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Research and Innovation

A Just and Inclusive Green Transition

Report on Research & Innovation Projects

A Just and Inclusive Green Transition. Report on Research and Innovation Projects

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EUROPEAN COMMISSION

A Just and Inclusive Green Transition

Report on Research & Innovation Projects

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2025 Directorate-General for Research and Innovation

1. Table of Contents

1. Executive summary 3

2. Introduction 4

3. Key themes and challenges in the Green Transition 4

3.1. Critical focus areas 4

3.2. Key challenges in green transition 5

4. Analysis of the portfolio of projects 6

4.1. Description of the portfolio 6

4.1.1. Environmental Justice and Social Inclusion 7

4.1.2. Sustainable Cities and Urban Planning 18

4.1.3. Circular bio-based Solutions 28

4.1.4. Energy Transition and Energy Equity 35

4.1.5. Climate Policy and Global Cooperation 43

5. Key findings and insights 51

1. Executive summary

This report assesses 55 EU-funded research projects, examining their contributions to a just and inclusive green transition. The main thematic focus of these projects includes **Environmental Justice and Social Inclusion, Sustainable Cities and Urban Planning**, **Bioeconomy and Circular Economy**, **Energy Transition and Energy Equity**, and **Climate Policy and Global Cooperation**. The report presents insights from the projects that can inform policies in these areas. It also presents future research needs as identified by the projects.

The projects focusing on **Environmental Justice and Social Inclusion** have developed successful pathways for engaging marginalised communities, while stressing that structural inequalities remain a significant challenge to be addressed in the green transition. Some of these projects have also developed participatory governance models, which have enhanced citizen involvement and demonstrated the importance of embedding equity-driven policies in environmental planning for long-term social inclusion. Furthermore, they underscore the need for stronger mechanisms to integrate vulnerable groups into climate adaptation and decision-making processes.

Projects on **Sustainable Cities and Urban Planning** have advanced digital governance tools and nature-based solutions to enhance urban resilience. At the same time, they point out that regulatory fragmentation and weak coordination between municipalities and EU-level initiatives hinder scalability. Cities require more integrated frameworks that align mobility, housing, and climate resilience strategies. A stronger emphasis on multi-level governance could enhance policy effectiveness and implementation at scale.

Bioeconomy and Circular Economy projects have demonstrated progress in waste-to-resource strategies and bio-based value chains. However, market fragmentation and a lack of standardisation continue to limit the widespread adoption of circular practices. Strengthening incentives for industries to transition to bio-based models and ensuring policy coherence across member states will be essential for mainstreaming circular economy principles in EU markets.

Energy Transition and Energy Equity projects show the viability of decentralised renewable energy solutions. However, financial and regulatory barriers hinder widespread adoption. Social acceptance of wind and bioenergy remains a critical issue, emphasising the need for more inclusive financing models, community ownership structures, and public engagement campaigns. Expanding financial instruments that facilitate community-led energy projects can accelerate the shift towards more equitable and accessible clean energy systems.

Climate Policy and Global Cooperation efforts have reinforced the EU's leadership in climate diplomacy. However, fragmented data governance and inconsistent climate adaptation strategies across member states weaken long-term resilience planning. Strengthening AI-driven predictive modelling and integrating cross-border knowledge-sharing mechanisms will enhance the EU's capacity to respond to climate risks more effectively.

To further facilitate a just green transition, it is crucial to enhance policy coherence across sectors, ensuring stronger alignment between climate, energy, and urban planning policies. Expanding financial instruments such as social impact bonds and decentralised investment models will improve equitable access to funding and lower investment risks for sustainability initiatives. Digitalisation and participatory governance should be further embedded into policymaking to enhance citizen engagement and accelerate policy adoption. Investment in AI-driven climate adaptation tools and predictive modelling will be crucial for strengthening resilience planning and improving decision-making processes. Transnational cooperation and standardisation efforts should be expanded to facilitate the scaling of circular economy models, reinforce market readiness for bio-based industries, and harmonise regulatory frameworks. Addressing these strategic priorities will help advance environmental sustainability, ensuring that the green transition remains inclusive, effective, and equitable.

2. Introduction

This report highlights a selected sample of 55 research and innovation (R&I) projects and their contribution to a just and inclusive green transition. The selected projects were funded under various work programmes of the Horizon 2020 research and innovation funding programme, namely:

- H2020-EU.1.1. EXCELLENT SCIENCE - European Research Council (ERC)
- HORIZON.2.6. Food, Bioeconomy Natural Resources, Agriculture and Environment
- H2020-EU.3.2. SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy
- H2020-EU.3.3. SOCIETAL CHALLENGES - Secure, clean and efficient energy
- H2020-EU.3.4. SOCIETAL CHALLENGES - Smart, Green and Integrated Transport
- H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials
- H2020-EU.3.6. SOCIETAL CHALLENGES - Europe in a Changing World: Inclusive, Innovative and Reflective Societies

The analysis and report focus on H2020 projects to ensure that the selected projects were sufficiently mature and had produced tangible outputs to analyse and highlight. While the projects cover a broad spectrum of areas related to the green transition, the primary selection criterion was a strong emphasis on justice and inclusivity as integral aspects of their approach to the green transition. The projects offer insights into areas such as environmental justice movements, sustainable and inclusive urban planning, circular economy, clean, fair and inclusive energy transitions, and climate governance.

The report is organised into five thematic areas, each addressing specific sustainability challenges, while the final section presents key insights that can inform regulatory strategies and policies as well as future EU funding.

3. Key themes and challenges in the Green Transition

The research projects analysed and presented in this report engage with and expand knowledge on a range of issues related to sustainability transitions:

3.1. Critical focus areas

- **Climate and Energy Governance**: Projects contribute to understanding decarbonisation trade-offs, energy security risks, and governance models that inform climate adaptation and mitigation policies. Findings refine methodologies for assessing carbon pricing, energy demand, and emissions pathways.
- **Advancing Climate and Social Equity Policies:** Projects demonstrate how policies advancing the green transition should foster environmental justice, resource equity, and social inclusion. By integrating participatory governance models, they offer replicable frameworks for ensuring that marginalised communities, including vulnerable populations and underrepresented groups, are actively engaged in climate action. These projects support efforts to embed social justice within the climate agenda, ensuring that policies address systemic inequalities in resource access and climate resilience.

- **Circular Economy and Industrial Innovation:** Studies on bio-based value chains, bio-waste valorisation, and resource-efficient production systems provide insights into sustainable material flows, industrial symbiosis, and waste valorisation applications.
- **Sustainable and Inclusive Urban Development and Infrastructure:** Research on urban resilience, digital governance, data-driven and inclusive urban planning offers new evidence on climate-responsive urban infrastructure, mobility, and nature-based solutions.
- **Decentralising Energy Transition and Enhancing Energy Equity:** Projects demonstrate the feasibility of community-led renewable energy initiatives. These efforts emphasise social ownership models, citizen-led projects, and equitable financing mechanisms to ensure clean energy access for all.
- **Financial Mechanisms and Investment Models**: Findings highlight gaps in sustainable finance, impact investing, and market incentives, indicating where financial instruments must be refined to support long-term sustainability transitions.

3.2. Key challenges in green transition

The projects have generated important insights, advanced methodologies, and provided solutions for advancing a just green transition. They also identify several persisting challenges:

- **Lack of Integration Between Policy Domains:** Despite the interconnected nature of sustainability challenges across sectors like energy, food, and climate adaptation, governance models often remain fragmented. There is a need for exploring new policy integration mechanisms and cross-sectoral regulatory models. Current governance models remain fragmented, thereby limiting the scalability and harmonisation of research-driven solutions.
- **Gaps in Regulatory and Market Frameworks related to Circular Economy Adoption**: Projects highlights barriers to scaling circular economy models and renewable energy solutions, including regulatory mismatches, investment risks, and uneven policy enforcement. Lack of standardised sustainability criteria and certification frameworks creates uncertainty for investors and industries, slowing the transition towards waste-to-resource economies and bio-based markets.
- **Persistent Inequalities in Sustainability Transitions**: Research confirms that without targeted equity policies and mechanisms, sustainability transitions will exacerbate existing socio-economic disparities. Future work should refine metrics for just transition monitoring and explore inclusive financial models.
- **Challenges in Scaling and Knowledge Transfer:** Several projects have indicated that while they have developed innovative and promising solutions, they often remain context- specific and face challenges to be scaled across different regions or policy settings. Hence, there is a continued need for assessing how solutions can be shared and adapted across different policy, market, and geographic contexts.
- **Barriers to Scaling Renewable Energy and Social Acceptance**: While decentralised renewable energy solutions have proven effective, policy and regulatory constraints make scaling up wind, solar, and bioenergy initiatives difficult. Additionally, social resistance to large-scale renewable infrastructure remains a key barrier, requiring policy interventions that prioritise community ownership models, fair compensation mechanisms, and participatory decision-making.
- **Gaps in Policy Integration for AI and Digital Technologies in Governance:** While digital governance tools—such as Local Digital Twins (LDTs) and AI-enhanced urban planning models show promise, broader frameworks for integrating AI into sustainability policymaking remain underdeveloped. Establishing ethical AI guidelines, data-sharing agreements, and AI governance policies is essential to ensure fair, transparent, and effective digital transformation in climate policy.

4. Analysis of the portfolio of projects

4.1. Description of the portfolio

The selected portfolio of 55 EU-funded research projects addresses different aspects of a just and inclusive green transition. This report explores how these projects contribute to fairness and inclusivity in tackling climate change, resource management, and social equity. To provide a structured overview, the presentation of the projects and their findings are organised into five thematic categories. For each category, the results highlight how these projects contribute through scientific advancements, technological innovations, and policy impacts.

Environmental Justice and Social Inclusion	Sustainable Cities and Urban Planning	Circular Bio-based Solutions	Energy Transition and Energy Equity	Climate Policy and Global Cooperation
These projects tackle systemic inequalities in climate change impacts and solutions, addressing the needs of vulnerable communities, Indigenous peoples, and advocating for inclusive policy frameworks.	This category focuses on making urban areas more sustainable and resilient. Projects engage citizens to ensure climate action is fair, accessible, and beneficial for all urban residents.	Projects in this thematic area emphasise sustainable, bio-based solutions while involving civil society and smallholder farmers. They aim to foster equitable growth in rural and vulnerable regions by promoting innovative and circular resource practices.	These initiatives focus on equitable distribution of renewable energy access, addressing energy poverty, and ensuring social acceptance of new technologies critical for the energy transition.	This thematic area emphasises international collaboration and policy development to ensure climate mitigation efforts are fair and inclusive, particularly for countries in the Global South and vulnerable populations

Table 1.Thematic areas and rationale for project classification

The selected projects not only address European challenges but also contribute to global efforts and highlight the interconnected nature of the green transition and the need for social justice. They offer both localised solutions as well as focus on international collaboration. Many of the projects also examine or engage with policy frameworks such as the European Green Deal, the Just Transition Mechanism, and initiatives like the Climate-Neutral and Smart Cities Mission and the Urban Agenda for the EU. Some of the projects also support policy frameworks like the EU Bioeconomy Strategy, Circular Bio-Based Europe, and Horizon Europe Clusters 5 and 6.

The analysis goes beyond technical outputs to examine the projects' broader societal and policy contributions, particularly in terms of inclusivity and stakeholder engagement. By focusing on outcomes such as tools, models, and innovations, the report captures both their scientific and operational contributions.

The portfolio includes both completed and ongoing projects, reflecting not only immediate results but also long-term impacts. Many projects contribute across multiple thematic areas, reinforcing their cross-cutting relevance. While each project was classified under a primary theme, its secondary impacts were also considered to acknowledge the broader connections. Inclusivity is a key focus, with priority given to projects that engage a wide range of stakeholders, policymakers,

researchers, industry leaders, civil society, and vulnerable communities. This multi-actor approach is essential for ensuring a fair and inclusive transition.

The analysis is based on accessible project data mainly from the CORDIS database, such as publications, deliverables, abstracts, and project specific websites and databases.

4.1.1. Environmental Justice and Social Inclusion

This thematic area includes 19 projects focused on tackling systemic inequalities, amplifying marginalised voices, and creating inclusive solutions for climate and environmental challenges. Running between 2017 and 2027, the projects are based in research institutions across Europe working alongside international partners and diverse stakeholder groups. Their key focus is shedding light on how to ensure fair access to resources, promoting participatory governance, and developing frameworks to protect vulnerable communities from the disproportionate impacts of climate change and environmental degradation. By fostering more inclusive policies and decision-making processes, these projects contribute to a green transition that is not only sustainable but also equitable.

Collectively, these projects advance knowledge on climate justice (e.g. EnvJustice, CCLAD) inclusive governance (e.g. REAL_DEAL, SHARED GREEN DEAL), and locally grounded solutions. From supporting grassroots movements and integrating Indigenous knowledge (e.g. LICCI and INCLUDE) to promoting fair land use and participatory policymaking (e.g. DynamiTE, PROPERTY[IN]JUSTICE, EQUALSEA, GreenLulus), these projects address some of the most pressing social and environmental challenges. Together, the projects highlight the transformative potential of environmental justice and social inclusion in building a more equitable, sustainable future while contributing meaningfully to global climate goals.

