2023 Green Growth and Sustainable Development Forum
Navigating the twin transitions: Going green and digital

Summary report

OECD Green Growth and Sustainable Development Forum
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High-level opening session

Mathias Cormann, OECD Secretary-General, opened the 2023 GGSD Forum by highlighting that this year's event drew on insights from two key OECD horizontal initiatives: the *Going Digital* and *Net Zero+* projects. He underscored five key areas for policy makers to align the digital and green transitions: labour market and skills policies; investment in research in green digital technologies; improving SME's access to digital technologies to enable low-carbon and circular business models; addressing the negative environmental impacts of digitalisation; and using improvements in data collection and analysis to better design, monitor and enforce environmental policies.

In her scene-setting presentation, **Kirsten Dunlop**, Chief Executive Officer of Climate-KIC, characterised the green and digital transitions as "unidentical twins": both transitions are taking place simultaneously, but digitalisation is not in itself an end goal and must support the green transition. She asserted that a successful strategy for managing the twin transitions needs to be holistic, systemic, place-based and value-chain-based due to the non-linear dynamics of digitalisation and climate change. She stressed the importance of working towards a low-carbon economy that is "worth living", emphasising well-being, affordability, accessibility, aesthetics, and sufficiency. New skills (as well as new mindsets and capabilities) are needed to bridge a catastrophic skills gap. Finally, Ms. Dunlop echoed **Mathias Cormann's** words, calling for a shift from competitive to collaborative sustainability through mutual learning and collective efforts for a sustainable and prosperous world.

Governor of Tokyo **Yuriko Koike** highlighted that Tokyo is leveraging digital technologies to mitigate and adapt to climate change. Tokyo aims to achieve a 50% reduction in greenhouse gas emissions by 2030 and attain net-zero emissions by 2050. A digital twin of the city, created through airborne laser scanning and artificial intelligence (AI), is being used to design more efficient emissions reduction strategies. Tokyo is also leveraging AI and the Internet of Things (IoT) to meet its 70% emissions reduction target from buildings by optimising energy supply and demand. As extreme weather events are likely to become more frequent with climate change, Tokyo is using digital technologies to improve disaster preparedness. High-speed and high-capacity connectivity are crucial to ensure timely and resilient communication in the event of a disaster. Governor Koike concluded by saying that her city aims to build a robust green financial market, and expressed Tokyo's commitment to collaborating on furthering green and digital initiatives for a sustainable world.

Dušan Chrenek, Principal Adviser for Digital for the Green Transition in the European Commission's Directorate-General for Climate Action (DG CLIMA), highlighted the EU's ambitious goals of reducing emissions by 55% by 2030 and climate neutrality by 2050. He argued that digital technologies play a pivotal role in decarbonising several sectors and can help to improve policy making. For instance, the European Commission's Destination Earth project aims at creating a detailed digital replica of the Earth in order to

monitor weather extremes and simulate scenarios to improve climate mitigation and adaptation policy. He stressed the importance of skills and investment to accelerate both transitions, and noted that the Commission's Recovery and Resilience Facility has earmarked funds for green and digital initiatives. Mr. Chrenek emphasised the importance of collaboration across sectors, acknowledging the support of the European Green Digital Coalition, a group of companies committed to supporting the green and digital transformation of the EU.

Dominic Waughray, Executive Vice President of the World Business Council for Sustainable Development (WBCSD), emphasised the challenge of calculating scope 3 emissions from thousands of suppliers that are part of large supply chains. The WBCSD Partnership for Carbon Transparency, comprising 60 multinational companies, is testing a methodology for estimating carbon footprints to create a standardised methodology to measure these emissions, with promising early results. Mr. Waughray suggested that the adoption of intervention accounting, which involves estimating future reductions in emissions due to specific business decisions, can be accelerated by AI-supported modelling. This would also be instrumental in accelerating investment in low-carbon technologies by providing investors with more robust information on their investment impact.

Jeremy Rollison, Senior Director and Head of EU Policy at Microsoft, mentioned that Microsoft has pledged to be carbon-negative by 2030 and to remove all emitted carbon since 1975 by 2050. In addition, the company supports its customers in achieving their sustainability goals through technologies such as Microsoft Cloud for Sustainability. Microsoft is a founding member of the Carbon Call initiative to advance carbon accounting. Mr. Rollison emphasised that AI can help accelerate sustainability innovations by improving data analysis and optimising performance in several sectors; Microsoft is already using this technology to reduce its environmental footprint. He concluded by highlighting the importance of helping workers and communities harness the power of AI. Microsoft is a partner in the INCO Digital Green Skills Certificate Programme, which equips online learners with skills to build sustainable digital solutions.

