documentary base such as regulations, directives, and policy papers, there is outlined the main directions of impact of the Global Gateway initiative:

- **Environmental Impact Assessment (EIA):** This process helps evaluate the potential environmental consequences of the projects funded under the Global Gateway, ensuring that they align with the EU's green policies, such as minimizing biodiversity loss, reducing emissions, and supporting circular economies.
- **Social Impact Assessment (SIA)**: This includes understanding how projects affect local communities, including issues like access to clean energy, job creation, and human rights. The focus is on social inclusivity and the improvement of livelihoods.

- **Economic Impact Analysis**: This can be measured by assessing the economic benefits of investments, such as job creation, infrastructure development, and economic growth, alongside long-term impacts such as the fostering of green industries and sustainable trade partnerships.
- **Monitoring and evaluation**: Ongoing tracking of each project's social, economic, and environmental outcomes is necessary for adaptive management and ensuring alignment with the Green Deal.

These directions are a profound base on bioeconomy that can be considered as a target for the CER Center's activity. Being a combination model of economy including biodiversity, sustainable development and circularity, bioeconomy can be a driver of the CER Centre.

There are defined also the Global Gateway implementation strategies and challenges in this study. The strategies are discussed as follows.

- **Partnership with local governments and stakeholders**: Ensuring the active involvement of local governments, NGOs, businesses, and communities is essential for success. This also includes aligning with local regulatory frameworks and needs.
- **Sustainability-focused investments**: Encouraging investments that prioritize long-term sustainability, which includes environmental protection, social equity, and economic benefits. The EU aims to create a green investment pipeline that follows the EU's green taxonomy and standards.
- **Technology transfer and capacity building**: Supporting countries with the necessary technology and expertise to implement the Green Deal objectives, focusing on renewable energy, energy efficiency, and digital infrastructure.
- **Funding mechanisms**: Mobilizing public and private sector funds, including innovative financing mechanisms such as green bonds, to support large-scale infrastructure and development projects.

Following to these, challenges are considered:

- **Political and economic instability**: In some regions, political and economic uncertainties can hinder the successful implementation of the Global Gateway projects.
- **Access to financing**: Despite the EU's commitment, obtaining sufficient financing, especially for low-income countries or projects with high initial costs, remains a challenge.
- **Geopolitical risks**: Global competition and tensions, such as those between the EU and China, can create risks in establishing effective partnerships and maintaining momentum on green investments.
- **Monitoring and transparency**: Ensuring that environmental and social standards are adhered to and that projects are regularly monitored is crucial. There can be challenges related to transparency in some regions, especially in countries with weak governance structures.

The CER Center should consolidate resources to mitigate the challenges. Important to note that the Belt and Road Initiative, as another worldwide project, focuses on solutions that ignore the mentioned challenges and promote project activities in an even unstable, risky, and not transparent environment.

Analysis of the New Circular Economy Action Plan in the Context of the Global Gateway Implementation

According to the CER Center's initiative, the objectives of the New Circular Economy Action Plan (NCEAP) is prioritized. This is a factor for NCEAPas a cornerstone of the European Green Deal, driving the transition to a resource-efficient and climate-neutral economy (European Commission, 2020). In the context of the Global Gateway, - the European Union's

strategy for global infrastructure and connectivity, - the NCEAP enhances sustainability by embedding circular economy principles into international partnerships and investments (European Commission, 2021). These efforts align with the Global Gateway's objective to address global challenges such as climate change, environmental degradation, and resource scarcity, which are integral to achieving the United Nations Sustainable Development Goals (SDGs).

The NCEAP promotes sustainability by emphasizing systemic changes in production and consumption patterns. It provides a framework for reducing waste, enhancing resource efficiency, and fostering innovation in sustainable practices. By prioritizing circular economy principles, the NCEAP supports the Global Gateway's aim to develop sustainable infrastructure and foster inclusive growth in partner countries. For instance, the plan's focus on creating a well-functioning market for secondary raw materials facilitates the decoupling of economic growth from resource use, addressing one of the critical pillars of sustainable development outlined in the Global Gateway (European Commission, 2020).