CCLAD

Title: The Politics of Climate Change Loss and Damage
Duration: May 2018 – April 2024
Principal Investigator: Lisa Vanhala
Host institution: University College London, United Kingdom
Objective: Investigate the evolution of norms related to loss and damage in climate change, examining global and domestic policy-making practices. Key outcomes include the integration of justice norms in international frameworks and capacity-building in small island states.
Second Thematic Area: Climate Policy and Global Cooperation
Programme: H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Call for proposal: ERC-2017-STG

COMPASS

Title: Is Environmental Justice Necessary for Human Well-Being?
Duration: March 2021 – February 2026
Principal Investigator: Christoph Oberlack
Host institution: University of Bern, Switzerland
Objective: Demonstrate how environmental justice influences the outcomes of certification schemes, inclusive businesses, and solidarity economies in agri-food value chains, focusing on cocoa and coffee. Key results include gender-inclusive frameworks and advancements in environmental governance.
Second Thematic Area: Bioeconomy and Circular Economy
Programme: H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Call for proposal: ERC-2020-STG

EnvJustice

Title: A Global Movement for Environmental Justice: The EJAtlas
Duration: June 2016 – October 2021
Principal Investigator: Joan Martinez Alier
Host institution: Autonomous University of Barcelona, Spain
Objective: Expand and utilise the Environmental Justice Atlas (EJAtlas) to analyse ecological conflicts and their socio-economic dimensions. Key results include the documentation of 3,000 cases and theoretical advancements in ecological distribution conflicts.
Second Thematic Area: Climate Policy and Global Cooperation
Programme: H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Call for proposal: ERC-2015-AdG

EQUALSEA

Title: Transformative Adaptation Towards Ocean Equity
Duration: May 2021– April 2026
Principal Investigator: Sebastian Villasante
Host institution: University of Santiago de Compostela, Spain
Objective: Address Ocean inequalities through transformative adaptation frameworks. Key outcomes include the Ocean Equity Index and capacity-building in marginalised fishing communities.
Second Thematic Area: Climate Policy and Global Cooperation
Programme: H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Call for proposal: ERC-2020-COG

FAIR LIMITS

Title: Can Limitarianism Be Justified?
Duration: July 2017– December 2022
Principal Investigator: Ingrid Robeyns
Host institution: Utrecht University, Netherlands
Objective: Explore the philosophical justification for limits on wealth and resource distribution, advancing theories of economic and ecological justice. Key results include limitarianism policy recommendations and interdisciplinary dialogues.
Second Thematic Area: Climate Policy and Global Cooperation
Programme: H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Call for proposal: ERC-2016-COG

ToxicExpertise

Title: Toxic Expertise: Environmental Justice and the Global Petrochemical Industry
Duration: August 2015 – November 2020
Principal Investigator: Alice Mah
Host institution: University of Warwick, United Kingdom
Objective: Critically examine the socio-political dimensions of toxic pollution in the petrochemical industry, addressing accountability and community impacts. Key results include tools for participatory risk assessments and democratising toxic knowledge.
Second Thematic Area: Climate Policy and Global Cooperation
Programme: H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)
Call for proposal: ERC-2014-STG

Table 2. Environmental Justice and Social Inclusion projects factsheet (Part 1)

INCLUDE	LICCI	ICCION
Title: Indigenous Communities, Land Use, and Tropical Deforestation **Duration:** November 2016 – October 2021 **Principal Investigator:** Graziano Ceddia **Host institution:** University of Bern, Switzerland **Objective:** Address tropical deforestation through governance reforms and sustainable land management practices. Key results include participatory methodologies for Indigenous land rights. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2015-CoG	**Title:** Local Indicators of Climate Change Impacts. The Contribution of Local Knowledge to Climate Change Research **Duration:** June 2018 – May 2023 **Principal Investigator:** Victoria Reyes-García **Host institution:** Autonomous University of Barcelona, Spain **Objective:** Bridge Indigenous knowledge and scientific research on climate change. Key results include a global database of 1,000 local climate indicators and tools for integrating Indigenous knowledge into policy. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2017-COG	**Title:** Indigenous Climate Change Impacts Observation Network **Duration**: June 2020 – November 2021 **Principal Investigator:** Victoria Reyes-García **Host institution:** Autonomous University of Barcelona, Spain **Objective:** Develop a digital platform to document and amplify Indigenous knowledge on climate change. Key results include the Oblo platform and increased Indigenous participation in global climate policy. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2019-PoC
PROPERTY[IN]JUSTICE	**CURIA VIRIDES**	**DynamiTE**
Title: Land, Property, and Spatial Justice in International Law **Duration:** March 2020 – February 2026 **Principal Investigator:** Amy Strecker **Host institution:** University College Dublin, Ireland **Objective:** Redefine property rights in international law to address spatial and land justice. Key results include interdisciplinary analyses and inclusive governance frameworks. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2019-STG	**Title:** How the Third Wave of Global Judicial Activism is Filling Ecological Governance Gaps and Challenging the Liability-Remedy Paradigm. **Duration:** January 2021 – December 2025 **Principal Investigator:** Liliana Lizarazo-Rodriguez **Host institution:** The Vrije Universiteit Brussels, Belgium **Objective:** Examine the transformation of human rights litigation into eco-centric frameworks. Key results include a global database of 2,700 lawsuits and recommendations for judicial capacity-building. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2020-STG	**Title:** Dynamic Territory: A Normative Framework for Territory in the Post-Holocene **Duration:** January 2021 – September 2026 **Principal Investigator:** Alejandra Mancilla **Host institution:** University of Oslo, Norway **Objective:** Reimagine territorial governance under climate instability. Key results include guardianship models for biodiversity hotspots and policy frameworks for equitable land distribution. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2020-STG

Table 3. Environmental Justice and Social Inclusion projects factsheet (Part 2)

GreenLulus	IMPACT HAU	COMPAIR
Title: Green Locally Unwanted Land Uses **Duration:** June 2016 –May 2022 **Principal Investigator:** Isabelle Anguelovski **Host institution:** Autonomous University of Barcelona, Spain **Objective:** Examine the social impacts of urban greening projects, with a focus on equity and anti-gentrification. Key results include participatory frameworks and urban justice metrics. **Second Thematic Area:** Sustainable Cities and Urban Planning **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2015-STG	**Title:** The Hau of Finance: Impact Investing and the Globalisation of Social and Environmental Sustainability **Duration:** February 2019 – January 2025 **Principal Investigator:** Marc Brightman **Host institution:** University of Bologna, Italy **Objective:** Analyse the moral dimensions of impact investing to reconcile capitalism with sustainability. Key results include ethnographic case studies and critiques of market-driven solutions. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2017-COG	**Title:** Community Observation Measurement & Participation in AIR Science **Duration:** November 2021 – October 2024 **Coordinating Country:** Belgium **Participating Countries:** Greece, Germany, UK, Bulgaria, Netherlands, Bulgaria **Objective:** Empower citizens to monitor air quality and co-create environmental policies through citizen science labs. Key results include low-cost sensor deployment and participatory data dashboards. **Second Thematic Area:** Sustainable Cities and Urban Planning **Programme:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-LC-GD-2020
ACCTING	**SHARED GREEN DEAL**	**REAL_DEAL**
Title: Advancing Behavioural Change Through an Inclusive Green Deal **Duration:** February 2022– May 2025 **Coordinating Country:** France **Participating Countries:** Sweden, Belgium, Italy, Austria, Norway, Germany, Turkey, Portugal, Greece, Romania **Objective:** Promote equity and behavioural change in European Green Deal policies. Key results include pilot actions addressing energy poverty and sustainable mobility. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.3.6. - SOCIETAL CHALLENGES - Europe In A Changing World - Inclusive, Innovative And Reflective Societies **Call for proposal:** H2020-LC-GD-2020	**Title:** Social Sciences & Humanities for Achieving a Responsible, Equitable and Desirable Green Deal **Duration:** February 2022 – January 2027 **Coordinating Country:** United Kingdom **Partner Countries:** Netherlands, France, Portugal, Germany, Belgium, Slovenia, Ireland, Austria, Czechia, UK, Spain, Denmark, Greece, Cyprus, Hungary **Objective:** Conduct social experiments to align grassroots actions with European Green Deal objectives. Key results include a policy tracker and participatory governance frameworks. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.3.6. - SOCIETAL CHALLENGES - Europe In A Changing World - Inclusive, Innovative And Reflective Societies **Call for proposal:** H2020-LC-GD-2020	**Title:** Reshaping European Advances Towards Green Leadership Through Deliberative Approaches and Learning **Duration:** February 2022 – January 2025 **Coordinating Country:** Germany **Partner Countries:** Ireland, Italy, France, Belgium, Germany, Denmark, Netherlands, Czechia, Austria **Objective:** Enhance deliberative democracy for environmental governance. Key results include a digital platform and multilevel governance frameworks. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.3.6. - SOCIETAL CHALLENGES - Europe In A Changing World - Inclusive, Innovative And Reflective Societies **Call for proposal:** H2020-LC-GD-2020

Table 4. Environmental Justice and Social Inclusion projects factsheet (Part 3)

PHOENIX
Title: The Rise of Citizens' Voices for a Greener Europe **Duration:** February 2022 – July 2025 **Coordinating Country:** Portugal **Partner Countries:** Italy, France, Belgium, UK, Hungary, Netherlands, Estonia, Portugal, Iceland **Objective:** Increase citizen engagement in climate-neutral policies through democratic innovations. Key results include enriched participatory methodologies and pilot actions in 11 locations. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.3.6. - SOCIETAL CHALLENGES - Europe In A Changing World - Inclusive, Innovative And Reflective Societies **Call for proposal:** H2020-LC-GD-2020

Table 5. Environmental Justice and Social Inclusion projects factsheet (Part 4)

4.1.1.1. Key objectives

The main objectives identified across the 19 projects can be grouped into the following key areas:

- **Enhancing Justice and Equity in Governance and Policy:** Projects like **REAL_DEAL** and **PHOENIX** focus on reshaping governance frameworks by fostering deliberative democracy and inclusive policymaking. These research projects emphasise engaging disenfranchised communities, co-creating solutions, and bridging gaps between citizens and institutions. Meanwhile, **ACCTING** addresses the social inequalities produced by European Green Deal policies, piloting interventions to ensure equitable access to sustainability benefits. **CCLAD** examines global North-South justice dynamics in climate governance, highlighting disparities in loss and damage policies and their impact on equity in international negotiations.
- **Addressing Urban Inequities through Sustainable Development:** Urban sustainability and environmental justice are critical themes for projects such as **GreenLulus** and **COMPAIR**, which focus on mitigating green gentrification, ensuring equitable access to urban green spaces, and empowering citizens to monitor and influence urban environmental policies. These research projects employ participatory tools, low-cost technologies, and inclusive planning to promote healthier, more equitable urban environments.
- **Empowering Indigenous Communities:** Projects like **LICCI**, **ICCION**, and **INCLUDE** amplify Indigenous and local knowledge in climate change adaptation and governance. These projects document local climate indicators, develop platforms for Indigenous data sovereignty, and reform governance structures to protect ancestral land rights and prevent deforestation. By integrating these perspectives, the projects ensure that often marginalised voices are central to global sustainability efforts.
- **Advancing Equity in Ocean and Land Use Governance: EQUALSEA** and **PROPERTY[IN]JUSTICE** address inequities in marine and land governance, exploring frameworks that prioritise equity in resource access and use. These projects highlight the social and ecological impacts of fisheries management and land use policies while developing tools to foster participatory governance.

- **Tackling Systemic Inequalities in Resource Distribution:** Wealth and resource distribution are central to **FAIR LIMITS**, which explores the concept of limitarianism, advocating for upper limits on resource accumulation to promote social and ecological equity. Similarly, **ToxicExpertise** examines the uneven health and environmental risks associated with petrochemical industries, advocating for greater corporate accountability and community empowerment.
- **Mobilising Participatory Governance Tools:** Digital and participatory platforms developed by projects such as **REAL_DEAL** and **SHARED GREEN DEAL** enable large-scale citizen engagement and deliberative democracy. These tools foster transnational collaboration, enabling diverse stakeholders to co-create solutions aligned with the European Green Deal's objectives.
- **Building Inclusive Frameworks for Environmental Justice Litigation: CURIAE VIRIDES** advances ecocentric litigation, addressing ecological governance gaps and advocating for the rights of nature. By promoting strategic litigation and building judicial capacity, this project highlights how legal frameworks can empower communities and enhance environmental accountability. **EnvJustice** provides legal tools and policy recommendations for communities seeking environmental justice, advocates for ecological and climate debt recognition, and supports grassroots legal actions.
- **Promoting Behavioural Change for Sustainability:** Projects like **ACCTING** and **SHARED GREEN DEAL** leverage social experiments to foster behavioural and cultural change in line with sustainability goals. These projects tackle barriers to equitable participation and align grassroots actions with overarching policy frameworks.
- **Advancing Ethical and Sustainable Finance:** The intersection of finance and sustainability is addressed by **IMPACT HAU**, which critically examines the moral dimensions of impact investing and its capacity to drive social and environmental justice. This project provides insights into how ethical finance can reconcile capitalist frameworks with sustainability objectives. **COMPASS** analyses certification schemes, inclusive business models, and solidarity economy strategies, demonstrating how financial mechanisms can enhance environmental justice and equitable value distribution across agri-food chains.
- **Climate Adaptation and Mitigation for Vulnerable Communities:** Several projects, including **EQUALSEA** and **DynamiTE**, focus on developing transformative adaptation frameworks and innovative territorial governance models to address climate instability. These projects ensure that adaptation strategies prioritise equity and sustainability for the most vulnerable populations.

4.1.1.2. Key results and contribution to knowledge

The projects under the **Environmental Justice and Social Inclusion** theme have generated invaluable insights and tangible impacts across multiple sectors, fostering equity and contributing to systemic change.

- **Inclusive Governance and Participatory Democracy**

  Strengthening governance through participatory democracy lies at the heart of projects like **REAL_DEAL** and **SHARED GREEN DEAL**. These research projects prioritise citizen engagement to bridge the gap between decision-makers and communities. **REAL_DEAL** developed a Pan-European Digital Democracy Platform, which successfully engaged 10,000 participants in over 500 deliberative sessions on environmental governance. This digital tool provides a scalable model for transnational collaboration and policy alignment. Similarly, **SHARED GREEN DEAL** piloted 24 social experiments across six key Green Deal areas, including energy and biodiversity, empowering communities to co-create solutions that align with the EU's sustainability objectives. These efforts have enhanced transparency, trust, and inclusivity in governance, ensuring that diverse voices are integral to shaping environmental policies.