Lamia Kamal-Chaoui, Director of the OECD Centre for Entrepreneurship, SMEs, Regions and Cities, remarked that digital technologies, such as platform-based ride-sharing apps and digital twins, are increasingly being used to decarbonise cities. She pointed out that cities and regions oversee two-thirds of climate-related public spending and investment, and thus have a huge role to play in delivering the USD 6.9 trillion per year in infrastructure investment required to meet climate and development objectives by 2030. She stressed the importance of tailoring solutions to local needs, addressing the digital and green skills gap, and gaining citizen support. Ms. Kamal-Chaoui then focused on SMEs, which account for a significant proportion of total GHG emissions. As discussed at the recent OECD Ministerial Meeting on SMEs and Entrepreneurship, greening SMEs requires flexible and proportionate environmental reporting frameworks.

Jerry Sheehan, Director of the OECD Science, Technology and Industry Directorate, acknowledged the unprecedented acceleration of digital technology adoption during the COVID-19 crisis and the dual focus on the green transition and digitalisation in post-pandemic recovery efforts. He referenced the positive impacts of digital technologies on energy optimisation, smart cities, and sustainable agriculture, noting that OECD analysis shows that around half of green startups rely on digital technologies. The OECD is collecting indicators on technology adoption, investment, jobs, skills, patent filings and emissions to better assess the links between the digital and green transitions and analyse the effect that digital innovation has on environmental performance, and is developing a framework to better design green industrial policies.

The open discussion moderated by **Deputy Secretary-General Lapecorella** initially focused on the role of education systems and skills policies in reducing existing inequalities while enabling progress on the green transition. **Kirsten Dunlop** stressed the necessity of a radical transformation of the education system and advocated for embedded experiential learning for all ages to keep pace with rapidly changing skills. **Dušan Chrenek** remarked that there has been more focus on digital rather than green skills in past years, and that the European Commission is working to address this with a number of initiatives including Net-Zero Academies as part of its Net-Zero Industry Act. **Dominic Waughray** stressed the importance of lifelong learning and mentioned the WBCSD Climate Drive initiative in response to many companies' requests for training programs to upskill their workforces. **Jeremy Rollison** agreed on the importance of lifelong learning and argued that digital skills are ultimately green skills.

The panel next provided examples of "positive tipping points". **Kirsten Dunlop** pointed to legislative changes in urban development, energy infrastructure, and regulations on plastic waste, and shifting from cost benefit analysis to evaluations that account for emissions and risks, as changes that can activate positive reinforcing loops. **Dušan Chrenek** described AI and innovative technologies as tipping points, emphasising the importance of scaling up technology adoption across all businesses. **Dominic Waughray** suggested that linking corporate environmental performance to corporate valuations would create rapid transformative change in global investment. **Jeremy Rollison** agreed with Dušan Chrenek on the role of technology, including carbon removal.

Key takeaways:

- **The green and digital transitions are "unidentical twins".** Both are taking place simultaneously, but digitalisation in itself is not an end goal. Digital innovation must be geared towards addressing pressing societal challenges.
- **A systemic and value-chain-based approach** is needed to ensure synergies and avoid trade-offs in the twin transitions and manage their non-linear dynamics.
- **Cities can leverage digital technologies to both mitigate and adapt to climate change.** For instance, artificial intelligence and big data can help to better manage energy demand in buildings and improve disaster readiness.
- Artificial intelligence and big data can **improve the environmental performance** of several economic sectors thanks to **enhanced data analysis and scenario simulations.**
- Better **linking corporate environmental performance and emissions reporting to corporate valuations** is instrumental for accelerating the green transition in companies. Further research is needed on how to measure scope 3 emissions.
- Addressing **skills gaps and lifelong learning** is essential to accelerating the twin transitions and ensuring that no-one is left behind.
- SMEs account for a significant proportion of emissions and face specific challenges. The implementation of **flexible and proportionate environmental reporting frameworks** is essential to their greening.

Session 1

Digital technologies for promoting green production and consumption

Ilze Zvidrina, Deputy Director of the Labour Market Policy Department at the Latvian Ministry of Welfare, and Chair of the OECD Employment, Labour and Social Affairs Committee (ELSAC), moderated this session that focused on how digital technologies can help to promote greener production and consumption while ensuring that no-one is left behind.

