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Empowering citizens in Europe's green transition: The role of digital solutions

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Executive summary

As Europe undergoes the green transition, engaging citizens as both beneficiaries and active agents in combating climate change is vital. Deeper participation helps to mitigate costs, while promoting a more inclusive approach to the green transition.

Digital solutions support top-down and bottom-up methods of citizen involvement, ranging from citizen climate assemblies to online activism. These digital solutions can overcome obstacles like resource limitations, dwindling public trust, and a significant skills shortage in the green and digital arenas. Digital tools widen public participation and empower individuals to influence environmental policy.

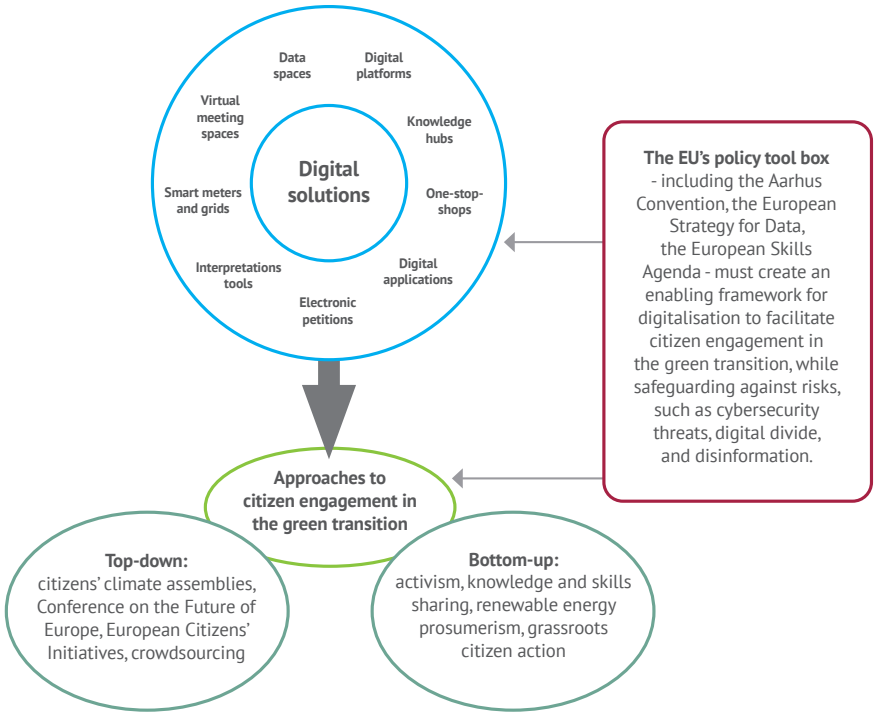
While digitalisation holds immense potential, it also introduces several challenges. Among these is the need to bridge gaps in digital literacy and access, while ensuring online spaces and processes are as safe for citizens as possible. Therefore, it is crucial to address these challenges to maximise benefits, mitigate negative externalities, and ensure a fair green transition.

This Discussion Paper highlights that the EU needs to:

- Intensify efforts to **place citizens at the heart of the twin transition, ensuring inclusive decision-making** that actively involves marginalised communities and minority groups, utilising digital tools to enhance accessibility and engagement.
- **Strengthen initiatives aimed at improving digital skills and literacy** at the EU and member state level to meet the EU's 2030 digital skills targets.
- Promote **open discussions about the trade-offs involved in the green transition, addressing the negative impacts of digitalisation** like cybersecurity risks and environmental pressures. This requires **comprehensive research on digitalisation's broader environmental impacts** to inform and develop effective mitigation strategies.
- Expand policy frameworks and access to digital information transfer tools, platforms, and technologies to **support individual agencies in undertaking sustainable practices**, including prosumerism and sustainable consumerism.
- **Encourage active participation in environmental decision-making through increased citizen access to environmental information**, specifically by intensifying efforts at the EU and member state level to electronically disseminate environmental information.

Fig. 1

FOSTERING CITIZEN ENGAGEMENT IN THE GREEN TRANSITION THROUGH DIGITALLY-ENABLED SOLUTIONS



Introduction

The Green Deal faces a reality check as protests and discontent sweep across Europe.[1] The success of the green transition relies on its ability to keep people on board and ensure the legitimacy of the Green Deal. However, ensuring public acceptance becomes increasingly challenging as citizens begin to feel the unavoidable trade-offs of the green transition, including employment shifts and increased consumer costs. As Europe navigates this necessary transition, it is crucial that citizens are fully engaged both as beneficiaries and proactive agents of change in the fight against climate change. While deeper citizen engagement does not eliminate transitional costs, it does help to mitigate these costs. Furthermore, it ensures citizens' voices are heard and their contributions valued, fostering a more inclusive and collective approach to the green transition.

Over recent years, citizen-led initiatives have emerged to address the climate crisis, paralleled by a comprehensive range of institutional efforts to integrate public voices into the policymaking process. Nevertheless, numerous factors still hinder effective citizen involvement in the green transition, including a lack of public trust, resource constraints, and skills for green jobs and a digitalised world. Digital transformation holds significant prospects to help overcome these barriers.

Online platforms, for example, can be used to exchange knowledge and resources that enable skills learning and empower community action. Decentralised energy systems and blockchain technology can even allow individuals to generate, distribute, and consume their own renewable energy, contributing to EU-wide energy targets.

While digitalisation offers novel solutions, there are also challenges associated with an increasingly digitalised society, including unequal access to digital products, the spread of disinformation and misinformation, and broader cybersecurity concerns. Understanding how the EU's policy framework can maximise the benefits of digital solutions for citizen engagement in the green transition, while minimising negative externalities, becomes crucial.

Understanding how to maximise the benefits of digital solutions for citizen engagement in the green transition while minimising negative externalities is crucial.

This Discussion Paper seeks to explore effective approaches and tools for citizen engagement at the intersection of democracy, the green transition and digitalisation. By analysing examples of top-down and bottom-up approaches, it identifies challenges and opportunities within this nexus and offers insights into how digitalisation can facilitate a more inclusive and practical green transition. Moreover, it examines ways in which the EU's policy and investment frameworks can better support digital tools as catalysts for citizen involvement in the green transition, while safeguarding against potential risks.

The findings in this Paper build on:

- A review of policy documents, studies, academic literature, and relevant EU legislation;
- Interviews with relevant stakeholders;
- Findings from two hybrid expert workshops organised by the EPC.

1. Digital strategies for citizen engagement in the green transition

Over three quarters of EU citizens view climate change as a pressing issue, with 85% supporting the transition to renewable energy.[2] To realise a green transition, citizens have actively engaged via both top-down and bottom-up initiatives. For the former, institutionally organised deliberative exercises have worked to include the voices of citizens in the decision-making process, such as through the Conference on the Future of Europe (CoFoE) at the EU level and the Citizens' Climate Assemblies at the national and regional levels. In parallel, citizen-led, or bottom-up, initiatives such as grassroots activism and digital education have also managed to mobilise segments of society and influence the EU's political agenda.

1.1. TOP-DOWN: INSTITUTIONALLY ORGANISED EXERCISES AND DIGITAL SOLUTIONS

At the EU level, citizen participation has been an established part of the institutional decision-making process for over a decade. While these top-down exercises encompass a range of topics, climate change frequently emerges as a priority issue, with citizens utilising institutionally led initiatives to further climate action. Consequently, this sub-section delves into specific EU-level participatory initiatives, such as the Conference on the Future of Europe (CoFoE) and European Citizens' Panels. Furthermore, it examines the role of crowdsourcing and citizens' climate assemblies in engaging citizens on climate-related issues, highlighting the use of digital solutions within these varied approaches.

1.1.1. EU-led participatory approaches

The Conference on the Future of Europe (CoFoE) and European Citizens' Panels (ECPs) represent significant advancements in participatory democracy within the EU. These initiatives are crucial as they provide a structured platform for citizens to directly influence policymaking on key issues like climate action.

The Conference on the Future of Europe

Held between 2021 and 2022, the CoFoE was an EU-wide series of citizen-led discussions on a broad array of issues seeking to improve participatory democracy in the EU by allowing citizens to share their ideas and visions for the future of Europe. The CoFoE was a joint initiative of the Commission, Parliament, and Council, comprising four European Citizens' Panels with 200 randomly selected citizens from all 27 member states each. Deliberations covered policy priorities for Europe on nine different topics, including climate change and environment, as well as digital transformation.[9]

Digital tools were central to the CoFoE, especially considering that several of the citizens' panels, including the plenary sessions, had to take place online due to the COVID-19 pandemic. In addition to EU-level panels, the CoFoE foresaw the organisation of citizens' at the national level in the member states, as well as a Multilingual Digital Platform.[10] The former allowed citizens to contribute online by submitting, endorsing, and commenting on policy proposals in any of the EU's 24 official languages. Citizens' inputs were then debated in a Conference Plenary, which brought together representatives of citizens and civil society with national and EU decision-makers. In this context, 49 proposals were drafted, making up the final report for the three EU Institutions.[11] Decidem's Multilingual Digital Platform software[12] also allowed simultaneous interpretation of all in-person and online sessions in 24 official EU languages.

LANDMARKS IN EU PARTICIPATORY PRACTICES:

Foundational to the CoFoE and ECPs were the European Citizens' Initiative (ECI), Citizens' Dialogues, and European Citizens' Consultations, having demonstrated the potential and importance of citizen engagement in shaping EU policies. These initiatives also highlight the evolution of digital tools in enhancing and facilitating citizen participation.

The European Citizens' Initiative (ECI)[3] was introduced via the Lisbon Treaty in 2009, allowing citizens to propose new legislative acts to the Commission. The ECI process is designed to take place entirely online, from the registration of the initiative to the collection of signatures and its final submission,[4] facilitating both logistics and allowing for trans-national exchange. From this process, several successful climate initiatives have emerged, highlighting the ECI as an effective pathway for advancing climate action.

The Citizens' Dialogues[5] were launched in 2012 at the initiative of the European Commission. The Dialogues consisted of townhall meetings in the member states, where EU policymakers could talk to citizens about their work, and the functioning of the Union and its decision-making. During the 2014-2019 mandate, almost 1,800 Citizens' Dialogues in around 700 cities, with over 200,000 Europeans took place, with priority policy issues including digital economy, climate action, energy and environment. Digital tools such as Sli.do, a platform for online polling, and apps were used to facilitate these exercises.[6]

The European Citizens' Consultations (ECCs) were introduced in 2018 throughout the EU to give citizens the opportunity to exchange opinions at nationally organised events on the future of the European Union. The consultations revealed that climate change was a chief concern for European citizens, who also sought more systematic engagement in the EU decision-making. The ECCs were complemented by an online survey hosted by the European Commission, providing a supranational dimension to the exercise. However, the low response rate and insufficient link between the online survey and the national ECCs prevented the survey from serving its envisioned purpose.[7] More broadly, a lack of clarity regarding the purpose of the exercise, fragmented approaches to citizen events across member states and insufficient follow-up by European institutions were weaknesses of the initiative that limited their policy impact.[8]

The CoFoE was an unprecedented exercise of citizen involvement in discussions concerning policy issues like the twin digital and green transition. Citizens could not only elevate the importance of issues like enhancing small-scale renewable energy production but suggest solutions like a digital product passport to educate consumers on sustainability. This process boosted the legitimacy of EU democracy and modernising European governance.