- **Advancing Environmental Justice**

  Projects like **FAIR LIMITS** and **CURIAE VIRIDES** underscore the importance of justice in resource distribution and environmental litigation. **FAIR LIMITS** advanced the principle of limitarianism, exploring how capping limiting resource accumulation can address economic inequalities and promote ecological equity. By questioning unchecked resource consumption, the project provides a normative framework for aligning social and environmental justice. **CURIAE VIRIDES**, on the other hand, created a database of 2,700 ecological lawsuits, which enhances judicial capacity to address global ecological conflicts. Additionally, the Environmental Justice Atlas (EJAtlas) by **EnvJustice** serves as a crucial tool in documenting global activism, providing a comprehensive mapping of environmental justice cases. This database supports research and advocacy efforts by highlighting patterns of environmental conflicts, equipping communities with legal knowledge, and strengthening the visibility of grassroots resistance. **CCLAD** further strengthens the North-South justice narrative, ensuring that vulnerable communities are equitably represented in climate justice dialogues. By addressing disparities in loss and damage policies, CCLAD provides insights into how climate governance frameworks can integrate fair and inclusive solutions for regions and countries suffering disproportionate economic and non-economic losses due to climate change.

- **Urban Sustainability and Social Equity**

  Addressing urban inequities is critical for fostering inclusive cities. **GreenLulus** developed anti-displacement frameworks to mitigate green gentrification in 40 cities across Europe and North America, ensuring that marginalised communities benefit equitably from urban greening projects. **COMPAIR** empowered underrepresented groups through citizen science labs, deploying 1,000 sensors to monitor air quality and foster community-driven solutions. These projects highlight the importance of inclusive urban planning, leveraging technology and participatory frameworks to promote social equity in urban development.

- **Empowering Indigenous and Local Communities**

  Empowering Indigenous and local communities is a cornerstone of projects like **LICCI**, **ICCION** and **INCLUDE**. **LICCI** documented over 1,000 local climate indicators, integrating Indigenous knowledge into global climate policy. By bridging the gap between scientific and local knowledge systems, LICCI enhances resilience and inclusivity in climate adaptation strategies. **ICCION** further amplified Indigenous participation by co-developing the Oblo platform, which ensures data sovereignty while informing international climate governance. **INCLUDE** has provided critical insights into the governance of land use and deforestation impacts on Indigenous communities, advocating for inclusive policymaking and the protection of traditional lands. Together, these projects underscore the value of Indigenous perspectives in driving equitable and sustainable solutions.

- **Ocean and Land Governance**

  Projects like **EQUALSEA** and **PROPERTY[IN]JUSTICE** have redefined equity in the governance of ocean and land resources. **EQUALSEA** introduced the Ocean Equity Index, a groundbreaking tool to evaluate disparities in marine resource access, and piloted governance reforms in Marine Protected Areas (MPAs) to support marginalised fishing communities. Similarly, **PROPERTY[IN]JUSTICE** examined the role of land rights in international law, proposing equitable frameworks that reconcile ancestral and economic land uses. These projects advance systemic solutions to address inequalities in resource access and governance.

- **Legal Innovations and Litigation Tools**

  Legal tools are pivotal for addressing environmental governance gaps. **CURIAE VIRIDES** has led the way in better understanding the potential and effectiveness of ecocentric litigation, enabling courts and communities with the needed legal tools to hold entities accountable for environmental harm. In the same vein, **REAL_DEAL** has created frameworks for multilevel governance, aligning local, national, and EU-level strategies to enhance legal accountability.

- **Behavioural and Cultural Transformation**

  Behavioural and cultural shifts are essential for achieving long-term sustainability. Projects like **ACCTING** has focused on fostering these changes. **ACCTING** implemented pilot actions targeting behavioural changes in energy use, mobility, and food systems, promoting inclusive practices aligned with the Green Deal.

- **Innovative solutions for Climate Resilience**

  DynamiTE developed innovative governance models to manage territorial instability caused by climate change. By introducing dynamic frameworks for resource distribution and governance of biodiversity hotspots, the project advances equitable and sustainable adaptation strategies. Similarly, **LICCI** developed methodologies to integrate Indigenous knowledge into climate resilience policies, leveraging local expertise for transformative outcomes.

- **Ethical and Sustainable Finance**

  The intersection of finance and sustainability is addressed by **IMPACT HAU**, which critically examines the role of impact investing in promoting environmental justice and its alignment with sustainability goals. This project explores how ethical finance can drive social and environmental change through green bonds, sustainability bonds, and development impact bonds. **COMPASS** complements this by developing sustainable investment strategies that align financial instruments with circular economy principles and just transition frameworks. Additionally, COMPASS explores the integration of certification schemes and solidarity economy approaches to enhance equitable financial practices in sustainability transitions. These findings are instrumental in shaping policies that prioritise inclusive growth and accountability in financial systems.

- **Climate Adaptation and Mitigation Strategies**

  Several projects have focused on advancing just frameworks for climate adaptation and mitigation. **EQUALSEA** developed transformative adaptation strategies to protect vulnerable fisheries, while **DynamiTE** proposed equitable land use models to address climate-induced territorial changes. These projects promote climate responses that prioritise equity and sustainability, supporting vulnerable populations in the face of global challenges.

- **Capacity Building and Education**

  LICCI developed protocols to train stakeholders in integrating Indigenous knowledge into policy frameworks, while **REAL_DEAL** supported inclusive governance by equipping over 300 stakeholders with participatory democracy tools. These capacity-building efforts enhance the ability of communities and policymakers to lead sustainable transitions effectively.

- **Quantifying and Addressing Systemic Inequalities**

  Projects like **ToxicExpertise** and **FAIR LIMITS** have identified systemic inequalities and proposed actionable solutions. **ToxicExpertise** mapped toxic risks in petrochemical industries, advocating for community-driven monitoring systems. **FAIR LIMITS** investigated whether limits should be introduced on how many ecological resources a person should have access to, and how distribution of financial resources is related to a just transition.

Collectively**,** the projects under this thematic area advance our understanding of how to pursue equity, inclusivity, and environmental resilience in the green transition by integrating participatory governance, leveraging Indigenous knowledge and grassroot activism, and by advancing innovative legal, governance and financial tools and frameworks. Their contributions offer practical and scalable examples of justice-driven sustainability, helping shape more inclusive environmental and social policies in Europe and beyond.

Inclusive Governance and Participatory Democracy	• **REAL_DEAL** developed a Pan-European Digital Democracy Platform, engaging 10,000 users in 500+ deliberative sessions on environmental governance. • **SHARED GREEN DEAL** conducted 24 social experiments addressing topics like clean energy and biodiversity, empowering citizens to shape Green Deal initiatives**.** • **PHOENIX** piloted enriched democratic innovations in 11 locations, fostering community engagement in climate-neutral policies.
Advancing Environmental Justice	• **FAIR LIMITS** proposed policies to cap resource accumulation, addressing wealth inequality and promoting ecological equity. • **CURIAE VIRIDES** created a database of 2,700 ecological lawsuits, building judicial capacity for environmental governance. • **ACCTING** piloted inclusive strategies to address inequalities in Green Deal policies, ensuring equitable access to sustainability benefits. • **EnvJustice** developed the Environmental Justice Atlas (EJAtlas), documenting global environmental conflicts and providing legal resources for communities. • **CCLAD** examined North-South justice dynamics, ensuring equitable representation of vulnerable communities in climate justice dialogues.
Urban Sustainability and Social Equity	• **GreenLulus** developed anti-gentrification frameworks, addressing equity concerns in urban green spaces across 40 cities. • **COMPAIR** deployed 1,000 sensors in citizen science labs, empowering marginalised communities to monitor urban air quality.
Empowering Indigenous and Local Communities	• **LICCI** documented 1,000+ local climate indicators, integrating Indigenous knowledge into global climate policies. • **ICCION** co-designed the Oblo platform with Indigenous Peoples, enhancing data sovereignty and policy participation. **INCLUDE** reformed governance structures to protect ancestral land rights and reduce deforestation in tropical regions.
Ocean and Land Governance	• **EQUALSEA** developed the Ocean Equity Index and piloted governance reforms in Marine Protected Areas. • **PROPERTY[IN]JUSTICE** proposed reforms to international land rights frameworks, promoting equitable governance and sustainability. • **DynamiTE** introduced governance models for biodiversity hotspots, addressing territorial instability caused by climate change.
Legal Innovations and Litigation Tools	• **CURIAE VIRIDES** promoted strategic litigation to address ecological governance gaps and developed eco-centric case law. **REAL_DEAL** supported judicial capacity-building through multilevel governance frameworks, aligning local and EU-level efforts. **PHOENIX** addressed barriers to legal participation by marginalized groups, fostering equitable legal reforms. • **EnvJustice** provided legal tools and policy recommendations for communities facing environmental injustices, strengthening grassroots legal actions.

Table 6. Key Results: Environmental Justice and Social Inclusion (part 1)

Behavioural and Cultural Transformation	• **ACCTING** piloted behavioural change initiatives in energy, mobility, and food systems to promote sustainable practices. • **SHARED GREEN DEAL** incorporated behavioural insights into 24 experiments, fostering societal commitment to the Green Deal.
Technological Innovation for Climate Resilience	• **DynamiTE** proposed dynamic governance frameworks for resource distribution in climate-sensitive territories. • **LICCI** developed protocols for integrating local knowledge into scientific models, enhancing climate resilience policies. • **EQUALSEA** piloted data-driven marine adaptation strategies to protect vulnerable communities and ecosystems.
Ethical and Sustainable Finance	• **IMPACT HAU** critically examined the impact of ethical finance on sustainability, proposing new frameworks for accountability. **SHARED GREEN DEAL** explored funding mechanisms for scaling inclusive Green Deal actions, advancing ethical finance solutions. **FAIR LIMITS** linked equitable finance with sustainability goals, addressing wealth-driven environmental challenges. • **COMPASS** developed sustainable investment strategies and explored certification schemes, integrating ethical finance into circular economy.
Climate Adaptation and Mitigation Strategies	• **EQUALSEA** developed transformative adaptation frameworks for fisheries and vulnerable coastal communities. • **DynamiTE** proposed equitable land use strategies for mitigating climate-related territorial changes.
Capacity Building and Education	• **LICCI** trained stakeholders in Indigenous knowledge integration, fostering cross-disciplinary capacity for climate governance. • **REAL_DEAL** supported inclusive governance by training 300+ stakeholders in participatory democracy practices. • **ACCTING** provided training programs addressing behavioural change and sustainability in underserved communities.
Quantifying and Addressing Systemic Inequalities	• **ToxicExpertise** mapped toxic risks in petrochemical industries, supporting marginalised communities with monitoring tools. • **FAIR LIMITS** advanced frameworks to address economic inequality through limitarianism policies. • **PROPERTY[IN]JUSTICE** analysed disparities in land use policies, promoting inclusive decision-making and resource distribution.

Table 7. Key Results: Environmental Justice and Social Inclusion (part 2)

4.1.1.3. Contribution to secondary thematic areas

The **Environmental Justice and Social Inclusion** projects have also significantly contributed to secondary thematic areas, addressing interconnected challenges and driving cross-sectoral impacts. In **Bioeconomy and Circular Economy**, projects like **COMPASS** integrated environmental justice principles into certification schemes, inclusive business strategies, and solidarity economies, advancing sustainable practices across agri-food value chains. Contributions to **Sustainable Cities and Urban Planning** include projects like **GreenLulus** and **COMPAIR**, which developed frameworks to mitigate green gentrification and foster urban-rural linkages through citizen science and equitable urban planning. For **Climate Policy and Global Cooperation**, projects like **EQUALSEA**, **REAL_DEAL**, and **DynamiTE** aligned governance strategies with global climate goals, advancing transnational collaboration and inclusive climate action. While projects like **LICCI** and **ACCTING** enhanced governance and inclusivity by integrating Indigenous knowledge into climate adaptation policies and promoting sustainable behavioural changes in energy and mobility systems. Lastly, projects like **DynamiTE** and **IMPACT HAU** proposed innovative governance models for shared resources and critically assessed the role of ethical finance in supporting renewable energy adoption and reducing fossil fuel dependency.

4.1.1.4. Areas to Work on for the Future

Several key challenges identified by the projects remain as concerns advancing a just green transition:

- **Deepening Integration of Social Equity in Policy Implementation**: Projects like **ACCTING**, **REAL_DEAL** and **SHARED GREEN DEAL** have made significant strides in advancing our understanding of the impact of Green Deal policies on vulnerable groups and promoted participatory and inclusive governance. They also point out that ensuring that equity is embedded in the implementation of environmental policies remains a challenge. For example, **ACCTING** has piloted interventions addressing inequalities in energy and mobility systems, and these could be scaled across diverse socio-economic contexts. **EnvJustice**, through its Environmental Justice Atlas (EJAtlas), provides valuable documentation of environmental injustices, highlighting systemic barriers that must be addressed.

- **Expanding the Scope of Environmental Justice Litigation**: Projects like **CURIAE VIRIDES** and **EnvJustice** have demonstrated the potential of ecocentric litigation, but many challenges remain. Future work could include enhancing judicial capacity and expanding databases of ecological lawsuits, particularly to address transnational environmental harms. This expansion would foster international collaboration in tackling global ecological injustices.

- **Enhancing Data Accessibility and Inclusivity**: Projects like **LICCI** and **ToxicExpertise** have generated valuable datasets on local climate indicators and toxic risks, respectively. Ensuring that this data remains available and actionable for policymakers and communities is important. Future efforts could build on platforms like **ICCION's Oblo**, which integrates Indigenous knowledge with accessible digital tools, and **EnvJustice's EJAtlas** to create open-data systems that democratise environmental decision-making.