In her scene-setting presentation, **Elena Verdolini**, Senior Scientist at the European Institute on Economy and the Environment, and Professor in Political Economy at the University of Brescia, noted that the environmental impact of digitalisation is linked to its consequences on energy demand. Digital technologies can either reduce total energy demand through higher efficiency or increase it due to a rebound effect (i.e. cost savings from digital innovations leading to increased consumption of goods and services). Currently, there is no clear evidence on which effect will prevail. She stressed that digital technologies are likely to have two main impacts on the labour market: driving-up demand for certain skills while reducing demand for others, and enhancing the productivity of certain workers. Reskilling and upskilling will be crucial to address these impacts. She emphasised the importance of technology governance to ensure that innovation contributes to a fair transition for all. Prof. Verdolini concluded by remarking on the importance of measuring progress in digitalisation and enhancing understanding of its interactions with environmental policies. In this context, addressing existing inequalities, including the "digital divide" will be instrumental for a just green and digital transition.

Michel Morvan, Co-founder and Executive Chairman of Cosmo Tech, suggested that AI can facilitate decision making for complex environmental issues. In the business sector, complexity is often linked with long supply chains, posing two difficult questions for managers: 1) how to accurately measure the carbon footprint of their companies, including scope 3 emissions; and 2) how to reduce emissions while maintaining profitability and avoiding unexpected consequences across the value chain. Drawing a parallel with using a GPS navigator to drive from point A to point B, he presented AI and digital twins as tools that can simulate various scenarios and identify the best courses of action for complex challenges. It is then up to individuals and organisations to decide whether and how to follow them.

Stephanie Minster, Associate Director at E.ON, emphasised the significant impact that consumer choices can have on the environment, particularly in countries with high consumption rates. Information about the environmental impact of products is often insufficient and difficult for consumers to access. Digital product passports – a unique digital ID linked to a physical product and accessible through a smartphone – can help address this challenge. Consumers can access comprehensive data about a product, from the raw materials used to its end-of-life practices, by scanning a QR code. This enhanced transparency can empower consumers to make more environmentally conscious decisions. It can also increase trust in second-hand markets by providing buyers with information on any maintenance performed on a product. This technology could also be useful for brands, as it could foster trust and facilitate the sale of new services including repairing. Ms. Minster concluded by discussing the challenge of transitioning from current to more complex IT systems that allow storing detailed and historic information for each item.

El Iza Mohamedou, Head of the OECD Centre for Skills, expressed concern about the mismatch between the pace of digital innovation and action required to address climate change, and the evolution of education and skills policies. Citing statistics from the OECD Programme for International Student Assessment

(PISA), she noted that current educational systems are not adequately preparing young people, with only half being taught strategies for discerning biased information online and one in three reaching baseline proficiency in reading, math, and science. Adult training processes do not adequately address these early gaps later in life. Referencing the *OECD Skills Outlook 2023*, Ms. Mohamedou stressed the importance of technical and transversal skills and equity in skill acquisition and environmental sustainability competence, noting disparities between different socio-economic groups.

Christoph Ziegenhohn, representing the German Public Employment Service, pointed out that megatrends such as ageing, automation, digitalisation, and climate change are affecting the labour market. He emphasised the role that public employment services play in preventing unemployment and supporting workers by actively supporting upskilling and reskilling. He advocated for strong collaboration with employers, especially small and medium-sized companies, and other stakeholders for effective skills development. Lifelong learning is important, and enabling upskilling within employment is essential to helping workers adapt to changes. Mr. Ziegenhohn concluded by affirming the importance of mutual learning networks, such as the European Network of Public Employment Services and the World Association of Public Employment Services, to navigate the ongoing labour market transformation.

The open discussion focused on how to reduce the environmental impact of digitalisation and to ensure a fair transition. **Elena Verdolini** highlighted the importance of aligning digital and green policies to address the issue of e-waste and promote circular practices, while **Michel Morvan** reminded the audience that each request to any AIs has an energy and environmental cost. **Stephanie Minster** stressed that regulations need to be easy to understand in order for business to effectively implement them. **Christoph Ziegenhohn** stressed the need to consult all stakeholders in order to ensure a just and fair transition. **El Iza Mohamedou** emphasised the role of vocational training in the green transition and the importance of “training the trainers” on new digital tools.

Key takeaways

- Artificial Intelligence and digital twins can improve decision making in response to complex challenges by simulating and evaluating multiple scenarios. The energy use of these technologies must also be taken into consideration.
- Unique digital IDs linked to physical products (a.k.a. digital product passports) can support the transition towards a circular economy by facilitating consumer access to information on the production and maintenance of goods.
- Further research on the interaction of digitalisation with policies for a just green transition and existing inequalities, including the “digital divide”, is needed.
- There is a mismatch between the pace of change required to address climate change and of technological innovation with the evolution of education and skills policies.
- Lifelong learning is essential to address the labour market implications of megatrends including climate change and digitalisation. Further research on the barriers and motivations that hinder individuals’ participation in adult training is needed.