The NCEAP's emphasis on digital tools further supports the Global Gateway. Digital solutions enable better resource management, enhanced monitoring of environmental impacts, and improved efficiency in infrastructure development. For example, the deployment of Digital Product Passports, - a concept highlighted in the NCEAP, - can aid in ensuring transparency and traceability of materials, a critical aspect of sustainable supply chains in the Global Gateway projects. Such innovations enhance accountability and help ensure that international investments meet stringent environmental standards (European Commission, 2020).

Although there are positive alignments between the CER Center's activity and NCEAP in the framework of the Global Gateway, however detailed discussions on opportunities and challenges in integrating circular economy principles are studied. The opportunities are discussed through the following aspects.

Resource Efficiency and Cost Savings: Incorporating circular economy principles can reduce resource consumption and waste. Circular infrastructure has the potential to mitigate climate change and address resource scarcity by adopting the 6R principles: refuse, reduce, reuse, repair, refurbish, and recycle. This approach can lead to cost savings and long-term sustainability in infrastructure projects, enhancing their economic viability (Global Infrastructure Hub, 2023).

Innovation and Job Creation: Circular economy projects foster innovation in recycling technologies, material science, and design processes. These advancements can lead to new business models, such as product-as-a-service and extended producer responsibility, creating jobs in emerging sectors and stimulating local economies in partner countries (European Commission, 2020).

Climate Action Alignment: Circular economy practices, such as reducing embodied carbon in infrastructure materials and improving waste management systems, directly contribute to the Paris Agreement goals. By integrating these practices, the Global Gateway can enhance its credibility as a global leader in climate action (European Commission, 2019).

Partnerships and Capacity Building: The NCEAP promotes international cooperation, offering opportunities for knowledge transfer and capacity building in partner countries. Initiatives like Horizon Europe can support research and innovation partnerships, ensuring the adoption of best practices tailored to local needs (European Commission, 2018).

The study shows that there are challenges also in NCEAP and the Global Gateway interoperability that should be considered within the architecture of the CER Center.

Policy and Regulatory Gaps: Implementing circular economy principles requires robust regulatory frameworks, which may be lacking in some partner countries. Harmonizing standards and regulations across regions poses significant challenges, particularly in areas like

waste management, secondary raw material markets, and eco-design (European Commission, 2020).

Financial Barriers: Transitioning to a circular economy demands significant upfront investments in infrastructure, technology, and capacity building. Securing these funds, especially in developing regions, remains a challenge despite the Global Gateway's commitment to mobilizing €300 billion by 2027 (European Commission, 2021).

Cultural and Behavioral Shifts: Achieving circularity requires changes in consumer behavior and business practices, which can be slow and resistant to change. Public awareness campaigns and stakeholder engagement will be critical to overcoming these barriers (European Commission, 2021).

Data and Measurement Challenges: Effective implementation of circular economy principles requires reliable data on material flows, waste generation, and environmental impacts. Developing standardized metrics and ensuring data availability are ongoing challenges (Global Infrastructure Hub, 2023).

The NCEAP provides a comprehensive strategy for embedding circular practices globally, which can be effectively leveraged through the Global Gateway's infrastructure and development initiatives. The following components are discussed as supporting the transition to circular practices in partner countries.

Technical Assistance and Capacity Building: The NCEAP's emphasis on research and innovation can guide capacity-building efforts in partner countries. Programs like Horizon Europe and Team Europe initiatives can provide technical assistance, training, and funding to local stakeholders, enabling them to adopt circular practices in areas such as waste management, eco-design, and sustainable production (European Commission, 2018).