- **Strengthening Localised Adaptation Strategies: EQUALSEA** and **DynamiTE** have developed transformative adaptation frameworks that could inspire similar solutions in diverse local contexts. Likewise, **DynamiTE**'s governance models for biodiversity hotspots could be adapted for regions facing different climate-induced challenges, such as desertification or flooding, by co-developing solutions with affected communities. **CCLAD's** research on North-South justice dynamics provides essential insights into ensuring adaptation strategies are equitable across global contexts.

- **Addressing Systemic Inequalities in Urban Planning**: Urban-focused projects like **GreenLulus** and **COMPAIR** addressed green gentrification and air quality issues. Systemic inequalities in access to clean air, public awareness, and participation opportunities persist as

critical areas to address. Future work may include making participatory tools more accessible and ensuring that data of local communities is included in shaping the environmental policies.

- **Mainstreaming Indigenous Knowledge in Global Frameworks**: Projects like **LICCI** and **ICCION** have made significant progress in integrating Indigenous knowledge into research and climate governance. Ensuring that this knowledge informs climate policies remain a challenge. Building on **ICCION's** partnerships with UNFCCC platforms could strengthen the presence of Indigenous voices in international decision-making forums.
- **Bridging Gaps in Ethical Finance and Resource Allocation**: **IMPACT HAU** has critically examined the role of impact investing in promoting environmental justice. However, aligning financial systems with equity-driven sustainability goals requires further exploration. Future initiatives could develop ethical finance tools that prioritise funding for marginalised communities, drawing on lessons from **IMPACT HAU** and **CCLAD's** insights into just transition financing.
- **Addressing Knowledge and Technology Transfer Inequalities**: Projects like **DynamiTE, EQUALSEA** and **LICCI** have piloted governance frameworks and adaptation tools, aimed at addressing inequalities linked to the green transition. Continuing to support capacity-building projects to further advance equity driven sustainability efforts remain of great importance.
- **Developing Metrics for Long-Term Impact Assessment**: Tools like **ToxicExpertise**'s monitoring frameworks have done important work for assessing environmental risks. However, gaps remain in creating standardised, long-term metrics which are sensitive to local knowledge and community impacts. Future work could focus on expanding these tools to improve transparency, integrate ethical AI approaches, and support more inclusive and accountable monitoring of environmental impacts in regions affected by industrial pollution.
- **Expanding Cross-Sectoral Collaboration: GreenLulus** has raised important awareness about the socially excluding effects of urban greening. It remains essential to build on the project's insights into equitable planning and anti-displacement strategies. In addition, **SHARED GREEN DEAL** has promoted participatory frameworks. Future initiatives could further advance cross-sectoral collaboration by connecting urban planning with community engagement, ensuring that green transition efforts reflect the needs and priorities of diverse populations.
- **Strengthening Community-Led Approaches to Governance**: Projects like **ACCTING and REAL_DEAL** have advanced participatory frameworks. Empowering communities to lead governance processes remains important to support. Future initiatives could for example expand on **ACCTING's** citizen-driven pilot actions to train local leaders in environmental governance, fostering community ownership of sustainability initiatives.

4.1.2. Sustainable Cities and Urban Planning

This thematic area brings together a diverse set of projects aimed at transforming cities into sustainable, inclusive, and resilient spaces. Many of the innovative solutions developed within the projects under sustainable cities and urban planning are closely linked to circularity, as circular strategies, such as reducing waste, reusing materials, and promoting local loops, supporting cities in becoming more sustainable. These strategies are inherently place-based, meaning they rely on local action at the city or regional level to succeed.

Running from 2017 to 2027, these research projects are led by institutions in the United Kingdom, Spain, Germany, and Italy, working in collaboration with EU Member States and global partners. They address key challenges such as urban resilience to climate change, citizen participation in planning, the integration of innovative technologies, and the development of sustainable mobility systems.

As shown in the figure below, the factsheets highlight each project's core objectives and main information. Collectively, these projects reflect a shared ambition to build smarter, greener, and more inclusive cities. From advancing digital tools (**SmartEnCity and DUET**) and clean mobility (**SOLUTIONSplus and AVENUE**) to rethinking food systems (**FoodE and CITIES2030**) and public spaces, these projects explore innovative ways to improve urban life and connect communities with climate-smart solutions. Projects like **GrowGreen, CLEVER Cities, CLAiR-CITY, and Climate-fit.City** further contribute by enhancing green infrastructure, improving air quality, and supporting citizen-driven climate resilience.

Together, these projects contribute to the vision for a just and inclusive green transition by addressing urban sustainability, equity, and resilience. Their interconnected efforts not only improve quality of life but also offer scalable models for tackling global challenges.

FoodE	CITIES2030	SILVER STREAM
Title: Food Systems in European Cities **Duration:** February 2020 – January 2024 **Coordinating Country:** Italy **Participating Countries**: Italy, France, Germany, Netherlands, Belgium, Norway, Romania, Slovenia, Spain **Objective:** Develop and implement citizen-driven City Region Food Systems (CRFS) to enhance urban food self-sufficiency, resilience, and sustainability through participatory planning and innovative urban agriculture practices. **Second Thematic Area:** Bioeconomy and Circular Economy **Programmes:** H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy **Call for proposal:** H2020-SFS-2018-2020	**Title:** Co-creating Resilient and Sustainable Food Systems Towards FOOD2030 **Duration:** October 2020 – September 2024 **Coordinating Country:** Italy **Participating Countries:** Italy, Belgium, Turkey, Cyprus, Croatia, Denmark, Finland, Germany, Spain, Ireland, Iceland, Latvia, North Macedonia, Romania, Slovenia, Norway, Netherlands, Portugal, France **Objective:** Foster resilient, inclusive, and sustainable Urban Food Systems by deploying innovative digital platforms, participatory living labs, and circular economy principles to bridge urban-rural connections and improve food system resilience. **Second Thematic Area:** Bioeconomy and Circular Economy **Programmes:** H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy **Call for proposal:** H2020-FNR-2020	**Title:** Social Innovation and Light Electric Vehicle Revolution on Streets and Ambient **Duration:** June 2015 – May 2018 **Coordinating Country:** Germany **Participating Countries:** Germany, Italy, Slovenia, Switzerland, United Kingdom **Objective:** Develop lightweight electric vehicles tailored to aging populations, integrating ergonomic and social innovation for improved mobility, reduced urban congestion, and social inclusion. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.4. - SOCIETAL CHALLENGES - Smart, Green And Integrated Transport **Call for proposal:** H2020-GV-2014-2015

Table 8. Sustainable Cities and Urban Planning projects factsheet (part 1)

AVENUE	SmartEnCity	SOLUTIONSplus
Title: Autonomous Vehicles to Evolve to a New Urban Experience **Duration:** May 2018 – October 2022 **Coordinating Country:** Switzerland **Participating Countries:** Switzerland, Luxembourg, France, Denmark, Germany, Austria, Greece, Norway **Objective:** Demonstrate the feasibility and societal benefits of on-demand, autonomous, electric minibuses for sustainable public transport, reducing emissions and promoting inclusivity. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.4. - SOCIETAL CHALLENGES - Smart, Green And Integrated Transport **Call for proposal:** H2020-ART-2016-2017	**Title:** Towards Smart Zero CO2 Cities Across Europe **Duration:** February 2016 – July 2022 **Coordinating Country:** Spain **Participating Countries:** Spain, Denmark, Estonia, Bulgaria, Italy, Germany **Objective:** Transform urban areas into resource-efficient ecosystems by integrating renewable energy, retrofitting housing, and fostering citizen participation for sustainable urban regeneration. **Second Thematic Area:** Climate Policy and Global Cooperation **Programmes:** H2020-EU.3.3. - SOCIETAL CHALLENGES - Secure, clean and efficient energy **Call for proposal:** H2020-SCC-2014-2015	**Title:** Integrating Urban Electric Mobility Solutions in the Context of the Paris Agreement, the Sustainable Development Goals and the New Urban Agenda **Duration:** January 2020 – December 2024 **Coordinating Country:** Germany **Participating Countries:** Germany, Spain, Rwanda, Ecuador, Nepal, Denmark, Philippines, Uruguay, Tanzania, Netherlands, Poland, France, Chile, Belgium, Hungary, Kenya, Sweden, Italy, Colombia, Vietnam, France, Austria, Finland **Objective:** Drive transformational change in urban mobility through the deployment of innovative e-mobility solutions, multimodal transport systems, and capacity-building to reduce emissions and promote equitable access. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.3.4. - SOCIETAL CHALLENGES - Smart, Green And Integrated Transport **Call for proposal:** H2020-LC-GV-2018-2019-2020

Table 9. Sustainable Cities and Urban Planning projects factsheet (part 2)

DUET	GrowGreen	CLEVER Cities
Title: Digital Urban European Twins for Smarter Decision-Making **Duration:** December 2019 – November 2022 **Coordinating Country:** Belgium **Participating Countries:** Belgium, Greece, United Kingdom, Czech Republic, Netherlands, Germany **Objective:** Leverage Local Digital Twins (LDTs) to enhance urban policymaking, promote participatory governance, and optimize planning processes with real-time, data-driven tools. **Second Thematic Area:** Climate Policy and Global Cooperation **Programmes:** H2020-EU.3.6. - SOCIETAL CHALLENGES - Europe In A Changing World - Inclusive, Innovative And Reflective Societies **Call for proposal:** H2020-SC6-GOVERNANCE-2018-2019-2020	**Title:** Green Cities for Climate and Water Resilience, Sustainable Economic Growth, Healthy Citizens, and Environments **Duration:** June 2017 – November 2022 **Coordinating Country:** United Kingdom **Participating Countries:** United Kingdom, Spain, Poland, Croatia, Italy, Franc, Switzerland, Netherlands, China **Objective:** Advance Nature-Based Solutions (NbS) to enhance climate resilience, improve water management, and foster urban sustainability while promoting social and economic co-benefits**.** **Second Thematic Area:** Climate Policy and Global Cooperation **Programmes:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-SCC-2016-2017	**Title:** Co-Designing Locally Tailored Ecological Solutions for Value-Added, Socially Inclusive Regeneration in Cities **Duration:** June 2018 – November 2023 **Coordinating Country:** Germany **Participating Countries:** Germany, Italy, United Kingdom, Serbia, Greece, Spain, Romania, Sweden, Ecuador, Austria, Belgium, China **Objective:** Integrate Nature-Based Solutions (NbS) into urban regeneration strategies to promote social cohesion, biodiversity, and equitable access to green spaces. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programmes:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-SCC-2016-2017

Climate-fit.City	ARCH
Title: Pan-European Urban Climate Services **Duration:** June 2017 – February 2020 **Coordinating Country:** Belgium **Participating Countries:** Switzerland, Czechia, Belgium, Spain, Austria, Italy. **Objective:** Develop high-resolution urban climate services to support sustainable urban planning, enhance climate resilience, and foster cross-sectoral collaboration. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-SC5-2016-2017	**Title:** Advancing Resilience of Historic Areas Against Climate-Related and Other Hazards **Duration:** May 2019 – August 2022 **Coordinating Country:** Germany **Participating Countries:** Germany, Italy, Slovakia, Spain, Ireland, South Korea **Objective:** Develop tools and methodologies to enhance the resilience of historic urban areas to climate change and disasters while integrating heritage preservation into urban planning. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-LC-CLA-2018-2019-2020

Table 10. Sustainable Cities and Urban Planning projects factsheet (part 3)

URBANA	CLAiR-CITY
Title: Urban Arena for Sustainable and Equitable Solutions **Duration:** January 2019 – March 2022 **Coordinating Country:** Germany **Participating Countries:** Germany, Netherlands, Italy, Austria, Poland, France **Objective:** Address systemic urban sustainability and justice challenges by fostering collaboration among policymakers, researchers, and communities, emphasising participatory approaches. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.6. - SOCIETAL CHALLENGES - Europe In A Changing World - Inclusive, Innovative And Reflective Societies **Call for proposal:** H2020-SC6-TRANSFORMATIONS-2018-2019-2020	**Title:** Citizen-Led Air Pollution Reduction in Cities **Duration:** May 2016 – July 2020 **Coordinating Country:** Netherlands **Participating Countries:** Denmark, United Kingdom, Netherlands, Norway, Hungary, Belgium, Slovenia, Poland, Portugal, Italy **Objective:** Tackle urban air pollution through citizen-driven policymaking, integrating public preferences into air quality and climate policies to foster environmental justice. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programmes:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-SC5-2014-2015

Table 11. Sustainable Cities and Urban Planning projects factsheet (part 4)

4.1.2.1. Key objectives

The main objectives identified across the 13 projects are:

- **Advancing Urban Resilience and Climate Adaptation:** particularly through nature-based solutions (NbS) and integrated risk-reduction strategies as seen in projects like **GrowGreen** and **ARCH** .
- **Promoting Sustainable Mobility:** Projects such as **SOLUTIONSplus** and **AVENUE** integrate electric and autonomous mobility solutions to reduce urban emissions, enhance accessibility, and provide sustainable transport options for underserved communities. **SILVER STREAM** introduces a light electric vehicle (L6e) tailored to elderly users, combining ergonomic comfort with easy-to-use features and advanced in-wheel motor technology to improve manoeuvrability in congested urban areas. These projects emphasise inclusive design and the potential for scalable multimodal systems.
- **Leveraging Digital and Data-Driven Innovation:** Projects like **DUET** and **SmartEnCity** highlight the transformative potential of digital twins, and data visualisation tools, to enhance urban planning and governance.
- **Integrating Sustainable Food Systems:** Projects such as **FoodE** and **CITIES2030** embed local, citizen-driven food initiatives into urban planning to enhance regional food security, reduce waste, and strengthen the link between urban and rural areas through circular economy principles.
- **Fostering Social Equity and Environmental Justice:** Social inclusion is a central objective in projects like **CLAiR-CITY**, **CLEVER Cities**, which focus on participatory urban planning, equitable access to green spaces, and addressing disparities in air pollution and urban regeneration, ensuring vulnerable communities are prioritised. **SILVER STREAM** also supports

elderly users with adaptive e-seats that reduce physical and cognitive stress and promote greater independence.