Session 2

Digital technologies for better environmental policy design, monitoring and enforcement

Marilette Van As, International Coordinator at the Dutch Ministry of the Interior and Kingdom Relations, and Vice-Chair of the OECD Public Governance Committee, moderated this session that addressed how digital technologies can help enhance the design, monitoring and enforcement of environmental policies.

Shardul Agrawala, Head of the Environment and Economy Integration Division in the OECD Environment Directorate, outlined three areas where digital technologies can improve the policy cycle. First, digital technologies can improve policy efficiency and targeting through real-time monitoring of physical variables and consumer sentiment. The EU-funded Structured Approaches for Forest fire Emergencies in Resilient Societies (SAFERS) platform, which uses data from multiple sources to design optimal responses to forest fires, is one example. Second, digital technologies can improve policy design and evaluation. For instance, trash bins equipped with radio-frequency identification (RFID) sensors can allow citizens to be charged according to the amount of waste generated, and a recent OECD study on the impact of Milan, Italy's congestion charge illustrates how big data can be used in impact evaluation. Third, digital technologies hold potential to improve environmental policy cycles by analysing vast datasets, identifying patterns, and increasing citizen engagement. Examples include increased citizen interaction through chatbots and combating greenwashing with models like Climate Bert, which scans corporate sustainability reports for accuracy. Mr. Agrawala concluded by highlighting challenges posed by digital technologies, including data access, interoperability, transparency in data analytics, privacy, cybersecurity, and algorithms bias.

Giedrius Kadziauskas, Director of the Environment Protection Department in the Lithuanian Ministry of Environment, gave several examples of how digital technologies are leveraged by his agency. For instance, Sentinel satellite data and AI are used to monitor changes in forest coverage areas to identify potential permit violations. Key challenges for this use are accurately matching satellite data with permit information, and adaptation of AI tools used for land-use monitoring in agriculture to the forestry sector. Another example is the Taking care of Lithuania application, which allows citizens to report illegal waste dumping and keeps them engaged throughout the enforcement process by providing information on investigations. This transparency increases pressure on governments to act quickly. When first launched, the agency worried that the application would receive too many violation reports, but the initiative has been successful and potential expansion for reporting other environmental violations is being considered.

Sascha Ruja, Business Development Director for Consulting & Operations at Egis, emphasised the need for efficient road use due to the transport sector's significant contribution to greenhouse gas emissions and air pollution. Traditional road use charging methods have evolved with technology, and it is now possible to charge drivers based on time, location and how polluting their vehicle is through automatic license plate recognition. Similarly, satellite technology is increasingly used to charge trucks based on distance travelled, location and pollution, allowing for more nuanced and effective road use pricing schemes. Mr. Ruja acknowledged the concerns over privacy that such technologies can raise. Overcoming these challenges hinges on transparent communication, building trust with the public, and adapting schemes to local legislations.

Vivian Ribeiro, Spatial Intelligence Lead on Intelligence for Sustainable Trade at the Stockholm Environment Institute (SEI), discussed the transformative impact of big data and digital technologies on agricultural policies. Focusing on the EU Deforestation Regulation (EUDR), she emphasised the importance of tracing deforestation activities through supply chains to correctly evaluate the environmental impact of products. For example, big data and digital technologies could be used to evaluate the deforestation impact of an ingredient in processed food sold to consumers. The SEI's Trase initiative supports value chain analysis by bringing together disparate and publicly available data. Ms. Ribeira acknowledged the challenge of promoting data literacy and accessibility to ensure that digital technologies can be used effectively to address environmental issues, and advocated for governments to establish effective and open monitoring systems.

Kathy Peach, Director of the Centre for Collective Intelligence Design at Nesta, shared that a recent Nesta survey conducted across six European countries revealed that while 70% of respondents believed that citizens should be involved in societal challenges such climate change, less than a quarter felt empowered to influence decisions. Lack of opportunities for participation can lead to policy failure and increased inequalities. Digital technologies can help to address these issues by creating innovative and more engaging ways for people to contribute their ideas and information to policy-makers. Nesta's Strategy Room project, which allows citizens to discuss specific issues, supported by videos and digital tools, is a scalable solution for councils to gather data on residents' views, fostering a sense of agency among participants in tackling climate change.