Policy Dialogue and Knowledge Sharing: The Global Gateway can facilitate policy dialogues that promote circular economy principles, using the NCEAP as a model. These discussions can help partner countries develop tailored strategies and policies that align with their unique socio-economic contexts. Knowledge-sharing platforms can disseminate best practices, success stories, and technical expertise (European Commission, 2021).

Financing Mechanisms: To address financial barriers, the NCEAP can integrate innovative financing mechanisms into the Global Gateway's investment strategy. Blending grants, loans, and guarantees can de-risk investments in circular economy projects. Public-private partnerships can further mobilize resources and drive innovation (European Commission, 2021).

Focus on Priority Sectors: The NCEAP's sector-specific approach—targeting key value chains such as electronics, plastics, textiles, and construction—can be mirrored in Global Gateway initiatives. For example, promoting sustainable building materials and designs in infrastructure projects can reduce resource consumption and embodied carbon (European Commission, 2020).

Digital Transformation: Digital technologies play a crucial role in enabling circularity. The NCEAP's focus on digital tools, such as the Digital Product Passport, can enhance transparency, track resource flows, and optimize supply chains. These tools can be integrated into Global Gateway projects to ensure accountability and efficiency (Global Infrastructure Hub, 2023).

Monitoring and Evaluation: Establishing robust monitoring and evaluation systems is essential for tracking progress and ensuring the effectiveness of circular economy initiatives. The NCEAP's proposed metrics can be adapted for use in partner countries, enabling continuous improvement and alignment with global sustainability standards (European Commission, 2020).

Based on the examinations, the New Circular Economy Action Plan and the Global Gateway are complementary frameworks that can collectively advance global sustainability

goals. By aligning their strategies and leveraging their respective strengths, the EU can foster transformative change in partner countries. The NCEAP's emphasis on innovation, capacity building, and systemic change provides a robust foundation for integrating circular economy principles into the Global Gateway's initiatives. However, addressing challenges such as policy gaps, financial constraints, and behavioral inertia will require concerted efforts and sustained collaboration among all stakeholders. Together, these frameworks have the potential to create resilient, inclusive, and sustainable economies worldwide.

Analysis of the Sustainable bio-economy for Europe in the context of the Global Gateway implementation: How does the Sustainable Bio-Economy for Europe align with the goals of the Global Gateway?

The Sustainable Bio-Economy for Europe aligns closely with the goals of the Global Gateway through its emphasis on sustainable development, global cooperation, and innovation. The European bioeconomy, with an annual turnover of €2 trillion and employing 18 million people, already contributes significantly to the EU's economic and environmental goals. The bioeconomy includes agriculture, forestry, fisheries, bio-based industries, and energy, which are important in order to achieve climate neutrality by 2050 under the European Green Deal. These objectives are positioned in the Global Gateway's focus on supporting inclusive growth, improving global connectivity, and promoting sustainability.

One of the most striking alignments is in job creation and socio-economic development. The bioeconomy has the potential to create 1 million new green jobs by 2030, specifically in rural and coastal areas, where economic opportunities are often limited. For example, the establishment of a single biorefinery can generate approximately 4,000 jobs over four years. This capacity to create employment directly supports the Global Gateway's aim to improve economic stability and reduce inequalities in partner regions.

The Global Gateway's objective to support infrastructure and innovation is also closely tied to the bioeconomy. The EU has allocated €10 billion under Horizon Europe (2021–2027) for research and innovation in food systems, natural resources, and the bioeconomy. This funding is important to scale up technologies like biorefineries, algae farming for renewable biomass, and bio-based materials such as biodegradable plastics. For instance, algae farming not only offers a renewable source of biomass but also contributes to carbon sequestration, reducing greenhouse gas emissions by up to 2.1 tons of CO_2 per ton of wood used in construction instead of concrete. Such improvements can be transferred to partner regions under the Global Gateway framework, in order to support not only innovation but sustainability as well.