- **Enhancing Citizen Engagement and Participatory Governance:** Stakeholder inclusion and co-creation are emphasised across projects such as **UrbanA**, **CLAiR-CITY** and **SILVER STREAM**, which leverage innovative tools and methodologies to involve citizens, policymakers, and local businesses in shaping sustainable urban solutions.
- **Scaling Nature-Based Solutions for Sustainability:** Projects like **GrowGreen** and **CLEVER Cities** integrate NbS into urban regeneration, biodiversity enhancement, and green infrastructure, showcasing the potential of ecological solutions to transform urban landscapes and improve urban well-being.
- **Improving Urban Air Quality and Public Health:** Projects such as **CLAiR-CITY** and **Climate-fit.City** focus on addressing urban air pollution and mitigating heat risks by integrating citizen behaviour, high-resolution climate data, and public health considerations into urban policies.
- **Preserving Cultural and Historical Assets:** Projects like **ARCH** ensure that historic urban areas are resilient to climate change by integrating heritage conservation with resilience planning and decision-support tools.

4.1.2.2. Key results and contribution to knowledge

The Sustainable Cities and Urban Planning projects have driven progress in urban resilience, mobility innovation, digital planning, and nature-based solutions. Their findings offer practical, data-driven insights and scalable solutions to the complex challenges of urban sustainability, helping cities develop more effective and inclusive strategies. The key insights and areas of impact of these projects are:

- **Deployment of Nature-Based Solutions (NbS) for Urban Resilience**

Projects like **GrowGreen** and **CLEVER Cities** showcased the potential of NbS to enhance urban resilience and liveability. For example, **GrowGreen**'s implementation of sponge parks in Manchester reduced stormwater runoff by 97.6%, while **CLEVER Cities** introduced urban greening initiatives in Milan and London that mitigated urban heat stress by lowering ground temperatures. These interventions also improved biodiversity and promoted community well-being. The ARCH project developed resilience tools applied in four historic cities and mapped over 50 heritage structures, reducing data collection time by 30% while integrating NbS with climate risk and heritage planning.

- **Advancements in Sustainable Urban Mobility**

Innovative mobility solutions were a major focus in projects such as **SOLUTIONSplus** and **AVENUE**. The deployment of electric buses, e-cargo bikes, and autonomous minibuses led to a 93% reduction in CO2 emissions in demonstration cities, while reducing reliance on private vehicles by up to 15%. These projects highlighted the potential of multimodal transport systems to transform urban mobility sustainably. In addition, **SILVER STREAM** project introduced inclusive light electric vehicles with in-wheel motors and adaptive features, enhancing accessibility and reducing emissions in urban mobility systems.

- **Enhanced Citizen Engagement and Participatory Governance**

Projects like **CLAiR-CITY** and **DUET** placed citizens at the centre of urban planning, empowering them to shape policies and decisions. Through participatory tools, such as Local Digital Twins and citizen workshops, these projects engaged over 7,600 citizens and improved transparency in policymaking. This approach not only fostered trust but also ensured that policies were aligned with local needs and aspirations. In addition, UrbanA brought together over 1,000 to share experiences, uncover the roots of urban injustice, and co-create practical solutions for fairer, more sustainable cities.

- **Integration of Digital Innovation for Urban Planning**

Digital tools and data-driven approaches were pivotal in projects like **DUET** and **SmartEnCity**, which leveraged real-time simulations and interactive dashboards to optimise urban planning and resource management. These tools enabled policymakers to evaluate multiple scenarios, enhancing policy alignment with sustainability goals and fostering data-informed decision-making processes.

- **Reduction in Urban Air Pollution**

Through citizen-driven methodologies, projects like **CLAiR-CITY** achieved significant improvements in urban air quality. Pilot cities recorded a 25% reduction in NO2 concentrations and an 18% decrease in PM2.5 levels by incorporating behavioural data into urban air quality management strategies. These outcomes demonstrate the power of participatory approaches in addressing environmental health challenges.

- **Transformation of Urban Food Systems**

Projects such as **FoodE** and **CITIES2030** revolutionised urban food systems by integrating sustainable practices into city planning. Innovations like rooftop gardens, vertical farming, and circular food supply chains engaged over 4,000 stakeholders and reduced the distance food travels from production to consumption by 30%. These initiatives strengthened local food security and built resilient urban-rural connections.

- **Preservation and Resilience of Historic Urban Areas**

The **ARCH** project developed cutting-edge tools like the Historic Area Information System (HArIS) to enhance the resilience of historic urban areas to climate change and disasters. These tools supported the preservation of cultural heritage while integrating heritage sites into broader urban resilience frameworks, ensuring their sustainability for future generations.

- **Reduction in Energy Demand and CO2 Emissions**

Energy efficiency and decarbonisation were central objectives in projects like **SmartEnCity**, which retrofitted 181 buildings, achieving annual energy savings of 9,872 MWh and reducing CO2 emissions by 1,549 tCO2eq. These interventions set benchmarks for scalable urban decarbonisation strategies.

- **Economic and Social Co-Benefits of Urban Regeneration**

Urban regeneration projects like **CLEVER Cities** and **GrowGreen** demonstrated substantial economic and social benefits. These included a 12% increase in property values near green infrastructure, the creation of over 200 green jobs, and enhanced social cohesion through participatory greening initiatives. These results underscored the potential of urban planning to drive equitable economic growth.

- **Development of Scalable Frameworks for Climate Resilience**

Frameworks and platforms developed in projects like **Climate-fit.City** and **GrowGreen** provided cities with scalable tools to enhance climate resilience. These tools, including high-resolution climate data and open-data platforms, have been replicated in cities beyond Europe, such as Dhaka and Tirana, showcasing their global relevance and applicability.

The Sustainable Cities and Urban Planning projects have demonstrated how inclusive innovation, data-driven planning, and ecological solutions can work together to shape healthier, fairer, and more resilient cities. By piloting real-world solutions - from mobility and food systems to cultural resilience - these initiatives have produced models that other cities can learn from, adapt, and scale. At their heart, these projects offer clear evidence that urban transformation begins with people-centred approaches and the needs of each place as the main elements to achieve a just and green urban transition.

Nature-Based Solutions (NbS) and Urban Resilience	• **GrowGreen:** Sponge parks reduced stormwater runoff by 97.6% and temperatures by 24°C in pilot cities. • **CLEVER Cities:** 44 hectares of green roofs and 600 trees planted to enhance urban biodiversity and cooling**.**
Sustainable Urban Mobility	• **SOLUTIONSplus:** Deployed e-mopeds, buses, and cargo bikes, cutting CO2 by 93% in demonstration cities. • **AVENUE**: Transported 150,000 passengers with autonomous minibuses, reducing private car reliance by 15%.
Citizen Engagement and Govern	• **CLAiR-CITY:** Engaged 7,600 citizens, reducing NO2 by 25% and PM2.5 by 18%. • **DUET:** Local Digital Twins implemented in 3 cities, enhancing transparency and participatory decisio making.
Digital and Data-Driven Urban Planning	• **SmartEnCity:** Retrofitted 181 buildings, saving 9,872 MWh annually and reducing 1,549 tCO2eq. • **DUET:** Real-time simulations reduced planning costs by up to 30%.
Urban Air Pollution Reduction	• **CLAiR-CITY:** Prevented 568 premature deaths annually, saving €1.2 billion in healthcare. • **Climate-fit.City**: Reduced heatwave-related deaths by 20%, benefiting 1.2 million globally**.**
Urban Food Systems Transformation	• **FoodE:** Piloted 17 food projects in 11 cities, increasing local food transactions by 25%. • **CITIES2030:** Established 20 food labs, cutting food miles by 30%.
Preservation of Historic Areas	• **ARCH**: Mapped 50+ historic structures, reducing data collection time by 30%. • **ARCH:** Developed resilience tools applied in 4 cities to integrate cultural heritage into urban planning.

Table 12. Key Results: Sustainable Cities and Urban Planning (Part 1)

Energy Efficiency and Decarbonization	• **SmartEnCity:** Retrofitting reduced CO2 by 1,549 tCO2eq annually and saved 9,872 MWh of energy. • **Climate-fit.City:** Developed scalable frameworks for cities to integrate climate tools globally.
Economic and Social Co-Benefits	• **CLEVER Cities:** Created 200+ green jobs and increased property values by 12%. **GrowGreen:** Generated €125,000 in annual healthcare savings from increased activity in green spaces.
Climate Resilience and Global Impact	• **Climate-fit.City:** Tools replicated in cities like Dhaka and Tirana, benefiting 1 million+ globally. **GrowGreen:** NbS frameworks scaled to cities worldwide, improving resilience for urban populations.

Table 13. Key Results: Sustainable Cities and Urban Planning (Part 2)

4.1.2.3. Contribution to secondary thematic areas

The Sustainable Cities and Urban Planning projects have also significantly contributed to secondary thematic areas by addressing interconnected challenges and fostering cross-sectoral impacts. In **Environmental Justice and Social Inclusion**, projects like **CLAiR-CITY** and **CLEVER Cities** prioritised equitable access to green spaces, improving urban air quality and addressing disparities in health outcomes for marginalised communities. Contributions to **Bioeconomy and Circular Economy** include initiatives such as **FoodE** and **CITIES2030**, which integrated circular food systems into urban planning, reducing food waste and strengthening urban-rural connections through local supply chains. For **Climate Policy and Global Cooperation**, projects like **DUET** and **Climate-fit.City** developed tools and frameworks to enhance urban resilience and align urban planning strategies with global climate goals, supporting transnational collaboration and the scalability of solutions. In **Energy Transition and Energy Equity**, **SmartEnCity** and **SOLUTIONSplus** contributed by advancing energy-efficient housing retrofits and promoting equitable access to clean mobility solutions, reducing reliance on fossil fuels and addressing energy poverty. Together, these contributions demonstrate the projects' capacity to tackle systemic urban challenges while reinforcing sustainability and equity across diverse thematic areas.

4.1.2.4. Areas to Work on for the Future

The projects under the Sustainable Cities and Urban Planning pillar have achieved remarkable progress. Building on this foundation could further enhance progress towards creating resilient, inclusive, and sustainable urban environments. Below are areas identified by the projects that could be further explored to maximise societal, environmental, and economic benefits:

- **Scaling Nature-Based Solutions (NbS):** Projects like **GrowGreen** and **CLEVER Cities** have demonstrated the potential of NbS in enhancing urban resilience and biodiversity. However, scaling these solutions across diverse urban contexts will require investments in policy

frameworks, blended funding mechanisms and local-regional coordination to support implementation at a larger scale.

- **Enhancing Digital Integration and Interoperability:** While tools like Local Digital Twins from **DUET** and **SmartEnCity** have transformed urban planning, their interoperability and accessibility for smaller municipalities need improvement. Improving modularity and accessibility of digital tools would help smaller cities adopt these innovations such as digital twins.
- **Promoting Long-Term Citizen Engagement:** Sustaining citizen participation, as exemplified by **CLAiR-CITY** and **CLEVER Cities**, is critical to ensuring inclusive decision-making. Future projects could emphasise engaging marginalised groups and embedding participatory processes into urban governance structures.
- **Improving Air Quality Monitoring and Mitigation:** Projects like **CLAiR-CITY** have achieved significant air quality improvements, but future efforts could focus on expanding real-time monitoring systems with additional attention to emerging urban pollution sources.
- **Advancing Climate Resilience in Vulnerable Urban Areas:** Enhancing resilience in neighbourhoods prone to climate risks requires predictive climate models and localised interventions. Expanding frameworks developed in **ARCH** and **Climate-fit.City** could support proactive urban planning.
- **Strengthening Urban-Rural Linkages:** Projects like **FoodE** and **CITIES2030** have highlighted the benefits of integrating urban and rural food systems. Scaling these initiatives could foster localised circular economies and enhance resource efficiency across regions.
- **Addressing Energy Transition Challenges:** Ensuring equitable access to clean energy solutions, as seen in **SmartEnCity**, is vital. Innovative financing mechanisms, such as green bonds and public-private partnerships, could help scale retrofitting and clean mobility solutions.
- **Ensuring Equitable Urban Regeneration:** Future projects could address inclusive regeneration as highlighted within **CLEVER Cities** by developing governance models and co-creation practices that ensure urban regeneration benefits are shared among all residents, particularly vulnerable groups.
- **Expanding Capacity Building and Knowledge Sharing:** Increasing training programmes for city officials and stakeholders would empower them to implement sustainable strategies. Global knowledge-sharing platforms can further amplify the impact of European urban models worldwide as highlighted by **SmartEnCity** and **CLEVER Cities.**

4.1.3. Circular bio-based Solutions

This thematic area brings together a diverse portfolio of projects aimed at advancing sustainable practices, fostering inclusivity, and driving innovation across Europe and beyond. Spanning a wide temporal range from 2018 to 2026, these projects are coordinated by institutions in countries such as Italy, Spain, Germany, and Finland, with collaborative efforts involving multiple EU Member States and global partners. They address key objectives such as enhancing regional bioeconomy strategies, promoting circular resource use, and empowering rural and urban communities through innovative technologies.

As shown in the figure below, the factsheets highlight each project's core objectives and main information. Projects like **BIOVoices** and **Power4BIO** focus on mobilising stakeholders and creating actionable frameworks for market adoption, while projects like **BIO4AFRICA** and **DIVAGRI** tackle rural challenges in Africa by introducing circular and bio-based solutions. Urban sustainability is also championed through efforts like **HOOP**, which valorises biowaste and wastewater in circular city models. Meanwhile, **BIOEASTsUP** and **BE-Rural** concentrate on supporting regional transitions to sustainable bio-economies through strategic planning and participatory roadmaps. These projects collectively demonstrate the potential of the bioeconomy to address societal challenges, improve livelihoods, and contribute to global sustainability goals.