The panel discussion explored the challenges and opportunities of the application of digital technologies in environmental policies. **Sascha Ruja** emphasised the importance of reliable and fair charging systems to maintain public trust, stressing proper design and testing. **Shardul Agrawala** remarked that a fully automatic charging system may lose salience for users and be less effective in changing behaviours. **Kathy Peach** advocated for early public engagement to improve policy design, and suggested leveraging citizen science to enhance environmental policy design and monitoring. **Giedrius Kadziauskas** stressed the importance of providing information tailored to different groups, addressing cultural beliefs, engaging citizens through better communication, and how digital technologies can help. **Vivian Ribeiro** showcased an application that provides consumers with environmental and social impact data on beef products. Speakers also discussed the importance of local champions in moving reforms forward.

Key takeaways

- Digital technologies can facilitate citizen engagement in policy making, but there is a need for open data and to equip citizens with the right skills to interpret it.
- Correctly mapping the users and stakeholders of new policies and digital solutions is crucial for their success and acceptability. For instance, peri-urban residents may be most affected by congestion charges, but may not be involved in consultation processes.
- Further research could investigate the effectiveness and scalability of tools that allow citizens to report environmental violations.
- As in other domains, use of digital technologies in environmental policies raises questions around data access, data interoperability, privacy and biases in algorithms. Further research could focus on addressing these issues in the context of environmentally just policies.
- Policy design needs to balance automation of payments with salience to ensure visibility of what is being charged, otherwise policies may be less effective.

Session 3

Digital technologies for the green transition of SMEs

Ana Costa Paula, Head of the Business Policy Unit at Portugal's Ministry of Economy and Maritime Affairs, and Bureau Member of the Committee on SMEs and Entrepreneurship, moderated this session on the role that digital technologies can play in driving a circular and low-carbon economy transition in SMEs, including key challenges and possible policy solutions.

Patrik Thollander, Professor at Linkoping University, began by noting that energy audit programmes commonly used to improve energy efficiency often focus on specific processes rather than decarbonising the entire production of SMEs. He shared key findings from a Swedish study showing that the creation of a database of energy efficiency measures doubled the impact of energy audits. He argued that "supply chain approaches", wherein the main company takes the lead in greening the entire supply chain, could accelerate the green transition by making decarbonisation a strategic issue for SMEs. Digitalisation would play a crucial role in such supply management approaches by simplifying data management and exchange among all actors. Prof. Thollander concluded by emphasising the role of learning networks as a tool to promote lifelong learning for SMEs to ensure that they can continuously adopt greener and more efficient technologies.

Enrico Biele, Programme Manager at the Italian National Energy Agency (ENEA), shared key findings from the Leap for SMEs Project, a collaborative initiative involving national energy agencies from nine European countries. Project outcomes indicate that responsibility for SMEs and energy policy is often shared among many institutions, making strong dialogue among policymakers crucial. Another key finding is the need to have better SME categories based on information such as energy consumption, number of employees, turnover, or economic sector. Mr. Biele highlighted the importance of benchmarking for energy audits and efficiency measures. Lastly, he suggested that the introduction of one-stop shops that collect information on all policies and incentives available to SMEs would be instrumental in addressing the information barriers they face.

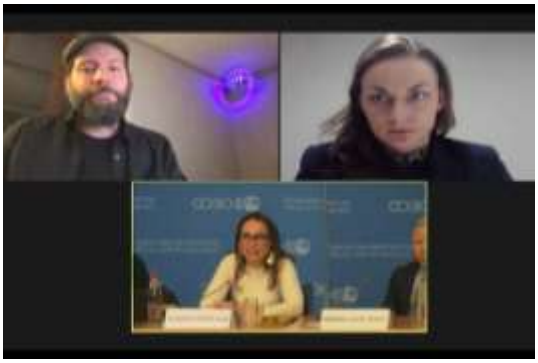
Heather Buchanan, Co-founder of Bankers for Net Zero, noted that a key challenge for financial institutions in greening their activities is how to measure the carbon impacts of the loans they provide. Large firms face a similar challenge in computing their scope 3 emissions, but the challenge may be more complex for financial institutions, whose clients may operate in multiple and very different sectors. Closing this information gap will require a radical change in the data that SMEs provide to banks, and building banks' capability to analyse it. In this context, Banks for Net Zero has launched the Perseus project, which aims at facilitating computation and sharing of SMEs' GHG emissions data. The project builds on open banking standards (i.e. protocols that allow banking clients to consent to the sharing of their bank statements with a third party) to calculate and transmit GHG emissions data from SMEs through analysis of their electricity bills.