Despite being backed by an inter-institutional agreement among the European Commission, Parliament, and Council, the feedback loop with citizens was not closed at the end of the process. Nevertheless, the CoFoE resulted in concrete responses on behalf of the three EU institutions,[13] including from the Commission, which reflected several of the citizens' proposals in their 2023 Work Programme and launched a new generation of European Citizens' Panels on its key legislative proposals.

European Citizens' Panels

At the CoFoE closing event on 9 May 2022, European Commission President Ursula von der Leyen made the novel proposition of making citizens' panels a regular feature within the Commission's policymaking toolkit ahead of key legislative proposals. For the first time, the EU's executive body agreed to include input from transnational citizens' events in the formulation of new legislation, through the ECPs.

The first three panels, held between December 2022 and April 2023, brought together about 150 citizens from all 27 EU member states to discuss food waste, virtual worlds, and learning mobility. Two new panels – on energy efficiency and tackling hatred in society – were launched in 2024. All five panels followed the same structure, with two in-person meetings in Brussels and one online. Each session was divided into both plenary and working groups, with simultaneous translation into all 24 official EU languages. The recommendations from the first three panels were forwarded to the responsible Directorate General in the Commission, which came up with a feedback report[14] in February 2024. Despite these steps forward, it is still unclear whether commitment to the new generation of ECPs will continue in the next Commission after the 2024 European Elections.

The ECPs alongside the CoFoE have been critical avenues for citizens to elevate and participate in sustainability-related policy matters. They are also the first step towards making the EU's decision-making more participatory – crucial for ensuring the transition is not only green, but also just. However, ECPs are still not mainstreamed and institutionalised within the EU's decision-making process, while guaranteed consideration and weight of citizens' input is missing. These steps would not only enhance the quality and inclusivity of the Commission's legislative outputs, but also ensure policymaking is evidenced-based, fostering the legitimacy and quality of EU's democracy.[15]

The ECPs alongside the CoFoE have been crucial for ensuring the transition is not only green, but also just.

1.1.2. Crowdsourcing

Crowdsourcing, or "the activity of getting information or help for a project or a task from a large number of people, typically using the internet,"[16] has been used in environment and climate campaigns since the advent of Web 2.0, the participatory web. Crowdsourcing is a key example of using digital tools to foster citizen engagement. In 2022 and 2023, the Code Europe and Digidem projects conducted a crowdsourcing campaign in ten European cities to collect citizens' ideas on air quality.[17] In each city the project was broken into four phases: problem mapping, problem solving, ideas selection, and policy formulation. Online platforms were designed for each phase in each city, on which citizens could contribute with their opinions and ideas, complemented by in-person stakeholder meetings. Moreover, social media were used to promote the campaigns using videos and graphics, to engage people through fact-based information.

While the first phase received a significant contribution (45,888 site visits and 2,385 comments),[18] each phase saw progressively reduced turnout, with phase four only seeing 1,130 partakers.[19] The reasoning for reduced participation in subsequent phases could be the need for citizens to register on the online platform. In the Brussels campaign, organisers also acknowledged that participants were not willing to share their personal data when asked to register on the platform. In response, the organisers decided to focus on in-person campaigning, and even organised a contest with prizes for the participants as an incentive.[20] Further challenges included language barriers between organisers and communities,[21] the need to tailor campaigns to fit varying community populations, cultures and democratic processes,[22] and the need for campaigns to build on communities to engage not only existing, but also potential participants.[23] These issues could be addressed by employing digital approaches like multilingual platforms, social media campaigns and literacy initiatives on personal data protection.

1.1.3. Citizens' climate assemblies

The Citizens' Climate Assemblies, organised or commissioned by state and regional authorities, have been the most prominent example of national level participatory and deliberative panels. Since 2018, at least eight EU member states have had citizens' climate assemblies[24] – i.e. Ireland, France, Denmark, Finland,

Germany, Spain, Austria, Luxembourg, and Poland. In addition, similar exercises have taken place at the regional level. Across organised panels, the green transition (including topics like energy and biodiversity loss) has featured prominently.

When climate assemblies moved online after the COVID-19 pandemic, digital tools became an essential part of the exercise, from the selection of participants to the deliberative process and the outreach on outputs. These included videoconference software (mainly Zoom), collaborative platforms, messaging apps, tools created specifically for each exercise, or technologies designed to enable participatory democracy. One example is Decidim,[25] a platform that facilitates various participatory tools such as assemblies, offering features for setting up meetings, creating surveys, submitting proposals, voting, tracking results, and commenting.

In addition to more flexibility, online meeting spaces can also help citizens feel freer to express their opinions, including disagreement, due to a lack of group pressure. For the same reasons, however, finding consensus can be harder. Digital platforms also ease the management of exercises, while enabling the contribution of the wider public, offering them the opportunity to submit proposals or present recommendations to improve the existing ones. While this can open the door to a broader public, experience shows that feedback tends to come from organisations and lobbies with specific interests and technical expertise rather than random citizens.[26]

However, the digital setting faces challenges including generational and socio-economic gaps in digital access and skills that can skew societal representation. Moreover, online engagement can be less focused and contain less deliberation, while the online format can limit informal engagement in-between sessions and the creation of personal connections that are helpful for a more honest and open debate. There is also the issue that while digital solutions can ease participation, the effectiveness of deliberative exercises are constrained by the exercises' policy impact and procedural integrity. A report published by KNOCA in April 2023[27] found that the recommendations developed by climate assemblies were more ambitious than those of legislators. France's Citizens' Convention on Climate is a prime example, having resulted in 149 proposals, yet only 10% were fully accepted by the government, and a significant 53%—many of which were progressive climate initiatives—were outright rejected.[28]

While digital solutions can ease participation, the effectiveness of Citizens' Climate Assemblies ultimately relies on the political will to implement their input.

EXAMPLES OF DIGITAL TOOLS ACROSS CLIMATE ASSEMBLIES

The Austrian Citizens' Climate Assembly from January until June 2023 focused on Austria reaching climate neutrality by 2040. An online consultation of around 6,000 people was organised through a dedicated online platform, Polis, where the general public was able to rate 100 statements by the Assembly and add their own. The platform was then used to gauge participant sentiment on issues, enabling consensus building. Two webinars were also organised to inform the general public about the Assembly and its work.[29]

France's Citizens' Convention on Climate took place between October 2019 and June 2022 to identify measures to reduce greenhouse emissions 40% by 2030. The general public could send contributions on a Decidim online platform.[30] These were later synthesised by a contractor specialised in participatory projects and reviewed by the Convention's governance committee before being submitted to the Convention's members and published on the Convention's website.[31] Jenparle, a collaborative platform, was also used for internal communication and drafting of the assembly recommendations.[32]

The Spanish Citizens' Assembly for the Climate took place from November 2021 to May 2022. The members used collaborative digital tools (Groupmap, Mural, Jamboard, Miro, and Survey Monkey), as well as the Decidim collaborative platform to work between sessions and draft their recommendations.[33] An online consultation was organised, which counted on the participation of 1,458 people.

1.2. BOTTOM-UP: CITIZEN-LED INITIATIVES AND DIGITAL SOLUTIONS

The Green Deal underscores that citizens "are and should remain a driving force of the transition".[34] In securing this transition, the 2020 State of the Environment Report highlighted a crucial need to better connect knowledge with action.[35] While citizens are recognised as being integral to the green transition, the vast knowledge they offer and their capacity for action remains largely untapped. Bottom-up approaches stemming from citizens or civil society offer a vital pathway to success in the green transition, with digital tools significantly facilitating this engagement. Technology enhances the capacity of individuals and civil society groups to organise, mobilise and innovate for social change, by creating online spaces that are accessible and dynamic, while overcoming limitations such as physical boundaries. The following section looks at digital solutions in four approaches to bottom-up citizen engagement: education, digital civic activism, grassroots movements, and prosumerism.

1.2.1. Education

Education through issue awareness, informed consumerism, skills-learning, and guidance provides citizens with the tools to actively participate in the green transition. Education leads to changes in behaviour, with a 2022 IPCC report finding individual lifestyle changes having the potential to reduce greenhouse gas emissions 40-70% by 2050.[36] Digital solutions play a crucial role in sharing, accessing, and disseminating relevant information to the public to encourage such change.

Online platforms and social media are increasingly used to generate awareness on critical climate change issues, whether it be through information campaigns or targeted groups. More recently, social media has been evolving into a primary news source for citizens within the EU,[37] making it an increasingly important space for climate information dissemination. Positively, social media's low barrier to entry makes it a space where citizens can engage with each other on issues, fostering a community of active participants.

Beyond helping to raise awareness, digitalisation can help to leverage environmental information to encourage behaviour change. For instance, citizens can use apps to measure factors like daily energy consumption. These technologies can not only offer figures, but also targeted guidance to decrease individual impact. By providing additional information, digital tools can also encourage informed consumerism, such as the Think Dirty app that allows users to scan product barcodes for ratings on ingredient toxicity.[38]

Digital tools like one-stop-shops and knowledge hubs are crucial for sharing information to encourage behaviour change.

EXAMPLES OF DIGITAL TOOLS FOR EDUCATION:

The TwinRevolution project offers vocational education and training resources to better align manufacturing and traditional industry sector needs in the twin digital and green transition. Resources encompass a comprehensive curriculum with complementary online training courses and interactive tools designed to equip individuals with essential digital and green skills for the manufacturing and traditional industry sectors.

The AURORA Energy Tracker mobile application motivates users to reduce their environmental impact by enabling them to monitor their carbon footprint through the input of electricity, heating, and transportation data. The app additionally features the ability to track energy usage trends over time, while providing personalised suggestions for lowering energy consumption and fostering sustainable living practices.

The Energy Community Platform is an example of an online, one-stop-shop for resources on energy communities. It offers a networking space complemented by an interactive map showcasing energy communities across Europe. The platform also acts as a knowledge repository with guidelines, including a maturity test that allows energy communities to assess their objectives and weaknesses, offering customised resources to address them.