BIOVoices

Title: Mobilisation of a plurality of voices and mutual learning to accelerate the Bio-based sector

Duration: January 2018 – April 2021

Coordinating Country: Italy

Participating Countries: Italy, Slovakia, Estonia, Portugal, Greece, Romania, Spain, Netherlands, United Kingdom, Germany

Objective: Mobilise societal actors to promote bio-based products through mutual learning. Key results include co-creation events with over 2,840 experts and tools for market development.

Second Thematic Area: Environmental Justice and Social Inclusion

Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

Call for proposal: H2020-BB-2016-2017

BioMonitor

Title: Monitoring the Bioeconomy

Duration: June 2018 – November 2022

Coordinating Country: Netherlands

Participating Countries: Netherlands, Italy, United Kingdom, Latvia, Slovakia, Germany, Spain, Finland, Belgium, France

Objective: Develop a data and modeling framework for the bioeconomy, enabling quantification and policy guidance. Outputs include enhanced datasets and stakeholder training programs.

Second Thematic Area: Climate Policy and Global Cooperation

Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

Call for proposal: H2020-BB-2016-2017

BIO4AFRICA

Title: Diversifying revenue in rural Africa through circular, sustainable and replicable bio-based solutions and business models

Duration: June 2021 – May 2025

Coordinating Country: France

Participating Countries: France, Ghana, Kenya, Uganda, Zambia, Finland, Netherlands, Portugal, Spain, Côte d'Ivoire, Ireland, Uganda, Spain, Denmark, Greece.

Objective: Diversify rural African incomes through small-scale bio-based technologies and circular economy practices.

Second Thematic Area: Environmental Justice and Social Inclusion

Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

Call for proposal: H2020-SFS-2018-2020

DIVAGRI

Title: Revenue diversification pathways in Africa through bio-based and circular agricultural innovations

Duration: June 2021 – May 2025

Coordinating Country: Germany

Participating Countries: Germany, Austria, Namibia, Botswana, Ghana, South Africa, Mozambique

Objective: Enhance rural African agriculture via circular innovations, promoting biodiversity, soil health, and capacity building for smallholder farmers.

Second Thematic Area: Environmental Justice and Social Inclusion

Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

Call for proposal: H2020-SFS-2018-2020

POWER4BIO

Title: emPOWERing regional stakeholders for realising the full potential of European BIOeconomy

Duration: October 2018 – March 2021

Coordinating Country: Spain

Participating Countries: Spain, Germany, Netherlands, Italy, Hungary, Belgium, Poland, Czechia, Ukraine, Greece, Czechia, Slovakia.

Objective: Develop regional strategies for bioeconomy adoption, including a 3-step methodological framework and regional recommendations.

Second Thematic Area: Sustainable Cities and Urban Planning

Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

Call for proposal: H2020-RUR-2018-2020

Table 14 Circular Bio-based Solutions projects factsheet (part 1)

BE-Rural

Title: Bio-based strategies and roadmaps for enhanced rural and regional development in the EU
Duration: April 2019 – July 2022
Coordinating Country: Germany
Participating Countries: Germany, United Kingdom, Bulgaria, Romania, Latvia, Poland, Croatia, Bulgaria
Objective: Strengthen rural bioeconomies by supporting regional bioeconomy strategies and roadmaps.
Second Thematic Area: Sustainable Cities and Urban Planning
Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy
Call for proposal: H2020-RUR-2018-2020

HOOP

Title: Hub of Circular Cities Boosting Platform to Foster Investments for the Valorisation of Urban Biowaste and Wastewater
Duration: October 2020 – March 2025
Coordinating Country: Spain
Participating Countries: Spain, Germany, Finland, Italy, Portugal, Greece, Netherlands, Belgium
Objective: Valorise urban biowaste and wastewater to foster circular cities, targeting investments and public engagement.
Second Thematic Area: Sustainable Cities and Urban Planning
Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy
Call for proposal: H2020-FNR-2020

BIOEASTsUP

Title: Advancing Sustainable Circular Bioeconomy in Central and Eastern European countries: BIOEASTsUP
Duration: October 2019 – March 2023
Coordinating Country: Poland
Participating Countries: Poland, Hungary, Slovakia, Czechia, Slovenia, Latvia, Estonia, Lithuania, Bulgaria, Romania, Croatia
Objective: Facilitate the transition to a sustainable bioeconomy in Central and Eastern Europe.
Second Thematic Area: Climate Policy and Global Cooperation
Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy
Call for proposal: H2020-RUR-2018-2020

FOSTER

Title: Fostering food system transformation by integrating heterogeneous perspectives in knowledge and innovation within the ERA
Duration: September 2022 – August 2026
Coordinating Country: Germany
Participating Countries: Germany, Netherlands, Portugal, Spain, Serbia, Hungary
Objective: Improve governance and inclusivity in food systems through co-learning and citizen science initiatives.
Second Thematic Area: Environmental Justice and Social Inclusion
Programme: HORIZON.2.6 - Food, Bioeconomy Natural Resources, Agriculture and Environment
Call for proposal: HORIZON-CL6-2021-GOVERNANCE-01

HealthyFoodAfrica

Title: Improving nutrition in Africa by strengthening the diversity, sustainability, resilience and connectivity of food systems
Duration: June 2020 – May 2025
Coordinating Country: Finland
Participating Countries: Finland, Ghana, Kenya, Uganda, Zambia, Ethiopia, Italy, Netherlands, France, Norway, Benin, Portugal
Objective: Develop sustainable, resilient, and healthy food systems in Africa via food labs and multi-actor approaches.
Second Thematic Area: Environmental Justice and Social Inclusion
Programme: H2020-EU.3.2. - SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy
Call for proposal: H2020-SFS-2018-2020

Table 15 Circular Bio-based Solutions projects factsheet (part 2)

4.1.3.1. Key Objectives

The main cluster objectives and scope, identified across the 10 projects include:

- **Enhancing Sustainability through Bioeconomy Principles**: Projects like **BIO4AFRICA**, **DIVAGRI**, and **HealthyFoodAfrica** focus on utilising bio-based technologies to transform agricultural and industrial residues into high-value products like biochar, bioplastics, and bio-composites. These efforts aim to close resource loops, reduce waste, and enhance the resilience of local economies.
- **Developing Circular Systems**: Initiatives such as **HOOP** and **BE-Rural** prioritise the valorisation of organic waste and the establishment of circular business models. This includes promoting the cascading use of biomass, optimising resource efficiency, and reducing reliance on non-renewable materials.
- **Policy Alignment and Governance**: Projects like **BioMonitor** and **BIOEASTsUP** emphasise creating robust policy frameworks to integrate circular bioeconomy principles into national and regional strategies. These include setting measurable indicators for circularity and fostering stakeholder alignment with the European Green Deal and Circular Economy Action Plan.
- **Stakeholder Engagement and Inclusion**: Stakeholder inclusion is a cross-cutting objective in projects such as **BIOVoices** and **FOSTER**, which aim to empower marginalised communities, promote gender equity, and involve diverse actors in decision-making processes. Public engagement tools like the BIOVoices platform and community-driven innovation hubs highlight the emphasis on participatory governance.
- **Capacity Building and Education**: Many projects, including **BE-Rural** and **HealthyFoodAfrica**, focus on educating stakeholders about bio-based innovations. This includes creating training programmes, curricula, and knowledge-sharing platforms to equip local communities, researchers, and policymakers with the skills to lead sustainable transitions.
- **Technological Innovation and Deployment**: Projects like **DIVAGRI**, **BIO4AFRICA**, and **Power4BIO** highlight the importance of deploying small-scale, robust bio-based technologies tailored to local needs. These technologies range from biorefineries to low-energy irrigation systems, which help address local challenges such as food security, water scarcity, and waste management.
- **Economic Development and Market Creation**: A focus on creating sustainable value chains and new market opportunities is evident in projects like **HOOP** and **HealthyFoodAfrica**, which aim to integrate smallholders and local producers into global value chains, fostering entrepreneurship and equitable economic growth.
- **Addressing Climate Goals**: Climate adaptation and mitigation are central to initiatives like **BioMonitor** and **BIOEASTsUP**, which focus on leveraging bio-based solutions to achieve net-zero emissions. These projects support the transition to a low-carbon economy through renewable energy adoption and efficient resource use.
- **Social Equity and Environmental Justice**: Social inclusion and equity underpin several projects, including **BIOVoices** and **DIVAGRI**, which ensure that women, youth, and marginalised communities benefit equitably from bioeconomy initiatives. These projects emphasise fair resource distribution, inclusive decision-making, and community empowerment.

4.1.3.2. Key results and contribution to knowledge

The **Circular bio-based** projects generate empirical evidence on the feasibility, scalability, and impact of bioeconomy and circular economy strategies.

The key insights and areas of impact of these projects are discussed below:

- **Technological Advancements and Circular Innovations**

Projects like **BIO4AFRICA** and **DIVAGRI** have implemented cutting-edge bio-based technologies to maximise resource efficiency and reduce waste. **BIO4AFRICA** tested 27 biomass types and deployed small-scale biorefineries, pyrolysis systems, and hydrothermal carbonisation technologies, enhancing circularity in rural economies. **DIVAGRI** established 15 demonstration sites, introducing innovations such as artificial wetlands and mobile biorefineries, which doubled irrigated land and projected a 200% increase in crop yields. Similarly, **HOOP** developed tailored circular business models, and its Urban Circular Bioeconomy Hub (UCBH) now supports 77 cities and regions in adopting circular practices.

- **Policy and Governance Frameworks**

Policy alignment and strategic planning are at the core of projects like **BioMonitor** and **BIOEASTsUP**, which developed tools and frameworks to integrate bioeconomy principles into governance. **BioMonitor's** toolbox, engaging over 250 stakeholders, includes models like MAGNET and BioMAT to project market trends for bio-based products. **BIOEASTsUP** created a Strategic Research and Innovation Agenda (SRIA) for 11 Central and Eastern European countries, contributing to a 15% reduction in GHG emissions in pilot cities through innovative urban planning.

- **Stakeholder Engagement and Inclusivity**

Empowering stakeholders is central to projects like **BIOVoices** and **FOSTER**, which prioritised participatory governance. **BIOVoices** conducted 77 Mobilisation and Mutual Learning (MML) workshops, engaging 4,190 participants, including 1,187 industry professionals and 705 civil society members, to co-create bioeconomy strategies. **FOSTER** facilitated 6 Citizen-Driven Initiatives (CDIs) to co-develop scalable solutions for regional challenges, enhancing inclusivity and grassroots innovation.

- **Capacity Building and Knowledge Sharing**

Education and training initiatives across projects such as **BE-Rural** and **HealthyFoodAfrica** equipped stakeholders with the knowledge and tools for sustainable transitions. **BE-Rural** developed educational materials in 6 languages and hosted regional workshops that trained over 100 participants. **HealthyFoodAfrica** established 10 food system labs in 6 African countries, benefiting over 300 smallholder farmers through capacity-building programmes.

- **Economic Development and Market Creation**

Projects like **Power4BIO** and **DIVAGRI** have driven the creation of sustainable markets and value chains. **Power4BIO** catalogued 36 bio-based solutions with Technology Readiness Levels (TRL) above 6, enabling regions to integrate these innovations into their economies. **DIVAGRI** developed 10 new value chains and integrated smallholders into sustainable agricultural and industrial systems, significantly boosting incomes and economic resilience.

- **Environmental Justice and Social Equity**

The focus on inclusivity and equity is evident in projects like **BIO4AFRICA** and **BIOVoices**, which engaged marginalised communities in bioeconomy initiatives. **BIO4AFRICA** involved over 300 local producers, with tailored programmes supporting women and youth. **BIOVoices** distributed 14,000 children's books in 11 languages, fostering early awareness of bio-based products and sustainability.

- **Contributions to Climate Goals**

Climate adaptation and mitigation are integral to projects like **BioMonitor** and **HOOP**, which developed tools and strategies to reduce greenhouse gas emissions and optimise waste management. **BioMonitor** projected a 3.5% annual growth in bio-based chemicals, demonstrating a significant shift away from fossil fuels. **HOOP** implemented waste valorisation systems in Lighthouse Cities, reducing GHG emissions and enhancing circular waste practices.

Together, the projects under Circular Bio-based solutions thematic area contribute to advancing a just and sustainable transition by embedding innovation, equity, and environmental stewardship into real-world systems. From cutting-edge bio-based technologies such as biorefineries and pyrolysis to participatory governance and sustainable business models, these projects offer practical solutions for building circular value chains. The projects contribute to a transition that leaves no one behind- ensuring the benefits of the circular and bio economy, such as skills, jobs, and access to innovation, reach the communities that need them most. To keep this progress going, it will be essential to strengthen collaboration, harmonise governance frameworks, and deepen stakeholder engagement and maintain momentum.

Technological Advancements and Circular Innovations	• **BIO4AFRICA** tested 27 biomass types and successfully implemented small-scale biorefineries, pyrolysis systems, and hydrothermal carbonisation technologies • **DIVAGRI** established 15 demonstration sites across five countries, deploying technologies that increased irrigated land and projected a 200% crop yield improvement • **HOOP** developed tailored circular business models for eight Lighthouse Cities and created the HOOP Urban Circular Bioeconomy Hub, which supports 77 cities and regions.
Policy and Governance Frameworks	• **BioMonitor** engaged over 250 stakeholders and developed the BioMonitor Toolbox, which integrates tools like MAGNET and BioMAT to project market trends in bio-based products • **BIOEASTsUP** supported 11 Central and Eastern European countries by creating a Strategic Research and Innovation Agenda (SRIA) and reducing GHG emissions by 15% in pilot cities.
Stakeholder Engagement and Inclusivity	• **BIOVoices** organised 77 Mobilisation and Mutual Learning (MML) workshops, engaging 4,190 participants, including 1,187 industry professionals and 705 civil society members. • **FOSTER** involved six Citizen-Driven Initiatives (CDIs) in co-learning processes, scaling local solutions across diverse regional contexts.
Capacity Building and Knowledge Sharing	• **BE-Rural** developed educational resources in six languages and organised regional workshops, training over 100 stakeholders. • **HealthyFoodAfrica** implemented 10 food system labs across six African countries, benefiting over 300 smallholder farmers.
Economic Development and Market Creation	• **Power4BIO** catalogued 36 bio-based solutions with Technology Readiness Levels (TRL) above 6 and empowered 10 regions to update bioeconomy strategies. • **DIVAGRI** created 10 new value chains and provided access to sustainable business opportunities for smallholder farmers.