Another important alignment is seen in the emphasis on resource efficiency and climate action. The EU bioeconomy supports the reduction of dependency on fossil fuels and encourages the use of bioenergy, which currently accounts for more than 50% of renewable energy production in the EU. Sustainable bioenergy, along with bio-based products, helps mitigate climate change while promoting resource efficiency. This directly supports the Global Gateway's ambition to combat climate change through sustainable energy transitions in partner countries.

The bioeconomy also supports the Global Gateway's goal of improving global cooperation by building sustainability-oriented trade relations. Approximately one-third of the biomass input to the EU bioeconomy is imported from non-EU countries. This highlights the interconnectedness of the bioeconomy with global markets. The Global Gateway can use this trade relationship to promote sustainable practices and strengthen global value chains in bio-based industries.

Moreover, the bioeconomy's contribution to circularity aligns with the Global Gateway's focus on sustainable economic models. Circular bioeconomy practices, such as transforming

agri-food waste into biodegradable plastics or fertilizers, save costs and reduce environmental impacts. For instance, avoiding food waste in the EU could save up to €143 billion annually, a model that could be extended to partner regions through Global Gateway initiatives.

The environmental restoration aspect of the bioeconomy also reflects the Global Gateway's emphasis on resilience. The bioeconomy contributes to ecosystem restoration, such as reducing ocean plastic pollution by up to 90% by 2025 through bio-based alternatives. It also aligns with the EU's target of restoring 15% of degraded ecosystems, a priority that can be shared with Global Gateway partners to address global environmental challenges.

In this study, the opportunities, as well as risks and challenges for promoting bio-economy principles in Global Gateway projects are subject of examination that is conceptualised through the following context. The key opportunities are seen as:

Scaling bio-based industries for economic and environmental benefits: The bioeconomy sector in the EU generates an annual turnover of approximately €2 trillion, employing over 18 million people and contributing €621 billion in added value annually, which accounts for 4.2% of the EU's GDP . These figures highlight the economic potential of bio-based industries, important for the process of transition from fossil-based materials to sustainable alternatives. Global Gateway projects can replicate this success by investing in renewable bio-based materials such as bio-plastics, chemicals, and biofuels. This will support additionally the global decarbonization efforts and create employment opportunities in both urban and rural settings.

Transforming biomass into drivers for energy decarbonization and circularity: The EU produces approximately 1.5 billion tonnes of biomass annually, of which 500 million tonnes are identified as sustainably available for additional uses by 2030 . This biomass can support various sectors, including bioenergy, bio-based materials, and food systems, with the aim to contribute to energy security and reduce dependence on non-renewable resources. For example, biomass currently supplies around 10% of global final energy, with projections suggesting it could meet approximately 15% of global energy demand by 2050 . With the integration of sustainable biomass use into Global Gateway projects, developing countries can improve their energy mix while preserving ecological integrity.

Some statistics on EU bio-based industries including energy, food, and other sectors are included in image 1.

Image 1: Source: JRC
https://ec.europa.eu/knowledge4policy/sites/know4pol/files/20190925_jrc_biomass_ri_days_final_pubsy_0.pdf

The image shows the distribution and utilization of biomass in the EU, highlighting its significant contributions to material uses (24%), bioenergy (23%), and animal feed and bedding (43%), among other applications. Biomass is sourced primarily from agricultural crops (52%) and forestry (27%), with smaller contributions from grazed biomass and crop residues. This flow of resources provides an overview of the EU's capacity to manage biomass sustainably, contributing to a circular economy. Supporting this, the 2018 EU Bioeconomy Strategy emphasizes that sustainably sourced biomass is key to fulfilling the demands of energy, materials, and food systems. The strategy outlines that annual biomass production in the EU amounts to 1.5 billion tonnes of dry matter, with approximately 500 million tonnes identified as sustainably available for additional uses by 2030. This sustainable management of biomass not only reduces dependence on fossil resources but also supports biodiversity and ecosystem restoration, aligning with the goals of the European Green Deal and Sustainable Development Goals.