ECOLISE serves as a knowledge and network hub for European community-based initiatives dedicated to sustainability, employing digital tools to amplify their efforts. Through newsletters, social media, workshops, and open online meeting series, ECOLISE facilitates awareness of community-led projects, encourages the exchange of knowledge and experiences within networks, and aims to influence decision-makers. ECOLISE also serves as a knowledge repository, embodied by the ECOLISEWiki, an online information archive in its pilot stage that gathers and allows sharing of knowledge among ECOLISE member networks and supporters.

Digital platforms, like community-to-community knowledge hubs, enhance knowledge sharing, and improving skills and employability in the green transition. The global ecovillage network (GEN), for instance, provides a communal solutions library with guidelines on practices like installing solar panels for communities to trial, tailor and share with others.[39] Similarly, by offering guidelines and support on regulatory and institutional capacities, digital one-stop-shops ensure citizen engagement is informed and simplified. For example, the Horizon Europe INNOVATE project created a virtual one-stop-shop for homeowners interested in energy retrofits,[40] while the Austrian government has a dedicated Energy Communities Platform with online tools and resources to ease energy community creation and operation.[41] In these instances, digital tools provide guidance and clarity on procedures that increases accessibility. Despite their promise, online platforms like one-stop-shops are not yet universally accessible, and raising awareness of their existence remains a hurdle.

Digital education initiatives encounter challenges, however, including the issue of disinformation and unverified information. For citizens, navigating the multitude of informational platforms and tools like labels can also be overwhelming.

1.2.2. Digital civic activism

Activism allows the public to highlight gaps between public will and governmental environmental actions, acting as a catalyst for change. With its low barrier to entry, digital activism is more accessible to the internet-equipped public, with a wider geographical reach. For example, the #ClimateChangedMe campaign, launched by the International Federation of Red Cross and Red Crescent Societies, encouraged individuals worldwide to share online their personal experiences with climate change, culminating in a published book of these accounts.[42] This new wave of activism is not dependent on established organisations or financial resources, promoting self-organisation and often sparking more offline action, as exemplified by the growing youth digital movement.[43] Digital activism has also been fostered by non-grassroots entities, enhancing credibility and outreach, as seen with The Guardian and 350.org's 2015 "Keep it in the ground" campaign against fossil fuel reliance.[44] Technology can thus be seen as carving out a vital space for citizens to mobilise, communicate and collectively engage.

Technology creates a vital space for citizens to mobilise, communicate, and collectively engage, serving as an alternative when offline protesting is risky or not possible.

Digitalisation also enables specific resources for digital activism, such as electronic petitions (e-petitions). These tools enable individuals and communities to initiate, view, sign, and discuss petitions.[45] These petitions offer a direct ear to governmental authorities on issues of public concern, including those pertaining to the green transition.

As Europe witnesses increasingly strict measures against environmental activists, labelled by the Commissioner for Human Rights of the Council of Europe as unjust and repressive in some instances,[46] digital platforms can serve as vital alternatives. Online platforms can serve as substitute spaces when offline protesting poses risks or helps spotlight the unjust treatment of activists. Digital tools serve as a double-edged sword, however, with technology enabling the surveillance and censorship of activists by governments and platforms, as well as harassment of activists. Moreover, digital activism itself can pose a cybersecurity threat through 'hacktivism' where hacking is the medium of protest.[47, 48]

EXAMPLES OF DIGITAL TOOLS FOR DIGITAL CIVIC ACTIVISM:

Fridays For Future Digital (FFFD) was introduced as part of the global Fridays For Future youth climate movement. FFFD acts as both a digital resource as well as a knowledge and training hub for digital activism. Furthermore, FFFD provides a space for those who cannot participate in person, through organising online events such as panels and hashtag campaigns.

As part of Extinction Rebellion, Digital Rebellion uses digital activism to raise awareness on climate justice issues. Digital Rebellion uses social media and email alerts to promote in-person activism, but also to encourage online activism by sharing materials like online petitions and reports, and by participating in awareness-raising campaigns.

The Estonian government facilitates e-petitions through an easy-to-use online platform, where users can initiate or sign petitions. Information can also be reviewed on issues within the petition, its status, the count of signatures received versus the target required, and public comments on the petition. Previous petitions have included petitions against building mines and support for protected areas.

1.2.3. Grassroots citizen action

Grassroots initiatives involve communities from the local to global levels creating innovative solutions to climate challenges. These movements offer the benefit of circumventing bureaucratic delays and quickly mobilising individual action. Within some of these movements, technology is a central component. The 'maker' movement centres around open access blueprints and fabrication workshops (fablabs or makerspaces), to make technology and know-how publicly accessible.[49] For example, Open Source Ecology distributes free online machine designs to provide end-users with their own production guidance.[50] Similarly, POC21, a grassroots event in Paris 2015, saw participants collaborate over several weeks to invent open-source blueprints for sustainable living products like affordable wind turbines and energy-saving kettles.[51] Across Europe, workshops equipped with technology, like 3D printers, provide open spaces for citizens to turn such blueprints into products.[52] Consequently, the maker movement holds significant potential to empower citizens with the resources and agency needed to engage in upcycling, repairs, and sustainable manufacturing, thereby contributing to a circular economy.

Digital tools also bolster the citizen science movement, democratising research and enhancing local knowledge integration. This approach is often facilitated by scientists or governments who delegate data collection and analysis to volunteers. For instance, Wageningen University utilises WebApps for citizens to enter self-collected data on water quality, supporting research with a blend of top-down organisation and bottom-up participation.[53] Another examples is the European Citizen Science Association, which serves as a hub for citizen science initiatives across Europe, providing an online space for best practices, tools, trainings and legal frameworks to support community-led scientific endeavours.[54]

Although initiatives like citizen science aim to broaden stakeholder engagement, they often attract volunteers from homogeneous demographic groups.[55] Thus, while digital tools increase the accessibility and reach of grassroots movements, the inclusion of vulnerable populations remains a challenge for some movements.

EXAMPLES OF DIGITAL TOOLS FOR CITIZEN SCIENCE:

Citizensensing is an app that enables citizens to contribute data on local environmental conditions like water quality and infrastructural damage. It acts as a Participatory Risk Management System, integrating user-submitted data with existing climate risk management guidelines. Through the app, citizens actively participate in climate risk assessment and receive personalised action recommendations, fostering community engagement in the green transition.

Sensor.Community is an infrastructure for citizen science that facilitates individuals to build sensor boxes, collect data on factors like air quality, and openly exchange this data online. Sensor.Community complements the Samen Meten platform, where such data from citizen scientists is mapped alongside official data from stakeholders like public authorities.

Through the GreenSCENT Environmental Monitoring app, individuals will be able to report and track local environmental issues using their smartphones. These user-generated reports, including photos and videos, are shared on the GreenVERSE platform for others to view and engage with, fostering a user community focused on environmental awareness and collaboration, while reflecting real-time changes.

1.2.4. Prosumerism

Prosumerism, a combination of the words 'producer' and 'consumer', entails consumers both producing and consuming their own goods, in this case energy. Digital tools can support the trend towards prosumerism, supporting citizen engagement and bottom-up initiatives like locally led energy communities.

In 2016, the concept of energy communities was new in European policymaking. The Clean Energy Package was introduced in 2019 to move away from the traditional energy supply model and create a decarbonised, decentralised, and digitalised system. In that spirit, energy communities aim to place people at the heart of this clean energy transition that is underway in European countries. In addition, they seek to help address issues such as energy poverty by empowering citizens and communities, both directly and indirectly.

Energy communities aim to place people at the heart of the energy transition. Digital tools can enable widespread participation and accessibility in this effort.

Digital solutions play a crucial role in enabling diverse activities within energy communities and are relevant across the entire chain of energy production, from community design, monitoring, and management of energy flows to engagement with consumers. They facilitate energy sharing, optimise self-consumption and maximise the benefits of flexibility services. Furthermore, digital tools have the potential to enable widespread participation and accessibility.

According to the Energy Communities Repository, there are two different types of digital tools used by energy communities: digital tools for internal management and communication, and for operations. The former is to manage the internal processes of energy sharing, the relationship between customers and members, and communications between each company involved. The primary tools utilised by energy communities are digital platforms. These platforms enable users to monitor and manage their energy consumption, participate in the wholesale market and benefit from renewable energy sources.

Although significant progress has been made, energy communities still face numerous barriers, many related to human factors such as; lack of knowledge and technical resources, financial constraints and unclear policy frameworks in various member states.

Digital platforms used by many energy communities lack regulation or a framework to address data sharing, including privacy, consent, and identity at a local level, causing challenges for these communities regarding the use of digital platforms and data spaces. One of the major challenges energy communities face is their dependence on traditional suppliers. This can lead to communities becoming reliant on specific distributors and suppliers to support the creation of these platforms. Standardisation and interoperability are important concerns within the broader power system, particularly in the context of energy communities. Finally, the inclusion of more vulnerable households in energy communities remains a challenge, despite the potential of digital tools to increase accessibility and participation. Finally, significant gender gaps still exist regarding female participation in energy communities, particularly for women from vulnerable groups.

EXAMPLES OF DIGITAL TOOLS FOR PROSUMERISM:

Som Comunitats is an online platform used by many communities in Spain for internal management purposes. This platform helps energy communities to manage their activities, including data visualisation for individual users, project management tools and other administrative tasks. In addition, Som Comunitats provides one-stop-shops and supports organisations that wish to create energy communities.

The Dutch ENTRNCE Trader developed by Alliander, is a digital platform for operations, which enables producers and consumers to directly exchange electricity with each other.

The EnergyID app aims to help communities and individual consumers collect, analyse, and compare their energy data by sharing it with groups of their choice. EnergyID processes the data of users into simple graphs to help them understand their consumption patterns and what they are currently saving. A benchmarking module allows users to compare quickly with others.

A similar activity of collecting, calculating, and analysing data on energy production and consumption is provided by the MARS software platform used in Croatia. In particular, this software uses the Internet of Things (IoT) to automatically collect and integrate data from smart meters and advanced sensors. Other tools, such as Hoomdossier are used to provide online support for home energy renovation services.[56]

1.3. CHALLENGES RELATED TO DIGITAL SOLUTIONS

While digital tools provide opportunities to address numerous non-digital challenges, they also introduce their own challenges. Building on the approach-specific challenges briefly identified in the previous sections, this section provides a comprehensive overview of the general trends associated with the use of digital solutions. These challenges are grouped into four overarching issues areas: data access and useability, security, environment, and social.

Data and information challenges

When it comes to citizen engagement, having access to data can empower individuals to make informed decisions that can lead to more sustainable behaviour. However, accessing this crucial data presents a significant challenge. As the volume of data grows, ensuring that it is standardised, interoperable, and useable across different sectors is crucial, yet challenging for data holders. Moreover, there is a gap in knowledge regarding how and where to access generated data and how this access can benefit citizens or third parties, should they choose to share it. There is thus a need for improved digital literacy to comprehend issues related to consent, data usage, and personal data utilisation.