Lucia Katriňáková, Head of the League for Digital Boost at the Slovak Alliance for Innovation Economy (SAPIE), noted that many SMEs in Central and Eastern Europe lack understanding of the key concepts underpinning digitalisation, the twin transitions and the benefits of incorporating green technologies into their businesses. A key focus of the League's activities is therefore to raise awareness and provide training. She stressed the importance of providing SMEs with access to financing for their green and digital investments, adding that the League supports companies by connecting them with finance providers and

providing them with guidance on accessing funding. Ms. Katriňáková mentioned the value of sharing best practices and lessons learned across the region, as well as of collecting data to understand the needs and preferences of SMEs. In this context, she remarked that the League for Digital Boost organises trips abroad to help SMEs learn from other businesses and develop international partnerships.

Carsten Waldeck, Chair of the European DIGITAL SME Alliance Focus Group on ICT Sustainability, and CEO at SHIFT, stated that his company's mission is to address the environmental impact of electronic waste. To this end, SHIFT has introduced modular designs that make devices easier to repair and a buyback warranty for every product sold. The buyback encourages customers to return devices for recycling, thus promoting a circular economy. He emphasised that system-on-a-chip (SOC) vendors should provide long-term support for their products to make it easier for manufacturers to keep devices up-to-date and secure, and advocated for producing a processor in the EU with open documentation. Mr. Waldeck concluded with the concept of "universal computing", i.e. a single device that combines the functionalities of multiple devices (smartphones, tablets, etc.), which could ultimately reduce electronic waste by 70%.

In the open debate, speakers continued to explore the role that energy efficiency can have in accelerating the green transition of SMEs, as well as how to address key barriers for their decarbonisation. **Enrico Biele** commented that the forthcoming EU Energy Efficiency Directive would introduce obligations to adopt energy management systems based on energy consumption thresholds, potentially covering certain energy-intensive SMEs. **Patrik Thollander** emphasised the importance of voluntary initiatives and of standardising energy audits. **Heather Buchanan** underscored the efficacy of blended finance, wherein governments assume a portion of risk, for the green transition. **Lucia Katriňáková** shared key insights from a survey in the CEE region that identified insufficient access to funding and information, lack of skills and limited awareness of benefits as key barriers to greening SMEs. Lastly, **Carsten Waldeck** stressed the necessity for new legal and financing structures for social purpose companies (i.e. entrepreneurial companies that aim at achieving societal goals rather than profit maximisation).



Key takeaways

- Insufficient access to funding and information, lack of skills and awareness, and evolving regulations are key barriers for adopting green digital technologies in SMEs.
- An obligation for lead companies in a supply chain to reduce scope 3 emissions could help to decarbonise SMEs along the entire chain. Digitalisation would be instrumental in managing data flows among the supply chain actors.
- One-stop shops for SMEs on green policies and incentives would help to address knowledge and awareness gaps.
- Standard methodologies to compute GHG emissions and open banking practices could help streamline computation and sharing of SMEs' emissions data, thus facilitating financing for low-carbon projects.
- The adoption of practices such as modular design and buyback warranties by companies may help to reduce electronic waste.

Session 4

Digital technologies for smart sustainable cities

Soo-Jin Kim, Deputy Head of the Division for Cities, Urban Policies and Sustainable Development in the OECD Centre for Entrepreneurship, SMEs, Regions and Cities, moderated this session that explored the role that digital technologies can play to help cities reach their climate objectives.

In his scene-setting presentation, **Ralf-Martin Soe**, Founding Director and Professor at the FinEst Centre for Smart Cities, commented that the definition of smart cities has evolved from being based on technology adoption to encompassing low-carbon development and well-being. He emphasised that digitalisation should always be regarded as a tool and not the end goal: for example, large cities often need digital technologies to offer a liveable environment for their residents, but this may not be the case for smaller urban areas. He warned that the ubiquitous use of digital technologies may create challenges for inclusivity due to the "digital divide", and stressed the importance of avoiding uncoordinated adoption of digital solutions among neighbouring cities. Fragmentation and lack of systems interoperability can decrease the attractiveness of regions. Mr. Soe concluded by mentioning diverse pilot projects underway in the FinEst Centre, including on digital urban twins, microgrids, autonomous mobility, building renovation, and a well-being score for cities.