Creating green jobs and supporting rural economies: Bioeconomy-driven initiatives are projected to create one million new green jobs in the EU by 2030, particularly in rural and coastal areas . Global Gateway projects can leverage this model by deploying small-scale biorefineries and promoting agroforestry, which provides diverse revenue streams for farmers, foresters, and fishermen. For example, better recycling of organic waste streams in Amsterdam generates €150 million in added value annually, creating 1,200 jobs and reducing CO_2 emissions by 600,000 tonnes .

Supporting urban circular bioeconomy: Cities can become major hubs for the circular bioeconomy. Initiatives like Amsterdam's circular economy plan demonstrate the potential to recycle high-value organic waste streams into resources for bio-based industries. For Europe's largest 50 cities, adopting such practices could multiply economic and environmental benefits by at least 50 times . Global Gateway projects can adapt these urban models to cities in developing countries, fostering local economies while addressing urban waste management challenges.

Strengthening food security and sustainable agriculture: Approximately 76% of EU bioeconomy employment stems from agriculture and food production . By deploying sustainable agricultural practices such as precision farming, crop diversification, and nutrient recycling, Global Gateway projects can improve food security while reducing environmental pressures. For example, innovations in turning organic waste into animal feed could save land currently used for feed production, with the potential to feed three billion additional people globally .

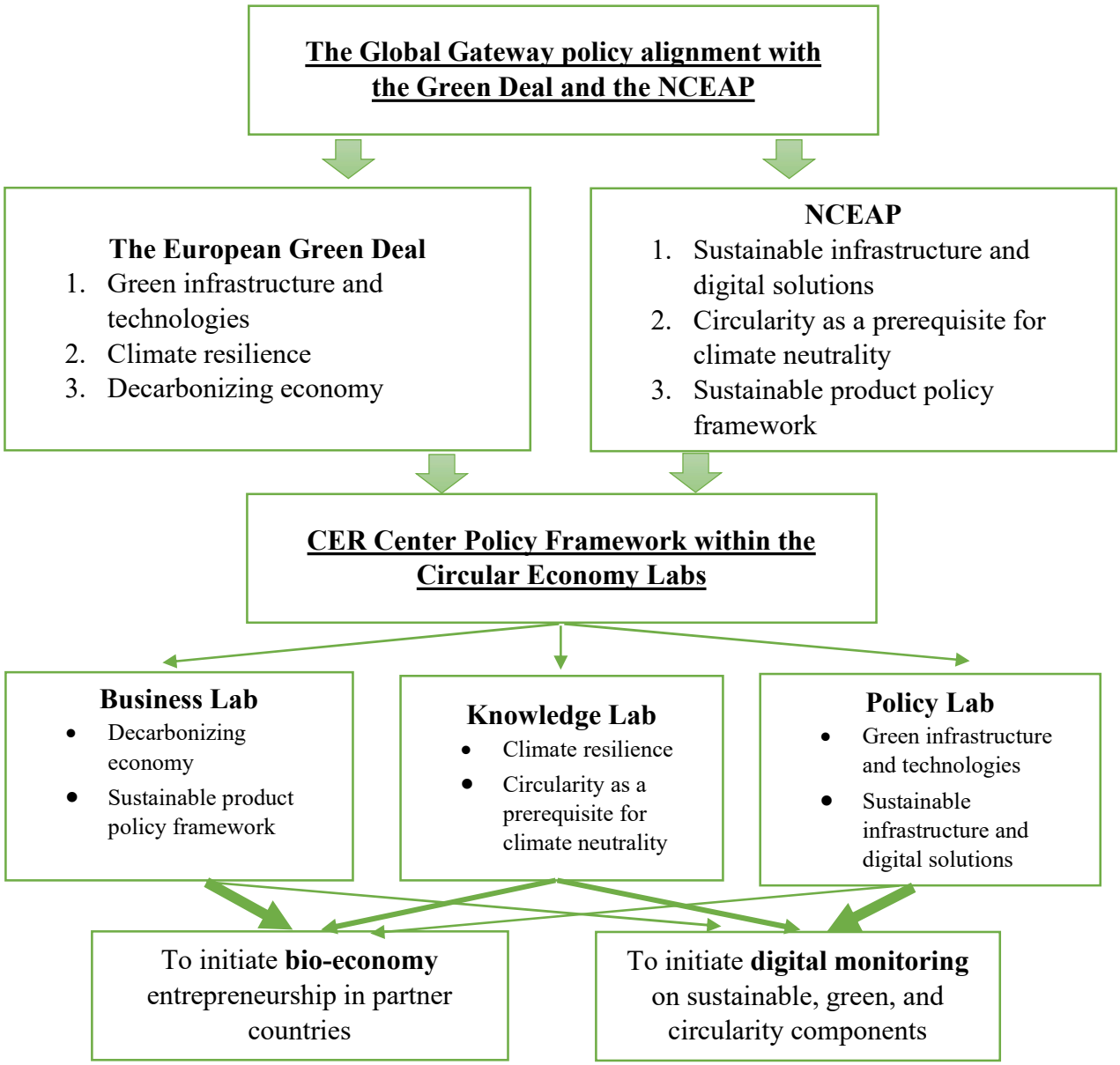
Advancing biodiversity and ecosystem restoration: The bioeconomy promotes the sustainable management of natural resources, including forests, oceans, and soils. EU initiatives aim to protect at least 30% of land and sea areas while restoring 15% of degraded ecosystems by 2030 . Global Gateway projects can incorporate these principles to preserve biodiversity hotspots in developing regions while supporting local communities through eco-tourism and sustainable forestry.