Challenges with data can also impact citizens' access to environmental information. Difficulties in accessing and processing data hinder the dissemination of essential insights. Even environmental information available exists in a fragmented ecosystem of public and private platforms. Consequently, while participation in environmental decision-making relies heavily on information, citizens face a scenario where this resource is hard to access and difficult to make sense of, creating barriers to effective engagement.

There is a gap in knowledge regarding how and where to access generated data and how this access can benefit citizens or third parties.

Security challenges

As the green transition becomes increasingly digitalised, with citizen devices more interconnected than ever, the landscape of security risks broaden significantly. The 2023 European Union Agency for Cybersecurity (ENISA) Threat Landscape report identified eight prime threats, including threats against data, information

manipulation, and supply chain attacks, such as those targeting power grids.[57] The generation and access of vast amounts of data raise serious concerns regarding privacy, necessitating rigorous measures to safeguard against unauthorised access and enhance cybersecurity. This need extends beyond individual data protection to the security of digital infrastructures and spaces, which are foundational to the transition. Interference by foreign actors presents a particular risk to infrastructure security given current geopolitical tensions. According to the International Energy Agency, cyberattacks on utilities have been increasing since 2018 with a significant increase observed following the Russian invasion of Ukraine in 2022.[58] Specifically, the average weekly cyberattacks escalated from 504 in 2020 to 1,101 in 2022. Despite the vulnerability of this sector, a report by ENISA showed that the energy sector is ranked behind sectors such as transport, banking and healthcare when it comes to IT spending on cybersecurity.[59]

As the green transition becomes more digitalised, the landscape of security risks broaden significantly.

Environmental challenges

Digitalisation carries its own environmental footprint, spanning from energy and power servers to the rise in manufacturing and waste of digital goods. The full magnitude and breadth of this impact remains largely unknown.[60] However, existing research has shed light on known issues. For example, the expansion of cloud computing services, coupled with short product lifetimes and replacement cycles, is driving an increase in e-waste, projected to reach 74.7 million tons by 2030.[61] The mining of materials for digital goods poses a challenge as well, with data showing at least 16% of the world's mines and critical mineral deposits located in areas already facing high or extremely high levels of water stress.[62] Furthermore, with the increased use of digital technologies comes an increase in energy use. European studies reveal that data centres in the EU used an estimated 45–65 TWh of electricity in 2022, accounting for 1.8–2.6% of total EU electricity use.[63] Moreover, the International Energy Agency (IEA) estimates that data centres' consumption could rise to more than 1,000TWh by 2026 in a worst-case scenario.[64] In addition to consuming significant amounts of energy, data centres also use a substantial amount of water; one study found that Chat GPT-3 requires the equivalent of a 500ml bottle of water for about 10 to 50 responses.[65] As a result, the Information and Communication Technologies (ICT) sector is accountable for an estimated 1.7% of global emissions,[66] almost equivalent to the aviation sector[67] and expected to increase further.[68] Understanding and effectively mitigating these effects become even more crucial as technology is increasingly presented as a solution to these very issues.

Social challenges

The surge in digital tool usage brings with it a complex web of social challenges. A glaring issue is the escalating necessity for digital skills; over 90% of jobs in Europe now demand basic digital competencies.[69] However, Eurostat highlights a persistent digital gender gap, with men more likely than women to possess these essential skills.[70] Europe's population is also aging, with a concentration of older generations in rural areas.[71] As older individuals tend to be less digitally savvy and rural areas more prone to connectivity issues, this is likely to exacerbate the digital divide. Moreover, maintaining the literacy necessary to navigate and compare indicators across a growing array of digital platforms and tools can be overwhelming for users.

Access to digital tools—and by extension, their benefits—is also uneven, influenced by factors such as skill levels, cost and connectivity infrastructure. Despite the critical nature of fibre networks for high-speed internet, within the EU they only extend to 56% of households, and while 5G coverage reaches 81% of the population, disparities remain.[72] Regarding the speed of internet, the 9th Cohesion Report shows that disparities remain not only within member states, but also between European regions.[73]

Access to digital tools and their benefits is uneven, influenced by skill levels, cost, and connectivity infrastructure.

The safety and security of online spaces is a great challenge to the digital movement, especially with regard to digital activism and the surveillance of citizens. Furthermore, the pervasive issue of disinformation and unverified information on social media[74] undermines its reliability as a digital tool for increasing awareness, sometimes exacerbating polarisation on crucial climate issues. Disinformation campaigns have the potential to erode public support for the green transition, especially as the increased utilisation of digital tools furnishes them with greater ammunition. Geopolitical tensions amplify disinformation concerns in particular through interference from foreign actors.[75] Moreover, generative artificial intelligence gives disinformation a new dimension, as openly available and unregulated tools allow anyone to generate false information and content.

2. Existing policy framework

Two-thirds of Europeans believe technology is critical in averting climate change.[76] To utilise digital tools to make a meaningful contribution to this goal, citizens must have not only the necessary entry frameworks but also protections. The European Declaration on Digital Rights and Principles[77] alongside Europe's Digital Decade 2030 targets[78] highlight the EU's focus on a digital transformation that places citizens at its core, with objectives such as universal access to internet, digital skills, and data control. As highlighted in section 1.3, however, there are several challenges unique to the use of digital tools. This section will explore how current EU policies relate to the previously identified challenges. To do so, this section will begin by examining the policy framework for democratic engagement and participation, exploring how digital solutions can enhance efforts or overcome identified hurdles. The section will go on to explore EU policies as they relate to the challenges from section 1.3, including access to data and information, data privacy, cybersecurity, disinformation, and addressing the digital divide through skills and training. Moreover, it will examine policies that empower individuals to engage in sustainable practices, specifically sustainable consumerism to mitigate the environmental impacts of digital products and prosumerism to accelerate the energy transition. The section will end with a brief look at key funding instruments.

2.1. DEMOCRATIC ENGAGEMENT

To empower citizen participation in the green transition through digital tools, a robust environmental democracy[79] framework is essential. In the EU, this foundation is established through legal grounds, specifically the Aarhus Convention and EU directives that implement this agreement.

The Aarhus Convention, established in 1998, aims to secure environmental rights internationally, focusing on three main pillars: the right to access environmental information, participate in public decision-making, and access environmental justice.[80] Having been adopted by the EU and all its member countries, the Aarhus Convention has fostered greater engagement of the EU's civil society and public in environmental matters and, through this, increased access to information, transparency and accountability.[81]

Digital tools play a critical role in ensuring public access to environmental information under the Aarhus Convention. In the case of Ukraine, digital tools have aided implementation amidst war through new digital platforms where citizens can easily access general environmental information (EcoSystem) and environmental risks (EcoZagroza). Moreover, digital innovation is integral to the application of this pillar as well. The right to access environmental information is reflected at the EU level through the Directive on Public Access to Environmental Information (referred to hereinafter as Directive 2003/4/EC) and the INSPIRE Directive.[82] The former not only cements public access to such information as outlined in Aarhus, but elevates the role of digital tools by encouraging electronic information dissemination. While INSPIRE Directive is perhaps less obviously citizen-centered, it established an important framework for spatial environmental data in Europe, making it more digitally available, interoperable and, essentially, usable across different sectors. As a package, these policies and their reliance on digital methods improve the sharing and accessibility of environmental data for citizens.

Implementation of this package remains a significant hurdle though, with a 2022 Environmental Implementation Review (EIR) of Hungary providing a case in point. The review found Hungary's implementation of the INSPIRE Directive and data accessibility to be poor, including criticisms such as the failure to provide certain assessment reports online—instead necessitating in-person visits.[83] In fact, as of 2020, no member state had fully implemented the INSPIRE Directive in line with its roadmap,[84] while a 2021 Aarhus Convention status report showed information requests met with delays and incomplete information.[85] The reasons for this gap are varied, including resource and technical capacity limitations, lack of connected environmental information systems, and a lack of interoperability and fragmented datasets. A major challenge is also weighing public access rights with concerns like data confidentiality, industry competitiveness, and intellectual property, the latter of which is particularly complex as copyright can be used to purposefully circumvent public access.[86] As a result, citizens not only face challenges requesting information, but also a fragmented and confusing state of disseminated information, evidenced by Bulgaria's landscape of over 530 relevant online databases.[87]

For the second pillar, public participation, the integration of digital processes is not as entrenched within the policy framework. Nevertheless, online solutions present a significant opportunity to galvanize citizen participation. In the EU, public participation, is guaranteed through Directive 2003/35/EC, which not only ensures that citizens are informed about environmental plans and programs but also provides avenues for active engagement. The only reference to digital methods in the directive, however, is the encouraged use of electronic public notices. This approach is mirrored in the EU's directives for Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs), that play a crucial role in ensuring citizen engagement in development projects and high-level policy formulation respectively.

While the use of digital methods across these policies is encouraged to inform citizens, there is a notable gap: the use of digital methods to facilitate the actual act of

participation. Estonia (see case study below) provides a glimpse of this potential, demonstrating a more integrated approach where digital platforms enable direct and easy citizen engagement in environmental decision-making processes. There lies an opportunity for the EU to further encourage the development and adoption of online tools to enhance public participation. The importance of such digital facilitation becomes even more critical as legislative changes like the Net Zero Industry Act seek to expedite net-zero technology projects through reduced permitting times, potentially curtailing thorough public engagement. As environmental decision-making accelerates, maintaining robust digital pathways for public input is essential for meaningful, efficient and eased community involvement in these expedited procedures.

CASE STUDY OF DIGITAL TOOLS IN THE IMPLEMENTATION OF THE AARHUS CONVENTION: ESTONIA

Estonia's use of digital tools in implementing Aarhus showcases the potential of technology to enhance democratic engagement, transparency, and efficiency in environmental governance.

Access to environmental information: Environmental information is mainly published on Estonia's environmental portal, containing data but also resources, like blogs, to make data more digestible. Supplementary resources include KESE, an environmental monitoring data system, and various portals providing air quality data, spatial data, fuel monitoring reports, and species biodiversity information. These platforms ensure that environmental information is readily accessible to the public. Estonia's State Gazette, Riigi Teataja, is also available entirely online, listing all legislation, amendments and procedural information.

Public participation: The Electronic Coordination System for Draft Legislation and VOLIS platforms work together to allow citizens to track legislation and submit comments at the national and local levels, all online. Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) proceedings are also open to the public through these means. The Citizen Initiative Portal empowers individuals to propose or support initiatives at national and local levels, in addition to guidelines for engaging in initiatives at the EU level.