Environmental Justice and Social Equity	• **BIO4AFRICA** directly involved over 300 smallholder farmers, including women and youth, in pilot projects and capacity-building initiatives. • **BIOVoices** distributed 14,000 children's books in 11 languages to raise awareness about the bioeconomy among younger generations.
Contributions to Climate Goals	• **BioMonitor** projected a 3.5% annual growth in bio-based chemicals, significantly reducing reliance on fossil fuels. • **HOOP** implemented waste valorisation systems that reduced greenhouse gas emissions and enhanced urban waste management efficiency.

Table 16. Key Results: Circular Bio-based Solutions

4.1.3.3. Contribution to secondary thematic areas

The projects under Circular bio-based solutions thematic area have also significantly contributed to secondary thematic areas by addressing interconnected challenges and fostering cross-sectoral impacts. In **Environmental Justice and Social Inclusion**, projects like **BIO4AFRICA** and **DIVAGRI** empowered marginalised communities, particularly women and youth, through capacity building and equitable access to bio-based solutions. Contributions to **Sustainable Cities and Urban Planning** include circular frameworks from **HOOP** and **BE-Rural**, which reduced landfill dependency and fostered urban-rural linkages for localised bio-based value chains. For **Climate Policy and Global Cooperation**, initiatives like **BioMonitor** and **BIOEASTsUP** aligned bioeconomy strategies with global climate goals, facilitating carbon-neutral transitions and transnational collaboration. In **Health and Societal Transitions**, **HealthyFoodAfrica** and **FOSTER** improved food security and inclusivity by enhancing governance and supporting diverse, sustainable diets. Additionally, **DIVAGRI** and **BIO4AFRICA** supported the **Energy Transition** by introducing renewable bioenergy technologies that address energy poverty and reduce fossil fuel reliance. Together, these contributions demonstrate the projects' capacity to tackle systemic challenges while reinforcing sustainability across diverse thematic areas.

4.1.3.4. Areas to Work on for the Future

The projects under the Circular bio-based solution thematic area have achieved good progress in enhancing the bioeconomy and circular economy innovation. Below are areas identified by the projects that could be further explored to further solidify sustainable transitions while maximising societal, environmental, and economic benefits:

- **Scaling and Replication of Solutions**: Many projects, such as **BIO4AFRICA** and **DIVAGRI**, have successfully piloted bio-based technologies and business models. Scaling these innovations could be part of future activities, with actions including technology replication across additional regions, continued training programmes, and stakeholder engagement to support wider adoption.
- **Policy Integration and Harmonisation**: Despite significant advancements in policy alignment, such as in **BIOEASTsUP**, **BioMonitor**, **HOOP** and **Power4BIO**, challenges persist in translating project outputs into cohesive policies at the local, national, and regional levels. Further efforts are needed to harmonise regulatory frameworks across EU Member States, particularly regarding standards for bio-based products, end-of-waste criteria, and circular economy incentives. Enhanced collaboration with policymakers can drive consistent implementation and create an enabling environment for sustainable innovations.

- **Technological Advancements and Commercialisation**: Continued investment in research and development is crucial for improving the efficiency, scalability, and cost-competitiveness of emerging bio-based technologies. Besides the advances achieved in **BIO4AFRICA**, **DIVAGRI**, **HOOP**, and **BioMonitor**, bridging the gap between pilot-scale innovations and market-ready solutions will require dedicated support for innovation ecosystems and commercialisation pathways via further training, technology adaptation, and stakeholder engagement.
- **Addressing Data Gaps and Monitoring**: Comprehensive data collection and robust monitoring frameworks are essential to measure the long-term impacts of bioeconomy initiatives. Tools such as the **BioMonitor** Toolbox have laid the groundwork for tracking bio-based markets, but further development is needed to include new metrics for biodiversity, social equity, and lifecycle sustainability.
- **Enhancing Stakeholder Inclusion and Capacity Building**: Strengthening stakeholder engagement is vital to ensure that all societal groups benefit equitably from the bioeconomy. Expanding education and training programmes, particularly in marginalised and underrepresented communities, will help build the workforce needed to support green transitions. Additionally, initiatives like **BIOVoices** and **FOSTER** could be strengthened to deepen citizen participation and foster greater public awareness.
- **Strengthening Urban-Rural Linkages**: Projects such as **BE-Rural** and **HealthyFoodAfrica** have demonstrated the potential of integrating urban and rural economies through localised value chains. Future efforts could focus on scaling these linkages, by replicating stakeholder co-creation processes, supporting rural bio-based solutions, and promoting inclusive food system strategies across regions.
- **Global Collaboration and Knowledge Sharing**: Expanding international cooperation is critical to addressing global sustainability challenges. Strengthening partnerships with non-EU countries, particularly in regions like Africa and Asia, as in **BIO4AFRICA** and **DIVAGRI**, would promote technology transfer, joint research, and market access for bio-based products. Aligning EU bioeconomy strategies with international climate and sustainability goals would also reinforce the Union's leadership on the global stage.
- **Public Awareness and Consumer Engagement**: Consumer adoption of bio-based products remains a barrier to market growth. Besides the outreach activities of **BIOVoices**, **FOSTER**, **BE-Rural**, future outreach campaigns targeting financial incentives, and education initiatives are needed to build consumer trust and demand for sustainable alternatives. Platforms like the BIOVoices network could be further leveraged to bridge knowledge gaps and drive behavioural change.

4.1.4. Energy Transition and Energy Equity

This thematic area brings together six projects focused on advancing sustainable, inclusive, and community-driven energy solutions. Running from 2015 to 2026, these projects are led by institutions across Europe, including Austria, Germany, Belgium, Italy, and Greece, and some of them in collaboration with international partners from Central Asia, Eastern Europe, and beyond (e.g., Kyrgyzstan, Kazakhstan, Sri Lanka, etc.). These projects focus on ensuring equitable access to clean energy, fostering social acceptance of renewable energy technologies, and developing participatory energy governance models to support vulnerable communities in the transition to sustainable energy systems.

As shown in the figure below, the factsheets highlight each project's core objectives and main information. Collectively, these projects reflect a shared commitment to a just, inclusive, and climate-resilient energy transition. From advancing biogas and hydropower solutions (**ISABEL, ISAAC, and Hydro4U**) to unlocking citizen-led investment in geothermal and wind energy (**CROWDTHERMAL and WinWind**) and aligning energy access with human development goals (**DecentLivingEnergy**), these research projects present how targeted innovation and participatory

governance can drive equitable access to clean, reliable, and climate-resilient energy across different social and geographic contexts.

DecentLivingEnergy	Hydro4U	CROWDTHERMAL
Title: Energy and emissions thresholds for providing decent living standards to all **Duration**: June 2015 - May 2019 **Principal investigator:** Narasimha Rao **Host Institution:** The International Institute for Applied Systems Analysis, Austria **Participating Countries:** Austria **Objective:** Quantify the energy requirements necessary to provide basic living standards while mitigating climate change. Focusing on poverty eradication and low-carbon development. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC) **Call for proposal:** ERC-2014-STG	**Title:** Hydropower for You - Sustainable Small-scale Hydropower in central Asia **Duration:** June 2021 – May 2026 **Coordinating Country:** Germany **Participating Countries:** Germany, Austria, Switzerland, Sri Lanka, Belgium, Uzbekistan, Spain, Kyrgyzstan, Kazakhstan **Objective:** implementing small-scale hydropower (SHP) in Central Asia, addressing unmet energy needs in the region, while promoting renewable energy adoption. **Second Thematic Area:** Climate Policy and Global Cooperation **Programme:** H2020-EU.3.3. - SOCIETAL CHALLENGES - Secure, clean and efficient energy **Call for proposal:** H2020-LC-SC3-2018-2019-2020	**Title:** Community-based development schemes for geothermal energy **Duration:** September 2019 – December 2022 **Coordinating Country:** Belgium **Participating Countries:** Germany, Poland, Slovenia, Romania, Ukraine, Portugal, Estonia, Turkey, Czechia, Spain, Hungary, Bulgaria, Italy, Serbia, Croatia, Belgium, United Kingdom, Netherlands, Iceland **Objective:** Enable community participation in the development and financing of geothermal energy projects through crowdfunding and social engagement. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.3. - SOCIETAL CHALLENGES - Secure, clean and efficient energy **Call for proposal:** H2020-LC-SC3-2018-2019-2020

Table 17. Energy Transition and Energy Equity projects factsheet (part 1)

WindWind	ISABEL	ISAAC
Title: Winning social acceptance for wind energy in wind energy scarce regions **Duration:** October 2017–March 2020 **Coordinating Country:** Germany **Participating Countries:** Germany, Italy, Spain, Poland, Norway, Latvia **Objective:** Enhance social acceptance for wind energy in regions with historically low uptake by addressing community concerns, promoting benefit, and fostering participatory decision-making. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.3. - SOCIETAL CHALLENGES - Secure, clean and efficient energy **Call for proposal:** H2020-LCE-2016-2017	**Title:** Triggering Sustainable Biogas Energy Communities through Social Innovation **Duration:** January 2016 – December 2018 **Coordinating Country:** Greece **Participating Countries:** France, United Kingdom, Germany, Greece, Belgium **Objective:** Promote the development of biogas energy via social innovation and community-based solutions. It supports equitable access to clean energy for local communities. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.3. - SOCIETAL CHALLENGES - Secure, clean and efficient energy **Call for proposal:** H2020-LCE-2014-2015	**Title:** Increasing Social Awareness and Acceptance of Biogas and Biomethane **Duration:** January 2016 – June 2018 **Coordinating Country:** Italy **Participating Countries:** Italy **Objective:** promoting the acceptance and implementation of biogas and biomethane in Italy by increasing public awareness, stakeholder engagement, and participatory decision-making. **Second Thematic Area: Environmental Justice and Social Inclusion.** **Programme:** H2020-EU.3.3. - SOCIETAL CHALLENGES - Secure, clean and efficient energy **Call for proposal:** H2020-LCE-2014-2015

Table 18 Energy Transition and Energy Equity projects factsheet (part 2)

4.1.4.1. Key objectives

The key clustered objectives and scope, identified across the 6 projects, include:

- **Ensuring Equitable Access to Clean Energy**: Projects like **DecentLivingEnergy** and **Hydro4U** focus on expanding energy access while aligning with climate goals. These projects aim to ensure that underserved populations - especially in Central Asia and developing contexts - gain access to reliable, affordable, and sustainable energy without compromising climate goals.
- **Strengthening Social Acceptance and Community Participation in Renewable Energy**: Projects such as **WinWind** and **CROWDTHERMAL** aim to bridge the gap between technological innovation and public trust, ensuring that communities are actively engaged in the renewable energy transition**.**
- **Advancing Decentralised and Community-Led Energy Solutions**: Projects like **ISABEL** and **ISAAC** emphasised the significance of locally driven renewable energy models, ensuring that clean energy benefits are equitably distributed, particularly in rural areas. Their biogas-centred approaches present the objective to support decentralised, community-driven energy solutions that align with local needs and priorities.
- **Integrating Renewable Energy with Climate-Resilient Infrastructure**: Projects such as **Hydro4U** and **DecentLivingEnergy** ensure that renewable energy planning aligns with long-term sustainability and climate adaptation goals. By incorporating scenario-based planning and sustainable design, they present a broader objective to ensure that energy infrastructure remains adaptive and resilient in the face of climate change.

- **Developing Innovative Financing Mechanisms for Renewable Energy Adoption**: Projects like **CROWDTHERMAL** and **WinWind** explored alternative financial strategies to facilitate investments in clean energy. They support the democratising investment in renewable energy and broadening access to clean energy markets.
- **Enhancing Climate Policy and Global Cooperation for Energy Equity**: Projects like **Hydro4U** and **DecentLivingEnergy** contribute to just and sustainable energy transitions via transboundary collaboration and integrated policy efforts. They ensure that energy transitions support both climate adaptation and equitable access to renewable energy.
- **Expanding Public Awareness and Energy Literacy**: Projects such as **ISAAC** and **ISABEL** focus on educational outreach and stakeholder engagement to foster a broad societal transition toward renewables. Both projects contribute to the wider objective of equipping citizens and local actors with the knowledge and tools needed to actively participate in the clean energy transition, ultimately leading to the adoption of renewable energy solutions.

4.1.4.2. Key results and contribution to knowledge

The implementation of the projects under the Energy Transition and Energy Equity thematic area has generated significant, tangible impacts across multiple sectors, advancing clean energy innovation, fostering economic equity, and driving systemic change in renewable energy governance. These initiatives contribute to a just and inclusive energy transition, emphasising decentralised energy solutions, financial participation, and technological innovation.

The clustering of key results reveals transformative achievements, supported by both qualitative and quantitative data, underscoring their contributions to energy equity, clean technology, and social sustainability.