Challenges and risks in implementing bio-economy strategies in partner regions arise from factors spanning environmental, economic, and societal dimensions. One major challenge is the sustainable management of biological resources and land use. The EU Bioeconomy Strategy highlights that balancing the competing demands of food production, bio-based materials, and ecosystem conservation is complex. For instance, while there is enough sustainable biomass within the EU to meet projected needs by 2030, this requires integrating strategies that address carbon balance, biodiversity trade-offs, and socioeconomic constraints.

Modelling the CER Centre activities

Based on the interoperability analyses of the Global Gateway functions with the European Green Deal, and the NCEAP, as well as considering specifications of the bio-economy in relation to the Global Gateway and other field-related policies, the study suggests functional directions for the CER Centre that presents in Figure 1.

Figure 1. CER Center Activity Modeling



The model shows interoperability between certain policy directions of the Global Gateway, the Green Deal, and the NCEAP related to the circularity and sustainability functions. Delegating these functions between the Business, Knowledge, and Policy Labs, it will be possible to formulate new policy directions for CER Center related to bio-economy and digital monitoring.

1. To identify the policy compliance between the Global Gateway, the Green Deal, and the NCEAP – as the basic regulations for the CER Centre - in the framework of circularity and sustainability.
2. To delegate the identified policy directions to the CER Centre as a Global Gateway policy implementation unit.
3. To distinguish between delegated policy directions related to circularity and sustainability within the CER Center's Circular Economy Labs.
4. To generate new policies for bio-economy and digital monitoring, based on the delegated circularity and sustainability functions. Thin, thick, and thicker arrows show the power of influence of each lab over the bio-economy and digital monitoring policies.

The initiatives within bio-economy and digital monitoring can be new policy direction for the Global Gateway implementation derived by the Green Deal and NCEAP, and providing through the CER Center.