2.2. ACCESS TO DATA AND A SINGLE MARKET

Only a fraction of data generated in the EU is used, in part due to legal and infrastructural hurdles. The European Strategy for Data, adopted in 2020, seeks to overcome these obstacles, primarily through expanding the sharing of and access to information. This goal is supported by two policies: the Data Governance Act (DGA) of 2020[88] and the Data Act (DA) of 2022.[89] While the DGA aims to facilitate data sharing and availability, the DA specifies who can generate value from data and under which conditions. As a result, citizens gain greater control of and access to their data. This strengthened access is significant for citizens as it provides opportunities for more sustainable behaviours, such as reduced energy consumption based on device insights. The challenge is that the EU often places the burden of protecting personal data and making informed consent decisions on the individual, a task that is particularly daunting when there is a general lack of digital literacy, as outlined in section 1.3.

The DGA and DA also serve as the basis for establishing a single market for data through 14 sector-specific Common European Data Spaces[90] (referred to hereinafter as data spaces). Data spaces are intended to increase not only data availability by facilitating sharing and interoperability across data holders and users, but also by easing access to data through connected, sector-specific spaces. As a result, public access to information should be strengthened. However, to ensure this in practice, data spaces will require inclusion of public information, while not falling prey to the challenges outlined in section 2.1, including public access, usability for a wide audience, data interoperability, and fragmentation. The GreenData4All initiative[91] is the Green Deal Data Space's way of overcoming known issues like fragmented and unconnected data systems through a review and revision of the INSPIRE Directive and the Directive 2003/35/EC.

As environmental decision-making accelerates, maintaining robust digital pathways for public input is essential for meaningful, efficient and eased community involvement.

The Green Deal Data Space remains largely conceptual at this point, however, with many projects still awaiting full implementation. Consequently, its ability to navigate these major challenges remains untested. Fundamentally, the success of this data sharing ecosystem relies on its usability and relevance to data users and stakeholders, which might be difficult to achieve, especially in the early stages. For citizens, potential challenges could also arise from the role of data intermediaries, who as outlined by the DGA, act as middlemen between data holders and users. While intended to boost trust and data sharing, involving intermediaries unnecessarily could extend the supply chain and raise costs for accessing data.[92] The ability to ensure their neutrality is also a concern, which could potentially compromise the quality of the data as well.

Moreover, when these intermediaries handle large volumes of data from holders, it becomes difficult to definitively determine when personal data processing occurs, necessitating GDPR compliance.[93] This ambiguity could lead to data privacy issues for citizens.

2.3. DISINFORMATION AND CYBERSECURITY

With the increased use of digital tools and spaces, the spread of disinformation becomes a growing concern due to its ability to undermine public trust and acceptance of facts, increase polarisation on important topics like climate change, and threaten democracy. To diminish the impact of disinformation, the European Parliament adopted the Artificial Intelligence Act (AI Act) in March, 2024.[94] The act mandated markings to help the public identify AI generated content and become attuned to disinformation efforts.

With the increased use of digital spaces, the spread of disinformation on topics like climate change becomes a growing concern.

To halt the spread of disinformation and fake content, however, the EU mainly relies on the Digital Services Act (DSA), which includes rules for digital platforms on tackling disinformation.[95] The 2022 Strengthened Code of Practice on Disinformation works alongside the DSA, encouraging industry to take measures like fact-checking to combat disinformation.[96] To address disinformation requires implementation on par with its rapidly evolving nature. Despite this, many member states missed the 17 February 2024 deadline to appoint a national Digital Services Coordinator, crucial for enforcing the DSA.[97] The challenge of disinformation more generally is compounded by the difficulty in defining disinformation and the delicate balance between controlling misinformation and safeguarding freedom of speech.

Cybersecurity also becomes an increasing risk as citizens become more digitally connected. To address this concern, the EU adopted the Network and Information Security 2 (NIS2) Directive in 2022, addressing the deficiencies of its earlier cybersecurity legislation, the NIS.[98] One major change is the increased scope of NIS2 and the services and sectors it applies to, with one such sector being the energy sector. The significance of this expanded coverage is enhanced protection of critical infrastructure against cyberattacks, whether it be power grids or data spaces. Cybersecurity is also essential in protecting citizens' personal information as data plays an increasing role in the twin digital and green transition. While the General Data Protection Regulation safeguards citizens' data through collection and processing requirements,[99] the NIS2 Directive further secures this data from cyberattacks. Moreover, the NIS2 will be complemented by the Cyber Resilience Act, approved in March 2024, that will set manufacturing requirements to protect citizens' connected devices against cyberattacks.[100]

While these policies safeguard the public, citizens can inadvertently become security threats themselves, primarily due to a lack of awareness and expertise. As a result, these policies are complemented by EU-wide efforts to equip end-users with digital skills, thereby reducing vulnerability to such threats while supplying the ICT industry with a skilled workforce.

2.4. DIGITAL SKILLS AND TRAINING

While skills and training strengthen users, thereby making the use of digital tools and data spaces more secure, they also address the digital divide by encouraging use and stimulating job opportunities. There is a strong foundation for digital skills and learning in the EU. The European Pillar of Social Rights, for instance, highlights the importance of digital skills and new green jobs to aid efforts to reach its goal of reducing people at risk of poverty by at least 15 million,[101] while the Digital Decade's 2030 targets included basic digital skills for 80% of the population and 20 million ICT specialists at minimum.[102] This urgency for digital skills has resulted in multiple targeted EU initiatives. The European Skills Agenda lays out a five-year plan to help EU citizens develop new skills and adapt to changes in the job market, with action item 6 of the agenda specifically targeted to the twin transitions.[103] In the context of digital skills, it focuses on enhancing individuals' proficiency in areas such as digital literacy, coding, cybersecurity, data analytics, and emerging technologies, through upskilling and reskilling programmes, trainings, and education initiatives.

Despite a strong foundation of policy initiatives for digital skills and learning, the EU remains short of its relevant 2030 digital goals.

To acquire such skills, the Digital Skills and Jobs Platform,[104] in addition to the Cybersecurity Skills Academy,[105] offer access to resources on jobs and funding, training courses, and predeveloped learning paths. Digital skills training is also embedded within wider initiatives, such as the Green Deal Industrial Plan's Net-Zero Industry Academies for up- and re-skilling,[106] and the allocation of €22.4 million by the Just Transition Fund, aimed at enhancing digital

skills in regions hardest hit by the green transition.[107] Moreover, the Digital Education Action Plan aims to evolve education and training systems to better support digital skills learning, including a European Digital Skills Certificate citizens could earn.[108]

Despite these efforts, the EU is short of its relevant 2030 digital goals. Only 68% of the public has acquired basic digital skills compared to an 80% target, while only 47% of its ICT specialist employment target has been met.[109] Moreover, digital literacy and skills are just two factors contributing to the digital divide, with barriers such as network connectivity, particularly in rural areas, and cost of entry persisting.[110]

2.5. INCLUSION WITHIN RENEWABLE PROSUMERISM

The EU has initiated a suite of policies aimed at enhancing citizen participation in the green transition through energy sharing and energy communities. These digitally facilitated initiatives are primarily supported by three key policies: the Renewable Energy Directive II (RED II),[111] which sets the legal framework for renewable energy production and supports the formation of energy communities; the Internal Electricity Market Directive (IEMD)[112] which updates the electricity market to incentivise citizen access and ensure system stability with increased renewable energy; and the Electricity Market Design Regulation (EMDR)[113] which promotes local energy trading within communities, enhancing the feasibility of community energy initiatives. Together, these measures create the necessary conditions for citizens to leverage digital technology to engage in renewable energy production and consumption.

However, the reality is that the digitally enabled opportunities created by these policies are not uniformly accessible. The 2024 Energy Communities Repository report reveals that vulnerable and energy-poor households often remain exogenous to these initiatives.[114] Moreover, a 2022 survey indicates that engaging those left behind is not a primary concern, with only 5% of energy communities prioritising engagement with vulnerable groups.[115]

The reasons for unequal accessibility can be attributed to several factors, including technical challenges such as a lack of digital literacy and skills, alongside informational hurdles. There are also financial barriers. The variety of current subsidies and funding to support the development of prosumerism (e.g. grants, low-interest loans, tax credits, feed-in tariffs etc.) are difficult to navigate. Subsidies also mainly reward households who have the financial means to establish or join energy communities, or to install renewable energy systems in their homes. As such, their current implementation risks leaving behind those most in need of support. Furthermore, the EU would be hard-pressed to ensure greater access without increasing funding, yet even maintaining current funding levels is uncertain given the Recovery and Resilience Facility's (RRF) conclusion in 2026 (a main funding source for EU energy communities).[116]

Despite these challenges, there is a silver lining. Digital solutions such as one-stop-shops for navigating regulations and funding, and online digital and energy literacy programs, present innovative ways to overcome these barriers, enhancing participation in the green transition.

2.6. SUSTAINABLE DIGITAL GOODS

Through policies for informed consumerism, citizens are empowered to address the environmental footprint of increased digitalisation by purchasing more sustainable products and increasing product lifespan via repairs. The proposed Ecodesign for Sustainable Products Regulation (ESPR) builds on the current Ecodesign Directive, resulting in more sustainable product options through requirements on durability, reusability and resource efficiency.[117]

Through policies of informed consumerism, citizens are empowered to address the environmental footprint of increased digitalisation.

Policies are also easing the comparison of products based on sustainability factors. Under the ESPR, the Digital Product Passport (DPP) will provide product environmental information through mediums such as a barcode. Similarly, as of June 2025 energy labelling requirements will be expanded to include smartphones and tablets on the EU market.[118] This inclusion allows these devices to be added to the European Product Registry for Energy Labelling (EPREL), where citizens can compare all energy-labelled products online, based on factors like energy efficiency, battery life, and reparability.[119] These are complemented by the proposed Right-to-Repair (R2R) Directive. The R2R, if adopted, would make repairs accessible, while banning manufacturing practices that prevent independent repair and refurbishment.[120] Additionally, the R2R would ease repairs for citizens through an online platform that connects consumers with repairers, but also by mandating a minimum of one initiative per member state that incentivises repairs at the individual level, such as through repair vouchers for citizens.

The predominant challenge will be ensuring information is user-friendly and easily comprehendible. When comparing the rollout time for these initiatives (two years in the case of ecodesign and energy labelling for smartphones and tablets) against the pace of digitalisation, there is also a clear mismatch, highlighting the risk that such policies may struggle to keep stride. Furthermore, while the repair movement is essential for reducing product lifecycle impact,

it also plays a role in addressing Europe's digital divide by enhancing the availability of products and services. As initiatives promoting accessibility, such as repair vouchers under R2R, are poised for national implementation, ensuring their effective targeting and reach to low-income households will be crucial.