Eva Jensen, Head of Climate Change, Energy and Transport at the European Environment Agency (EEA), agreed with Ralf-Martin Soe that digitalisation should be considered as an enabler for the green transition, adding that it can have both positive and negative outcomes for the environment. She described the role that digitalisation can play in driving behavioural shifts in transportation. For example, the "first mile" (the first leg of a trip from home to the closest public transportation) and the "second mile" (the last leg of the trip) influence people's decisions on car usage; digitalisation can encourage greener choices by providing better information on alternative transport modes, including biking and walking, as well as potential savings. As people react to the ease of use and cost of different options, pricing and regulations will continue to influence greener consumer behaviours.

Cristina Bueti, Counsellor for the International Telecommunication Union Study Group 20 on Internet of things (IoT) and smart cities and communities (SC&C), underscored the importance of international standards in facilitating the green and digital transitions in cities. Echoing Ralf-Martin Soe's presentation on the challenges posed by fragmentation, she commented that standards can help to address interoperability issues among different data platforms, which may be driven, among other things, by a multiplicity of public and private service providers (e.g. different utilities). She stressed that integrating eco-design principles in the design phase of new digital tools can help to avoid technologies that have proven ineffective in similar contexts. Emphasising accessibility, ITUC standards are freely available for cities regardless of size or budget constraints. Ms. Bueti concluded by noting that standards can be technical (e.g. energy efficiency) or policy-oriented, thus adapting to the diverse needs of cities and companies.

Annalisa Donati, Acting Secretary General at the European Association of Space Agencies (Eurisy), described the importance of satellite-based technologies for many services that we use daily. Eurisy, an association of 24 European space agencies and key stakeholders, aims at encouraging innovative uses of satellite applications to address today's challenges. She highlighted that open data provided by satellite underpin many services used globally, including the global positioning system (GPS) that makes it possible to locate shared vehicles or reduce travel times by identifying shorter routes. The Copernicus satellite

constellation collects a vast amount of daily information on land, sea, atmosphere, climate, emergencies, and security. Sharing best practices on how cities can leverage this data to improve their decision making and service delivery is crucial. A key challenge – especially for smaller cities – is the lack of skilled personnel to manage and analyse these data. To this end, Eurisy collaborates with international organisations to train city administrators in utilising data for climate change mitigation and adaptation.

Philippe Crist, Senior Advisor for Innovation and Foresight at the International Transport Forum (ITF), discussed the governance challenges surrounding mobility data. Drawing parallels to physical infrastructure, he emphasised the need to consider mobility data as foundational infrastructure (like water or electricity) and to integrate public outcomes into their governance. He proposed three main pillars for mobility data governance: data reporting (i.e. ensuring that public authorities can gather the information needed to address specific challenges); data sharing (i.e. promoting interoperability among operators, including through minimum mandatory sharing obligations); and ensuring that regulations can be easily understood by operators and translated into digital system operations. Mr. Crist concluded by highlighting that some countries, for example Switzerland, are starting to recognise mobility data as national infrastructure alongside road and rail networks.

In the open discussion, **Ralf-Martin Soe** remarked that the first step towards building a smart city is agreeing on a long-term strategy and introducing an experimental culture. **Cristina Bueti** highlighted the role that digital technologies can play in building climate-resilient cities by providing accurate real-time data. **Eva Jensen** flagged that the EU Destination Earth project – mentioned by Dušan Chrenek in the opening session – will feature a module on city adaptation and the importance of understanding how people interact with the built environment to design effective adaptation policies. **Philippe Crist** indicated that climate change may require a shift in how transport infrastructure is built: from resilience, where systems are built to absorb large shocks and quickly return to their original state, to regeneration, where systems are designed to safely fail in case of large shocks and to be easily rebuilt to adapt to new circumstances. **Annalisa Donati** stressed the importance of partnerships to ensure that technology is developed to respond to societal needs.

Key takeaways:

- Lack of interoperability between digital systems at the city level or between neighbouring cities risks slowing the green transition. The use of standards can help to avoid fragmentation.
- Ubiquitous use of digital technologies may create challenges for a green and inclusive transition due to the “digital divide”.
- Lack of skills hinders the use of large of digital solutions to improve decision making and service delivery, especially in smaller urban areas.
- There is need to foster knowledge exchange and partnerships among researchers and users of technologies to share best practices and ensure that societal needs are at the centre of innovation and research.
- Further research is needed on whether mobility data should be regarded as foundational infrastructure, and on how to design their governance to promote a green and inclusive transition.

Session 5

OECD-GGKP joint session: Green growth and international co-operation in the context of new global challenges

Jens Kristian Nørgaard, Technical Key Expert at the SWITCH to Green Facility, moderated this session that explored how the international landscape has evolved since the Green Growth Knowledge Partnership (GGKP) was founded ten years ago, and the implications of these changes for advancing the green transition.