Economic challenges are significant in regions with underdeveloped bio-based sectors. Despite the potential to create up to one million green jobs in rural and coastal areas by 2030, barriers such as insufficient investments, high upfront costs for establishing biorefineries, and limited market uptake for bio-based products hinder progress. The EU has proposed initiatives such as a €100 million Circular Bioeconomy Investment Platform to address these issues, but disparities in regional capacities remain a concern .

Environmental risks include the potential for overexploitation of natural resources, which could lead to soil degradation, water scarcity, and biodiversity loss. To mitigate these risks, strategies must incorporate ecological boundaries. Monitoring systems and frameworks like the EU Green Deal are in place to ensure that bio-economy activities align with sustainability goals. However, implementing these measures consistently across regions is a challenge, particularly in areas with limited governance structures .

Socially, the transition to a bio-economy may lead to disruptions in traditional sectors, creating resistance among stakeholders. Training and education programs are necessary to build local capacity and acceptance. Moreover, ensuring equity in resource distribution and benefits is critical to avoid exacerbating existing inequalities, especially in rural areas .

Technological challenges include the development and deployment of innovations needed for a circular and sustainable bioeconomy. For instance, advanced biotechnologies, bio-based product standards, and waste-to-resource technologies require significant research and development investments, as highlighted by the EU's allocation of €10 billion under Horizon Europe. Lastly, there are risks associated with policy coherence and coordination. Bioeconomy strategies must align with broader climate, energy, and circular economy policies, requiring cross-sectoral cooperation. The European Commission's progress report emphasizes that gaps in policy coherence could undermine efforts to integrate bioeconomy principles effectively across regions.

Conclusion

The study of the implementation of the Global Gateway strategy through the new EU Circular Economy Resource Centre was discussed in the paper considering (1) the Green Deal agenda, (2) the New Circular Economy Action Plan, and (3) the Bio-Economy. Important to note that the WEEE framework is mentioned in the study as a future research object in this context.

There are suggested in the study to prioritize kay activities in the relevant labs focusing on circularity and sustainability components. In particular, promoting green infrastructure and technologies can be relevant with the Business Lab, climate resilience and sustainable development activities: Knowledge Lab, and decarbonizing economies: Policy Lab.

Although the environmental, social, and economic impacts of the Global Gateway are clearly emphasized, however, we assume to delegate the monitoring and coordination functions to the CER Centre. Moreover, the study shows challenges on political and economic instability; access to finance; geopolitical risks; monitoring and transparency; that are necessary to manage. In the context of these risks the Belt and Road Initiative, - as another worldwide project, focuses on solutions that ignore the mentioned challenges and promotes project activities in even unstable, risky, and not transparent environment. We assume that the management of these challenges should be coordinated by the CER Center. This will enable to harmonize environmental, social, and economic benefits within risk analyses and promote effective solutions.

The study examined also the possible policy framework of the newly-established CER Center, modeling the activities toward the bio-economy and digital monitoring prioritization. In this context, the Global Gateway implementation is discussed as a policy toolkit to promote bio-economy and digital monitoring.

Based on the examinations, the New Circular Economy Action Plan, the Green Deal, and the Global Gateway are complementary frameworks that can collectively advance global sustainability goals as a macro solution, and promote circularity and bio-economy in micro levels. By aligning their strategies and leveraging their respective strengths, the EU can foster transformative change in partner countries emphasizing on innovation, capacity building, and systemic change, providing a robust foundation for integrating circular economy principles into the Global Gateway's initiatives. However, addressing challenges such as policy gaps, financial constraints, and behavioral inertia will require concerted efforts and sustained collaboration among all stakeholders, that could be implemented by the CER Center.

The bioeconomy also supports the Global Gateway's goal of improving global cooperation through Green Deal and the New Circular Economy Action Plan. However, this is a subject of cross-border cooperation, as approximately one-third of the biomass input to the EU bioeconomy is imported from non-EU countries. This highlights the interconnectedness of the bioeconomy with global markets through various regulations and directives, that could be a part of the CER Centre's coordinating functions.

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