2.7. KEY FUNDING INSTRUMENTS

The use of digital tools for citizen engagement in the green transition is supported by several EU funding instruments. The Digital Europe Programme allocated €7.5 billion (MFF 2021/27) across five crucial areas including advanced digital skills and promoting the widespread use of digital technologies.[121] The 2023-2024 Work Programme sets forth objectives to tackle the twin digital and green transition, such as the introduction of a digital product passport to facilitate a shift towards a circular economy.[122] The promotion of digital skills is also largely supported by the European Social Fund Plus (ESF+).[123] The ESF+ is centred around investing in its citizens, with employment and skills training being two large issue areas. The Employment and Social Innovation (EaSI) chapter of the fund is particularly targeted towards skills training, supported by a budget of €762 million.[124]

Horizon Europe, with a €95.5 billion budget, concentrates on advancing the twin transition.[125] As part of this initiative, it backs various projects for citizen engagement in the green transition. The Solutions to Tackle Energy Poverty project, for example, reached 16,000 consumers and 1,000 frontline workers, advising on energy savings for energy poor households through initiatives like its 35 online training modules.[126] Another example is the Eco-Bot project, piloted in Germany, that introduced a chatbot for consumers to receive customised energy-saving assessments and recommendations.[127] Additionally, the LIFE Programme for environment, climate and energy had a €5.43 billion budget for 2021-2027.[128] In 2021, roughly €11.8 was focused towards digital, primarily through its Clean Energy Transition sub-programme.[129] This sub-programme aims to digitalise the energy system while addressing issues like energy poverty and supporting energy communities,[130] however, just 1% of an already small budget results in modest support for such ambitious goals.

3. Conclusion

Failing to avert climate change is not an option, yet we face the risk of missing the mark on our climate goals. Addressing this challenge requires the engagement of all societal levels, with a crucial role played by citizens. Digital tools not only help to embed citizen involvement in decision-making—thereby enhancing the efficacy of policies and citizen buy-in—but also empower individuals and communities to take action. However, the benefits of digital solutions and the green transition are not reaching all citizens equally, highlighting a gap in inclusiveness. A more strategic approach is needed, increasing the active involvement and benefits of all citizens in the transition.

In utilising digital tools for citizen engagement in the green transition, the EU's current policy framework holds promise. However, it does not fully match the pace of digitalisation, underscoring the urgency for policies to broaden and evolve. Ensuring citizens have access to all necessary tools while safeguarding them against risks such as cybersecurity threats and data privacy breaches is crucial. Such a strategic adjustment is key not only to meeting our climate and environmental goals but also to making the green transition as effective and inclusive as possible.

3.1. POLICY RECOMMENDATIONS

Strategic direction

The success of the green transition hinges on its ability to place citizens at its heart. Beyond mere support for policies, active citizen engagement is essential for the transition to yield the widespread action necessary for real change.

- **The EU should double its efforts to embed citizens at the core of the twin transition through inclusive decision-making. Particular attention should be paid to those who are too often excluded from this process**, like marginalised communities and minority groups. The EU should further incorporate digital methods, like digital platforms and open-source software, to facilitate more inclusive, accessible, and streamlined deliberative exercises and policy outputs.

- **EU and member state leadership should foster an open and honest dialogue on the trade-offs of the green transition.** Such 'trade-offs' include the negative externalities of digital solutions for citizen engagement in the green transition, including cybersecurity risks, shifting job markets, and environmental pressures. Diverse stakeholders must be included in this dialogue, working to not only identify costs, but develop mitigation strategies. To support this dialogue, the **Commission must conduct thorough research to fully understand the broader environmental impacts of digitalisation**, such as increased amounts of e-waste and energy consumption.

- **The EU must shift its communication and strategic direction from merely mitigating transitional costs to actively expanding citizen access to the opportunities the green and digital transitions offer.** This requires better public

engagement and communication from EU institutions that increases public awareness of available opportunities. This also, however, requires ensuring opportunities and benefits, like energy sharing and energy community participation for example, are more evenly accessible to all citizens.

- **The EU should focus its policy direction on frameworks that increase individual agency in sustainable practices.** The EU needs to empower sustainable citizen action through increased product transparency, reduced corporate control, and strengthened consumer rights. Such principles extend beyond consumerism, to include access to environmental data and information. This policy direction not only enables citizens to actively contribute to the EU's goals, but also fosters a more equitable balance between people, profit, and planet.

Public participation and democratic processes

- **The EU, member states and sub-national authorities should institutionalise participatory exercises like citizen assemblies, ensuring sustained citizen inclusion in decision-making.** These exercises must also be streamlined, aided by digital tools like platforms such as Decidim or Jenparle, to minimise their bureaucratic hurdles, thereby promoting authentic citizen leadership in the procedural dynamics.

- Organisers of participatory exercises within the EU (the Commission) and member states (national, regional and local public authorities) **should introduce digital platforms with comprehensive feedback loops for deliberative exercises**. These platforms would allow citizens to track the progression of exercises and proposals. The platform should provide clear explanations to citizens for the reasoning behind the acceptance or rejection of proposals.

- **For citizen assembly organisers, usually public authorities at the EU, national, regional or local level, virtual gatherings should be provided as complements to in-person meetings, not replacements.** Informal exchanges should also be facilitated for online components to address the challenge of forging personal connections and group cohesion online. This could be achieved through smaller, focused sessions on specific issues or by forming dedicated working groups tasked with particular aspects of the assembly's agenda.

- **Organisers should ensure assemblies are complemented with training on the use of necessary digital equipment and tools**, while technical support should be readily available throughout the duration of the assembly.

Crowdsourcing

- **EU and member state crowdsourcing campaign organisers should ensure that the utilised platforms are user-friendly, encouraging participants to easily register through streamlined processes.** This registration must be done in full accordance with the GDPR rules.

- **EU and member state crowdsourcing initiatives should utilise digital tools to ensure diverse language accessibility** of both resources and general participation.

- **EU and member state online crowdsourcing initiatives should be complemented with in-person events** to promote the initiative to the general public and to ensure participants can be directly engaged with, while also allowing for adaptation to different communities.

Environmental participation

- **EU and member states must uphold citizens' rights to participate in environmental assessments**, particularly given efforts to accelerate the green transition through reduced permitting times for strategic industries. To do this:

  - **The Commission should develop guidelines encouraging the uptake of digital methods for public participation at both local and member state levels.** These guidelines should advocate for the use of electronic tools not just for notification and information purposes but also to simplify and enable participation processes online. Moreover, these guidelines should include examples of good practice across member states.

  - **For member states, the digitalisation of information regarding environmental assessments (EIA and SEA) should be required, not encouraged.** This information should be housed in a central member state information system where citizens can easily monitor, and track based on projects or location.

  - **Member states should be encouraged by the Commission to complement EIA and SEA reports with resources that help communicate complex environmental topics to the general public.** This could include the creation of accessible toolkits, blog posts, and similar content on platforms where reports are published, in addition to coordination with the media on such campaigns.

Informed and empowered consumerism

Awareness

- **The Commission should ensure citizens are made aware of the environmental impact of consumer choices by complementing tools for information transfer like the digital product passport with education campaigns, media coverage, and national education system initiatives.** This will ensure that citizens not only have access to information but also possess the necessary understanding to interpret environmental indicators and their significance.

Sustainable products

- **The EU should expedite the rollout of the Ecodesign for Sustainable Product Regulation and digital product passports to help inform and empower consumers to make more sustainable choices.** This expansion would accommodate the increasing use and manufacturing of ICT equipment.

Prosumerism

Clear regulatory framework

- **The EU should establish a clear and supportive regulatory framework to enable prosumer participation in energy markets.** This should facilitate their participation in energy trading and demand response programmes. This could involve creating digital platforms or market structures that facilitate peer-to-peer energy trading, where prosumers can buy and sell excess energy directly to other consumers or grid operators.

Interoperability

- **The EU should establish interoperability standards and protocols to encourage the development and adoption of open-source solutions and to ensure compatibility among different renewable energy systems, smart devices, and energy management platforms.** A Directive on interoperability standards for renewable energy systems could specify minimum requirements for interoperability and establish a framework for compliance. This will require EU-wide agreement on the certification process, enforcement mechanisms, and penalties for non-compliance.

Energy and digital literacy

- **The EU should launch information and awareness campaigns to educate consumers about energy efficiency, renewable energy options and smart energy technologies.** These campaigns can be conducted through various channels, including traditional media, social media, workshops and community events.
- To include the most vulnerable consumers in community initiatives and ensure that they also benefit from digital advancements and energy solutions, **member states should establish accessible, inclusive, and user-friendly Energy Advice Offices or similar one-stop shops. These should provide advice and training** on current complex regulatory frameworks for energy communities and energy sharing, as well as providing **technical guidance to assist communities in choosing suitable digital communication and technology tools**.
- **The EU should consider establishing a central hub or an online platform** incorporating initiatives like the Energy Communities Repository and the Rural Energy Community Hub to **help citizens navigate the array of multi-levelled one-stop-shops, access personalised energy data, and support their engagement and understanding** of energy prosumerism.

Research and innovation

- **The EU should continuously invest in research and innovation of digital solutions to support the advancement of prosumerism in the renewable energy sector.** Increased EU research funding through Horizon Europe in support of collaborative research initiatives and pilot projects would be particularly beneficial.

Financial support

- **Financial resources from the EU budget should be allocated to enable the organisation of participatory exercises, including the necessary digital equipment.** This should be foreseen in future Multiannual Financial Frameworks (MFFs) and be made available for stakeholders at all levels, not only national governments, allowing for participatory exercises to take place also in contexts affected by illiberal tendencies.
- Given the importance of the RRF in supporting energy communities, **the EU should deliver clear guidelines on funding mechanisms post-RRF** that details and ensures continued support for citizens in the twin digital and green transition.
- **Subsidies and funding for prosumerism should be designed inclusively, by helping vulnerable households to overcome financial barriers to engage in energy communities**, such as helping offset the upfront costs of installing renewable energy systems.
- **Digital skills training under the European Social Fund Plus should be expanded, with emphasis on reaching the most disadvantaged.** Training opportunities should prioritise networks (civil society organisations, job centres, social security offices,

mosques, churches, etc.) which have established contact with hard-to-reach, marginalised citizens. These networks can aid in training, including as energy tutors for energy communities, and spread the word of available support and opportunities.

Data infrastructure, accessibility and protection

Common European Data Spaces

- **Common European Data Space must be user-friendly for all levels of digital literacy, with a streamlined interface that facilitates easy navigation and retrieval of information, addressing current fragmentation issues.** Furthermore, ensuring that the data within these spaces are as open-source as possible is key to maximise benefits related to innovation and democracy.