Richard Damania, Chief Economist at the World Bank Sustainable Development Practice Group, began by stating that the urgency of addressing multiple environmental challenges has not diminished, and that three major changes have taken place since the founding of the GGKP. First, there is now widespread acceptance of environmental problems, with central banks and economists recognising their economic implications. Second, the world is more interconnected, and disruptions such as economic or health crises cross borders very quickly. Third, the transformative impact of digitalisation: technological advancements enable more accurate and real-time measurement and monitoring of environmental issues. This ability to swiftly identify and address problems better positions us to tackle global environmental challenges.

Ingvild Solvang, Head of the Climate Action and Inclusive Development Unit at the Global Green Growth Institute, reminded that the GGKP was founded with the objective of driving transformative change by generating and sharing knowledge on green growth. The partnership has grown over time – now comprising over 95 green economy organisations – and has been successful in its mission, as evidenced by its large library and three online platforms. A critical challenge persists, however: how to leverage this knowledge to accelerate environmental action. Ms. Solvang highlighted the potential of new digital technologies to facilitate knowledge generation and sharing.

Kumi Kitamori, Deputy Director of the OECD Environment Directorate, commented that while many countries have committed to net-zero goals, a key challenge is making green policies resilient to future shocks. Referencing the sustainable development framework (which emphasises the need to balance economic, social and environmental concerns), she referred to the tension between green and inclusivity goals. Citing the “yellow vest” movement in France, she made the point that certain green policies can have negative distributional impacts. These must be anticipated and addressed to ensure that policies are not overturned as governments change or shocks in energy markets occur. Ms. Kitamori concluded by underlining the importance of mainstreaming climate adaptation into various sectors and policy areas.

Elisa Tonda, Chief of the Resources and Markets Branch in the United Nations Environment Programme’s Industry and Economy Division, emphasised the urgent need to address the triple planetary crisis: climate change, biodiversity loss, and pollution/waste. Building on insights from UNEP’s *Making Peace with Nature* report, she explained that these challenges are deeply interconnected and have a common root cause: the currently unsustainable production and consumption patterns of society. In this context, she pointed to the recently established Intergovernmental Negotiating Committee to develop a legally binding instrument on plastic pollution as important sign that the international community is increasingly focusing on these issues. Ms. Tonda affirmed the importance of collaboration, such as through the GGKP, to bring evidence to policy makers, businesses, and the finance sector to help drive transformative action.

Recognising that stakeholders (e.g. policymakers, banks, firms) may need different types of green growth information, **Smail Al Hilali**, Officer in Charge for the Department of Circular Economy and Environmental

Protection at the United Nations Industrial Development Organization, underlined the importance of adapting green knowledge to different audiences and contexts. For example, engaging with SMEs is crucial to greening the global economy given their sheer number and role in international value chains, however they often face resource constraints which can vary according to the country and industry. UNIDO's approach involves creating partnerships between governments, academia and the private sector to tailor knowledge to meet the needs of SMEs. The GGKP Platforms play a key role in vetting and customising knowledge for SMEs. Mr. Al Hilali concluded by indicating that, in addition to sharing open-access knowledge, addressing funding and investment barriers is crucial to improving the environmental performance of SMEs.

In the open debate, speakers focused on the role of digitalisation for green growth and sustainable development, as well as on inclusivity issues. **Ingvild Solvang** highlighted the role that digital technologies can play in unlocking climate finance flows by improving access to information. **Elisa Tonda** noted that artificial intelligence can facilitate access to knowledge available on GGKP platforms by tailoring and summarising information for diverse users. **Smail Al Hilali** pointed out that the information exchange can go both ways: SMEs can use online digital tools to learn about green options, while platforms can learn about what SMEs need by observing what they search for. **Kumi Kitamori** stressed that STEM technologies are key to both the green and digital transitions, but that too few girls opt for this type of education. **Richard Damania** mentioned a recent MIT study on major technological innovations that suggests that their benefits mostly accrue to a few people in the short term before trickling down to the wider population, illustrating the importance of policy design to ensure that no-one is left behind.

Key takeaways:

- Knowledge and awareness of green growth issues has substantially increased over the past decade.
- Green growth knowledge must be adapted to different groups and contexts. Digital technologies, including artificial intelligence, can help to tailor information.
- Digital technologies can improve access to climate finance by improving access to information, streamlining transactions, and helping to track and monitor the use of funds.
- Collaboration is key to driving transformative change. Partnerships like the GGKP can play a crucial role in bringing together different stakeholders.
- Further research is needed on how to address the gender gap in STEM education, which hinders an equitable green and digital transition.