- **Data intermediaries should clearly indicate procedures for verifying when data being processed is personal data** and demonstrate their compliance with GDPR in these instances to ensure the protection of citizens' personal data.

- **The Commission should provide detailed specifications and greater clarity on the architecture and operational functionality of the Green Deal Data Space.** This will help demystify its current conceptual framework, making it more tangible and easier to understand for all stakeholders. The Commission should revise its current communication tools to educate the public on how these spaces can be utilised to engage in the green transition.

- **The Commission should establish guidelines and consider future mandatory requirements for public entities to streamline the integration of their data into the Green Deal Data Space**, thereby helping to realise the goal of a connected and easy-to-navigate data space.

Access to personal data

- To enhance citizen access to personal data and promote digital literacy, **the Commission should launch an informational campaign that communicates to citizens their right to access and share personal data, in addition to guidelines on how and where this data can be accessed**. This includes important topics such as the ability to provide granular consent rather than a blanket agreement.

- Citizens' data can be greatly beneficial for the green transition, such as water and energy consumption data that provides insights into sustainable behaviour change. Consequently, **an informational campaign should also explain to citizens the benefits of both personal and third-party usage of their data specifically in the context of the green transition**, while reassuring citizens of security measures and data protection protocols in place.

Digital inclusion

Digital skills

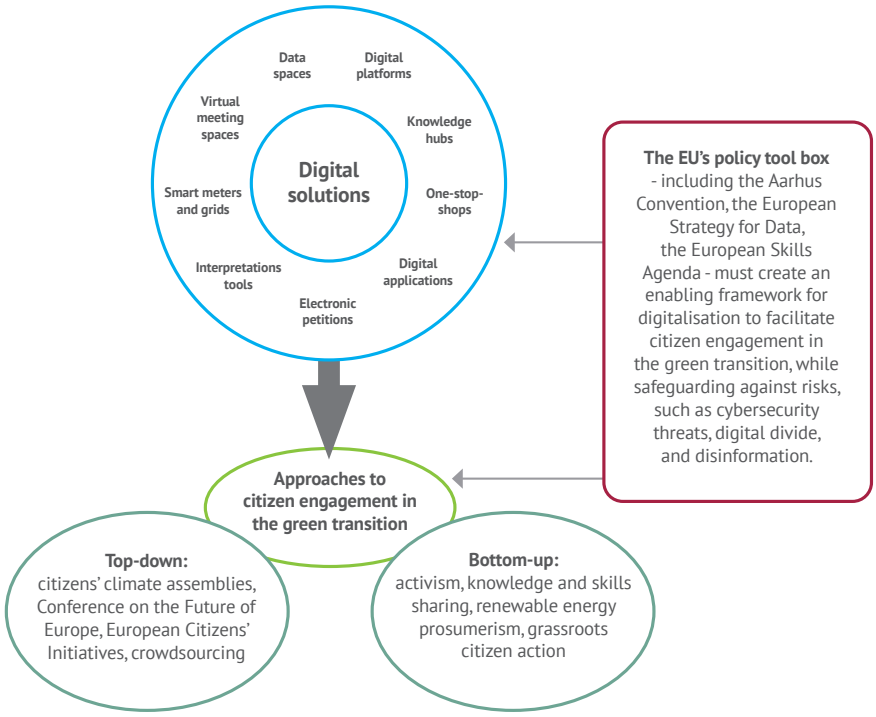
- **To meet the EU's 2030 digital skills targets, member states should improve efforts to meet the ambitions of the European Skills Agenda, the European Pillar of Social Rights Action Plan, and the Digital Education Action Plan.** Member states should prioritise investment in education and training systems with a particular emphasis on digital skills development to ensure access to high-quality learning opportunities for all citizens throughout their lives.

- **Member states should integrate digital skills into education curricula, vocational training programmes, and adult learning initiatives.** This includes equipping educators with the necessary digital competencies, leveraging digital tools and technologies in teaching and learning and ensuring that digital skills are embedded in core subjects and disciplines.

- **Communication campaigns need to be undertaken by member states to ensure that citizens are aware of the educational resources available for improving digital skills.** These campaigns could include media outreach, partnerships with educational institutions, and community-based initiatives such as publicly accessible workshops.

Fig. 1

FOSTERING CITIZEN ENGAGEMENT IN THE GREEN TRANSITION THROUGH DIGITALLY-ENABLED SOLUTIONS



[1] Sipka S., Moore B., Stagianni M. (2024), "From protests to policy: What is the future for EU agriculture in the green transition?", *European Policy Centre*.

[2] European Commission (2023), "*Standard Eurobarometer 99 - Spring 2023*".

[3] European Citizens' Initiaitive (ECI): https://citizens-initiative.europa.eu/_en, (last accessed on 6 June 2024).

[4] European Citizens' Initiative (ECI), "How does it work", (last accessed on 6 June 2024).

[5] Website of the European Commission (2024) on Citizens' Dialogues: https://commission.europa.eu/about-european-commission/get-involved/past-initiatives/citizens-dialogues_en, (last accessed on 6 June 2024).

[6] Citizens' Dialogues 2015-2019 website: https://cop-demos.jrc.ec.europa.eu/citizen-engagement-projects/citizens-dialogues, (last accessed on 6 June 2024).

[7] Stratulat C., Butcher P. (2018), "The European Citizens' Consultations - Evaluation report", *European Policy Centre (EPC)*.

[8] Stratulat C., Butcher P. (2019), "Citizens expect: Lessons from the European Citizens' Consultations", *European Policy Centre (EPC)*.

[9] Kantar Public (2022), "*Multilingual Digital Platform of the Conference on the Future of Europe Report*".

[10] Conference on the Future of Europe, *Multilingual Digital Platform* (archived): https://wayback.archive-it.org/12090/20230417172132/https:/futureu.europa.eu/e, (last accessed on 6 June 2024).

[11] Conference on the Future of Europe (2019), "*Report on the Final Outcome of the Conference on the Future of Europe*".

[12] Decidim Platform: https://decidim.org/, (last accessed on 6 June 2024).

[13] Petit P. (2022), "In EU Citizens' Panels, the institutions must not leave citizens behind", *European Policy Centre (EPC)*.

[14] European Commission (2023), "Summary report: Joint meeting of the EU platform on food losses and food waste and of the European citizen's panel".

[15] Demidov A., Greubel J., Petit P. (2023), "Assessing the European Citizens' Panels: Greater ambition needed", *European Policy Centre (EPC) and Bertelsmann Stiftung*.

[16] Oxford Learner's Dictionaire (n.d.), "*Crowdsourcing*", (last accessed on 6 June 2024).

[17] Co-Deciding Europe (2022), "Iceland, Lietchestein, Norway Grants", (last accessed on 6 June 2024).

[18] Co-deciding Europe (2022), "Problem Mapping - Crowdsourcing Phase 1", (last accessed on 6 June 2024).

[19] Co-deciding Europe (2021-2023), "Citizens' recommendations on air quality from", *the CODE Europe & DIGIDEM projects 2021-2023*.

[20] European Citizen Action Service (2022), "Brussels for Clean Air Crowdsourcing of Citizens' Solutions".

[21] *Ibid*.

[22] European Citizen Action Service (2023), "Love is in the air! Improving Air Quality Through Citizen Action", p.11

[23] *Ibid. p.10*.

[24] KNOCA, "Key features of climate assemblies and brief guidance", (last accessed on 6 June 2024).

[25] *See Endnote 12*.

[26] Youngs R. (2022), "EU Democracy After the Conference on the Future of Europe", *Carnegie Europe*.

[27] KNOCA, "Climate assemblies: emerging trends, challenges and opportunities", (last accessed on 6 June 2024).

[28] Cuorant, D. (2021), "The promises and disappointments of the French Citizens' Convention for Climate", *Deliberate Democratic Digest*.

[29] KNOCA, "The Austrian Citizens' Climate Assembly", (last accessed on 6 June 2024).

[30] KNOCA, "France Citizens' Convention on the Climate, La Convention Citoyenne pour Le Climat (2019)", (last accessed on 6 June 2024).

[31] Convention Citoyenne pour Le Climat, "Vos contributions", (last accessed on 6 June 2024).

[32] Respublica (2022), "Comment la plateforme digitale de concertation Jenparle a facilité la participation lors de la Convention Citoyenne pour le Climat : témoignage d'une participante", (last accessed on 6 June 2024).

[33] KNOCA, "The Spanish Citizens' Assembly for the Climate", (last accessed on 6 June 2024).

[34] European Commission (2019), Commission communication on the European Green Deal of 11 December 2019, COM(2019), 640 final.

[35] European Environment Agency (2019), "The European environment - state and outlook 2020".

[36] IPCC Sixth Assessment Report (2022), "Climate Change 2022: *Mitigation of Climate Change*".

[37] European Parliament (2023), "Press Releases: TV still main source for news but social media is gaining ground", (last accessed on 6 June 2024).

[38] Think Dirty App: https://www.thinkdirtyapp.com/, (last accessed on 6 June 2024).

[39] Global Ecovillage Network: https://ecovillage.org/about/about-gen/, (last accessed on 6 June 2024).

[40] Maraquin T., Eisermann M. (2020), "Innovate: The accelerator for renovation one-stop-shops".

[41] Österreichische Koordinationsstelle für Energiegemeinschaften, "Gemeinschaft schafft Energie", (last accessed on 6 June 2024).

[42] IFRC (2021), "Press Release: *New #ClimateChangedMe campaign sounds a global alarm: "The climate crisis is here, and we need to act now*", (last accessed on 6 June 2024).

[43] OECD (2020), "Development Policy Papers: Digital transformation and the futures of civic space to 2030".

[44] The Guardian (2018), "Keep it in the ground: A series exploring climate change, fossil fuel divestment and how humanity can solve the climate crisis", (last accessed on 6 June 2024).

[45] Riehm U., Böhle K., Lindner R. (2014), "Electronic petitioning and modernization of petitioning systems in Europe", Office of Technology Assessment at the German Bundestag.

[46] Mijatović D. (2023), "Crackdowns on peaceful environmental protests should stop and give way to more social dialogue", *Council of Europe Portal*.

[47] George J.J., Leidner D.E. (2019), "From clicktivism to hacktivism: Understanding digital activism", *Baylor University*.

[48] Council of the European Union (2022), "Top cyber threats in the EU", (last accessed on 6 June 2024).

[49] Publications Office of the European Union (2017), "Overview of the Maker Movement in the European Union", *European Commission*.

[50] Open Source Ecology (2019), "The vision of Open Source Ecology is a world of collaborative design – for a transparent and inclusive economy of abundance", (last accessed on 6 June 2024).

[51] *Ibid*.

[52] FabLabs, "Map of documented fablabs across Europe and the world", (last accessed on 6 June 2024).

[53] Website of Wageningen University on Citizen Science: https://www.wur.nl/en/dossiers/file/citizen-science.htm, (last accessed on 6 June 2024).

[54] European Citizen Science Association: https://www.ecsa.ngo/about-us/, (last accessed on 6 June 2024).

[55] Pateman R.M., West S.E. (2023), "Citizen Science: Pathways to Impact and why Participant Diversity Matters", *Citizen Science Association*.

[56] European Commission (2023), "Digital Tools for Energy Communities", *Energy Community Repository*.

[57] ENISA (2023), "Threat Landscape report (2023)".

[58] IEA (2023), "Cybersecurity - Is the power system lagging behind?".

[59] ENISA (2023), "NIS Investments Report 2023".

[60] United Nations Environment Programme (2021), "The growing footprint of digitalisation".

[61] Forti V., Balde C.P., Kuerh R. and Bel G. (2020), "The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential", Bonn/Geneva/Rotterdam: United Nations University, *United Nations Institute for Training and Research*.

[62] United States Geological Survey (USGS), "Global distribution of selected mines, deposits, and districts of critical minerals", (last accessed on 6 June 2024).

[63] JRC Publications Repository (2024), "Energy Consumption in Data Centres and Broadband Communication Networks in the EU", *European Commission*.

[64] International Energy Agency (2024), "Electricity 2024 - Analysis and forecast to 2026".

[65] Li P., Yang J., Islam M.A., Ren S. (2023), "Making AI Less 'Thirsty': Uncovering and Addressing the Secret Water Footprint of AI Models", *Cornell University*.

[66] The World Bank and ITU (2024) "Measuring the Emissions & Energy Footprint of the ICT Sector: Implications for Climate Action", *Washington, D.C. and Geneva*.

[67] Ritchie H. (2024), "What share of global CO_2 emissions come from aviation?", *Our World in Data*, (last accessed on 11 June 2024).

[68] Belkhir L. and Elmeligi A. (2018), "Assessing ICT global emissions footprint: Trends to 2040 & recommendations", Journal of Cleaner Production, Vl. 177, p. 448-463.

[69] European Commission, "Shaping Europe's digital future", (last accessed on 6 June 2024).

[70] Mancino D.,(2023), "Digital literacy in the EU: An overview", *Publications Office of the European Union*, (last accessed on 6 June 2024).

[71] Eurostat, "Ageing Europe - statistics on population development", (last accessed on 6 June 2024).

[72] European Comission (2023), "2023 Report on the state of the Digital Decade".

[73] European Commission (2024), "Ninth Report on Economic, Social and Territorial Cohesion".

[74] Bjornsgaard K., Dukić S. (2023), "The Media and Polarisation in Europe: Strategies for Local Practitioners to Address Problematic Reporting", *Radicalisation Awareness Network and European Commission*.

[75] Vinocur N., Haeck P. and Wax E. (2024), "Russian influence scandal rocks EU", *POLITICO*, (last accessed on 6 June 2024).

[76] European Commission (2023), "The digital decade", (last accessed on 6 June 2024).

[77] European Commission (2022), "European Declaration on Digital Rights and Principles", (last accessed on 6 June 2024).

[78] European Commission (2022), "Europe's Digital Decade: digital targets for 2030", (last accessed on 6 June 2024).

[79] In this context, environmental democracy refers to the integration of democratic principles into environmental decision-making.

[80] United Nations (1998), "*Full text Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention)*", UNECE.

[81] United Nations (2023), "After 25 years of the Aarhus Convention, States' compliance with environmental rights obligations matters more than ever", UNECE.

[82] Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), Official Journal of the European Union, L 108, 25.4.2007, p. 1–14.

[83] European Commission (2022), "*COMMISSION STAFF WORKING DOCUMENT: Environmental Implementation, Review 2022, Country Report – HUNGARY*".

[84] Kotsev A., Minghini M., Cetl V., Penninga F., Robbrecht J. and Lutz M. (2021), "INSPIRE - A Public Sector Contribution to the European Green Deal Data Space", Publications Office of the European Union, p. 31.

[85] United Nations Economic Social Council (2021), "Synthesis report on the status of implementation of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters".

[86] European Environmental Bureau (2019), "Still too hard to access environmental information in the EU – EEB report".

[87] United Nations (2021), "Meeting of the Parties to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters: Synthesis report on the status of implementation of the Convention", *Economic Commission for Europe*, p.21.

[88] Regulation (Eu) 2022/868 of the European Parliament and of The Council of 30 May 2022 on European data governance and amending Regulation (EU) 2018/1724 (Data Governance Act), Official Journal of the European Union, L 152/1.

[89] Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 December 2023 on harmonised rules on fair access to and use of data and amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act), Official Journal of the European Union, L-2023/2854, 22.12.2023.

[90] European Commission, "Common European Data Spaces", (last accessed on 6 June 2024).

[91] European Parliament, "Legislative Train Schedule GreenData4All - Revision of the Directive establishing an infrastructure for spatial information in the EU (INSPIRE) and the Directive on public access to environmental information (REFIT)", (last accessed on 6 June 2024).

[92] Carovano G., Finck M. (2023), "Regulating data intermediaries: The impact of the Data Governance Act on the EU's data economy", *Computer Law & Security Review*.

[93] *Ibid*.

[94] European Parliament (2021), European Parliament legislative resolution of 13 March 2024 on the proposal for a regulation of the European Parliament and of the Council on laying down harmonised rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts (COM(2021)0206 – C9-0146/2021 – 2021/0106(COD)).

[95] Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market for Digital Services and amending Directive 2000/31/EC (Digital Services Act) (Text with EEA relevance), Official Journal of the European Union, L 277/1, 27.10.2022.

[96] Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market for Digital Services and amending Directive 2000/31/EC (Digital Services Act) (Text with EEA relevance), Official Journal of the European Union, L 277/1, 27.10.2022.

[97] Scott M. (2024), "The EU's online content rulebook isn't ready for primetime", *Politico*, (last accessed on 6 June 2024).

[98] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive), Official Journal of the European Union, L 333 27.12.2022, p. 8.

[99] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), Official Journal of the European Union, L 119/1, 4.5.2016.

[100] European Parliament (2024), "*Cyber Resilience Act: MEPs adopt plans to boost security of digital products*", (last accessed on 6 June 2024).

[101] European Commission (2021), "Employment, Social Affairs and Inclusion: *The European Pillar of Social Rights Action Plan*".

[102] European Commission (2023), "2023 Report on the state of the Digital Decade".

[103] European Commission, "Employment, Social Affairs & Inclusion, Social Skills Agenda", (last accessed on 6 June 2024).

[104] European Commission, Digital Skills and Jobs Platform: https://digital-skills-jobs.europa.eu/en, (last accessed on 6 June 2024).

[105] European Commission (2023), "Communication on the Cybersecurity Skills Academy", (last accessed on 6 June 2024).

[106] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: A Green Deal Industrial Plan for the Net-Zero Age, Official Journal of the European Union 2023/2854, 22.12.2023.

[107] European Commission (2023), "Just Transition Fund to ensure a smoother road to carbon-neutral regions", (last accessed on 6 June 2024).

[108] European Commission, "European Education Area - Quality education and training for all", (last accessed on 6 June 2024).

[109] European Commission (2023), "2023 Report on the state of the Digital Decade", p.4.

[110] *Ibid. p. 6-9*.

[111] Directive (Eu) 2018/2001 of the European Parliament And Of The Council of 11 December 2018 on the promotion of the use of energy from renewable sources, Official Journal of the European Union, L 328, 21.12.2018, p. 82–209.

[112] Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, Official Journal of the European Union, L 158, 14.6.2019, p. 125–199.

[113] European Commission (2023), Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design.

[114] European Commission (2024), "Energy Communities Repository: Barriers and action drivers for the development of different activities by renewable and citizen Energy Communities".

[115] Community Energy for Energy Solidarity, "CEES survey finds few EC's are tackling energy poverty", (last accessed on 6 June 2024).

[116] REScoop Europe, "Briefing: Public financing opportunities for energy communities in Europe", (last accessed on 6 June 2024).

[117] European Commission (2022), "Proposal for Ecodesign for Sustainable Products Regulation".

[118] Commission Delegated Regulation (EU) 2023/1669 of 16 June 2023 supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to the energy labelling of smartphones and slate tablets (Text with EEA relevance), Official Journal of the European Union, L 214, 31.8.2023, p. 9–46.

[119] EPREL - European Product Registry for Energy Labelling: https://eprel.ec.europa.eu/screen/home, (last accessed on 6 June 2024).

[120] Proposal for a Directive of the European Parliament and of the Council on common rules promoting the repair of goods and amending Regulation (EU) 2017/2394, Directives (EU) 2019/771 and (EU) 2020/1828, Official Journal of the European Union, COM/2023/155 final.

[121] European Commission (2021), "Shaping Europe's digital future", (last accessed on 6 June 2024).

[122] European Commission (2021), "The Digital Europe Programme - Work Programmes", (last accessed on 6 June 2024).

[123] European Commission (2022), "Commission kick-starts work on the European Year of Skills: EU funding and assistance to invest into skills", (last accessed on 6 June 2024).

[124] European Commission, "ESF+ direct (EaSI)", (last accessed on 6 June 2024).

[125] European Commission (2021), "Horizon Europe", (last accessed on 6 June 2024).

[126] STEP – Solutions to Tackle Energy Povety (2021), "A european project delivering vital solutions during a pandemic and an energy crisis".

[127] Eco-Bot, "Residential energy monitoring platform in Germany", (last accessed on 6 June 2024).

[128] European Commission, "LIFE Programme", (last accessed on 6 June 2024).

[129] European Commission, "Green budgeting, LIFE – Performance Programme for the Environment and Climate Action", (last accessed on 6 June 2024).

[130] European Commission, "Clean Energy Transition", (last accessed on 6 June 2024).

NOTES

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NOTES

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The Paris Agreement and the Sustainable Development Agenda provide a direction for travel, and SPfE engages in a debate on the needed measures to achieve a fair transition to an environmentally sustainable economy and society. It focuses on areas where working together across the European Union can bring significant benefits to the member states, citizens and businesses, and ensure sustainable prosperity within the limits of this planet.

The **European Politics and Institutions** programme covers the EU's institutional architecture, governance and policymaking to ensure that it can move forward and respond to the challenges of the 21st century democratically and effectively. It also monitors and analyses political developments at the EU level and in the member states, discussing the key questions of how to involve European citizens in the discussions over the Union's future and how to win their support for European integration. The programme has a special focus on enlargement policy towards the Western Balkans, questions of EU institutional reform and illiberal trends in European democracies.

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