The key insights and areas of impact of these projects are discussed below:

- **Inclusive Governance and Participatory Energy Planning**

Strengthening governance through participatory decision-making is central to projects like **WinWind** and **CROWDTHERMAL**, ensuring that local communities have a voice in renewable energy deployment. **WinWind** has established six regional stakeholder desks, engaging over 300 policymakers, developers, and local communities in dialogue and policy co-creation. This model improved stakeholder trust in wind energy planning by 35%, reducing opposition to new wind projects. **CROWDTHERMAL** has introduced the Social Licence to Operate (SLO) framework), which has helped reduce public opposition to geothermal energy by 25%, ensuring smoother project implementation. **ISAAC** has also contributed to energy democracy by implementing participatory processes in Italy in Andria and Arborea, engaging over 4,000 citizens through surveys, workshops, and public consultations. The participatory process in Andria led to a 20% increase in acceptance of biogas plants, demonstrating the effectiveness of structured community engagement. **ISABEL** facilitated the formation of community energy cooperatives, ensuring that biogas energy ownership remains in local hands. These efforts bridge the gap between decision-makers and communities, ensuring that renewable energy deployment aligns with public interests and long-term sustainability goals.

- **Technological Innovation and Renewable Energy Deployment**

Renewable energy solutions have proven to be the key enabler of equitable energy transitions, ensuring that clean energy is accessible, scalable, and adaptable to diverse socio-economic needs. Projects like **Hydro4U** have pioneered the deployment of containerised small-scale hydropower units, that offer clean, reliable energy to remote communities while ensuring environmental sustainability. Similarly, **ISABEL** has developed small-scale biogas plants, integrating agricultural waste into local energy grids, empowering rural communities to manage their energy production independently. **CROWDTHERMAL** has showcased the viability of direct-use geothermal energy for district heating, reducing reliance on fossil fuel-powered heating

systems. **WinWind** has optimised wind energy siting through GIS-based tools, reducing wildlife conflicts by 30%, ensuring better alignment of wind projects with biodiversity conservation efforts. **ISAAC** has expanded biogas production capacity, identifying a production potential of 150-250 billion cubic meters across Europe, demonstrating the large-scale viability of biogas as a renewable fuel. By integrating technology-driven renewable energy models with sustainable development objectives, these projects contribute to energy security, climate resilience, and equitable energy access, ensuring that clean energy transitions remain both technologically robust and socially inclusive.

- **Financial Inclusion and Community Energy Investment**

Expanding financial accessibility in clean energy transitions is fundamental to democratising energy ownership and ensuring equitable distribution of energy benefits. Projects like **CROWDTHERMAL** and **WinWind** have demonstrated how innovative financial frameworks can empower local communities to participate in renewable energy investments, reducing reliance on traditional financing models. **CROWDTHERMAL** has pioneered community-driven geothermal investment models, successfully raising €1.2 million through crowdfunding in just two months, proving that decentralised financing mechanisms can accelerate geothermal adoption. Similarly, **WinWind** has facilitated land lease pooling frameworks, leading to a 15% increase in local economic benefits and ensuring that municipalities and landowners receive fair compensation for hosting wind farms. **ISAAC** has introduced alternative crowdfunding schemes, raising €200,000 and engaging over 100 community investors, demonstrating the viability of citizen-led investment in biogas infrastructure. By integrating financial democratisation with sustainable energy development, these initiatives bridge the gap between capital accessibility and local energy autonomy, creating replicable models for equitable and community-driven clean energy transitions.

- **Environmental Sustainability and Climate Resilience**

Integrating climate resilience and biodiversity safeguards into energy planning is essential for ensuring that renewable energy development aligns with ecological conservation and long-term sustainability goals. Projects like **WinWind, Hydro4U, ISABEL, and CROWDTHERMAL** have demonstrated how strategic environmental planning can mitigate risks associated with renewable energy expansion while maximising climate benefits. **WinWind** has implemented an environmental protection framework that has reduced bird mortality in wind farm areas by 30%, setting a precedent for biodiversity-conscious wind energy deployment. Meanwhile, **Hydro4U's** hydrological modelling techniques have safeguarded water resources, prevented depletion and ensured that hydropower expansion does not compromise water security for local communities.

DecentLivingEnergy has presented that using low-energy housing and smart city design can help provide essential cooling for 3.7 billion people in the Global South, as well as contributing to about 14% of today's global residential electricity consumption. This approach advances climate adaptation while minimising emissions from mechanical cooling systems, offering a replicable low-energy model for heat resilience.

In the field of emissions reduction, **ISABEL's** biogas initiatives have prevented 10,000 tons of CO_2-equivalent emissions annually, highlighting the potential of waste-to-energy systems in decarbonisation strategies. Similarly, **CROWDTHERMAL's** binary geothermal systems have achieved a 99% reduction in emissions compared to fossil-based heating, demonstrating the viability of geothermal energy as a near-zero carbon alternative. By embedding environmental resilience and emissions mitigation, these projects reinforce the principle that scaling clean energy must be balanced with ecological responsibility. Their approaches serve as replicable models, ensuring that renewable energy expansion supports - not disrupts - natural ecosystems and local resource management strategies.

- **Capacity Building and Energy Education**

Education and training empower communities and policymakers to actively participate in the energy transition. Project likes **ISAAC**'s educational outreach programmes engaged 850+ students via educational tours and distributed 5,000+ digital learning materials, fostering biogas literacy

among future generations. **CROWDTHERMAL** developed digital financial literacy tools, enabling local investors to navigate renewable energy crowdfunding platforms, ensuring that community members could actively invest in geothermal projects. **ISABEL's** regional training workshops equipped rural communities with the technical expertise needed to manage biogas plants, providing operational training and best-practice guidelines for efficient bioenergy production. Meanwhile, **Hydro4U** established specialised hydropower training programmes, ensuring that local engineers gain expertise in sustainable water-energy management and enabling long-term maintenance of hydropower infrastructure. **DecentLivingEnergy** contributed to capacity building by development of a replicable policy framework that enables governments to estimate national energy needs for poverty eradication, helping planners in India, Brazil, and South Africa align social development with low-carbon strategies. By embedding training and public education into renewable energy transitions, these projects ensure that local communities have the knowledge and capacity to lead their own energy future, promoting sustainable, long-term adoption of renewable energy solutions.

The Energy Transition and Energy Equity projects collectively demonstrate how targeted innovation, financial inclusivity, and participatory governance can converge to advance just and sustainable energy systems. Projects like **DecentLivingEnergy**, **Hydro4U**, **ISAAC**, and **WinWind**, have provided evidence supporting climate-aligned energy access, community-based ownership models, and cross-border collaboration. These findings contribute to strengthen global sustainability objectives, including the SDGs and the Paris Agreement, while offering replicable models that centre energy democracy, data-driven policymaking, and equitable transitions. Looking ahead, scaling these solutions, streamlining policies, and enhancing stakeholder inclusion will be essential to ensure that the energy transition leaves no one behind.

Inclusive Governance and Participatory Energy Planning	• **WinWind** established six regional stakeholder desks, engaging 300+ policymakers, developers, and communities, improving stakeholder trust by 35%. • **CROWDTHERMAL** introduced the Social License to Operate (SLO) framework, reducing public resistance to geothermal projects by 25%. • **ISAAC** implemented participatory processes in Italy, engaging 4,000 citizens, increasing biogas plant acceptance by 20%. • **ISABEL** facilitated community energy cooperatives, ensuring local ownership of biogas projects.
Technological Innovation and Renewable Energy Deployment	• **Hydro4U** deployed small-scale hydropower, generating 13 GWh/year. • **ISABEL** integrated biogas plants into local grids, converting agricultural waste into energy. • **CROWDTHERMAL** showcased geothermal district heating, reducing fossil fuel reliance. • **WinWind** optimized wind farm siting, cutting wildlife conflicts by 30%. • **ISAAC** identified 150-250 billion m^3 biogas potential across Europe, proving large-scale feasibility.

Financial Inclusion and Community Energy Investment	• **CROWDTHERMAL** raised €1.2 million through crowdfunding, demonstrating the viability of community-driven geothermal financing. • **WinWind** increased local economic benefits by 15% through land lease pooling, ensuring fair compensation for landowners. • **ISAAC** raised €200,000 for biogas investments, engaging 100+ community investors in citizen-led energy projects.
Environmental Sustainability and Climate Resilience	• **WinWind** reduced bird mortality by 30%, improving biodiversity protection in wind farm areas. • **Hydro4U** safeguarded water resources, ensuring sustainable hydropower expansion. • **ISABEL** prevented 10,000 tons of CO_2-equivalent emissions annually, supporting climate resilience. • **CROWDTHERMAL** achieved a 99% reduction in emissions from geothermal heating, proving its near-zero carbon potential. • **DecentLivingEnergy** showed that low-energy housing can reduce cooling demand by 14%, aiding 3.7 billion people in the Global South.
Capacity Building and Energy Education	• **ISAAC** trained 850+ students through biogas education programs and distributed 5,000+ digital learning materials. • **CROWDTHERMAL** developed financial literacy tools to support renewable energy investors. • **ISABEL** trained communities in biogas plant operations, strengthening rural energy knowledge • **Hydro4U** provided hydropower training programs, equipping engineers with sustainable water-energy management skills • **DecentLivingEnergy** developed a planning tool showing that basic living standards can be met with 30% less energy through efficient housing and public transport.

Table 19 Key Results: Energy Transition and Energy Equity

4.1.4.3. Contribution to secondary thematic areas

The Energy Transition and Energy Equity projects have significantly contributed to secondary thematic areas, addressing interconnected challenges and generating cross-sectoral impacts. These contributions highlight the projects' multidimensional role in advancing climate governance, social inclusion, ensuring that the green transition is equitable and aligned with broader sustainability objectives. In **Climate Policy and Global Cooperation**, projects like **DecentLivingEnergy** and **Hydro4U** have provided critical insights into energy justice and transnational cooperation for climate resilience. **DecentLivingEnergy** quantified the energy thresholds required for dignified living, informing about the climate mitigation and adaptation policies by linking energy access with emissions reductions. Meanwhile, **Hydro4U** has demonstrated how small-scale hydropower can support regional energy cooperation, adapting EU energy standards to fit the specific environmental and policy conditions of Central Asia. These contributions ensure that climate policies incorporate fair energy access models and scalable solutions for developing regions. For **Environmental Justice and Social Inclusion**, projects like **CROWDTHERMAL, WinWind, ISABEL,** and **ISAAC** have promoted community-led renewable energy adoption, enhancing public trust, participation, and ownership in clean energy initiatives. **CROWDTHERMAL's** crowdfunding model enabled citizen participation in geothermal energy projects, while its Social Licence to Operate framework strengthened public acceptance of

geothermal investments. **WinWind** enhanced trust in wind energy by implementing transparent decision-making models. **ISABEL** and **ISAAC** empowered communities, reduced opposition, while expanding access to clean energy. Together, these projects extend beyond energy equity, supporting global climate governance, community-driven sustainability, and social innovation, reinforcing the EU's vision for an inclusive and resilient green transition.

4.1.4.4. Areas to Work on for the Future

The Energy Transition and Energy Equity projects have made significant strides in advancing sustainable, inclusive, and decentralised energy solutions. At the same time, the projects point towards several areas that require further development to maximise impact, ensure long-term sustainability, and align with broader climate and social equity goals:

- **Strengthening Participatory Governance and Community Engagement**: Despite progress in fostering community involvement, further efforts are needed to strengthen participatory governance models in renewable energy transitions. **WinWind** and **CROWDTHERMAL** have demonstrated the value of stakeholder engagement in increasing public trust and social acceptance of wind and geothermal energy. However, replicating these participatory frameworks in diverse socio-economic and geographical contexts remains a challenge. Future initiatives could focus on institutionalising stakeholder participation in energy governance, ensuring long-term citizen involvement in decision-making processes.

- **Expanding Investment Models**: **ISAAC** and **ISABEL** have shown that cooperative and community-led biogas investments can enhance local ownership and trust. However, gaps in financial regulations and incentive mechanisms pose barriers to widespread adoption. Future efforts should focus on developing risk mitigation instruments for community investors, and harmonising financial incentives across regions.

- **Capacity Building and Workforce Development for Renewable Energy Transitions:** Ensuring workforce readiness in the renewable energy sector is essential. While **ISABEL** and **ISAAC** have pioneered energy literacy programmes, expanding these initiatives to include training and policy education will be essential. Future projects could focus on developing curriculum-based energy education programmes in schools and technical institutions, providing vocational training in renewable energy technologies to ensure local labour markets are equipped to support the clean energy transition, and training policymakers and local leaders in energy governance to ensure informed decision-making at all levels.

- **Scaling Technological Innovations and Infrastructure Development:** Despite advancements in decentralised energy solutions, infrastructure gaps persist in scaling up renewable energy technologies. **Hydro4U's** containerised hydropower and **ISAAC's** biogas scaling efforts highlight innovative approaches, yet further investment is required in grid modernisation, storage technologies, and smart grid integration. Research could focus on site-specific deployment, tool refinement, and system modelling to support efficient and scalable renewable energy integration.

- **Enhancing Environmental Sustainability and Climate Resilience in Energy Systems:** Environmental sustainability is a core concern for energy transition projects, yet additional work is needed to balance energy infrastructure expansion with ecological conservation. **Hydro4U** has successfully incorporated hydrological modelling into hydropower planning, but similar approaches must be applied to wind and solar projects to minimise biodiversity impacts. Likewise, **WinWind's** focus on reducing wind farm-related wildlife disruptions could be expanded to cover other renewable energy sectors. Research on ecosystem-compatible energy infrastructure is crucial for ensuring that clean energy deployment does not come at the cost of environmental degradation

- **Data Integration & Accessibility in Energy Transition**: Projects like **DecentLivingEnergy** have provided replicable frameworks for assessing energy needs, energy equity and emissions mapping. Challenges remain in ensuring that these insights are accessible, actionable and used by policymakers and industry stakeholders. Future efforts could focus on enhancing data

accessibility and integration for evaluating the social and environmental impacts of energy transition projects.

- **Integrating Climate Resilience into Renewable Energy Infrastructure:** Ensuring that renewable energy systems are resilient to climate change is crucial for long-term sustainability. **Hydro4U** has demonstrated the potential of small-scale hydropower in adapting to regional water constraints, but further research is needed on its applicability across diverse climatic conditions.
- **Expanding Circular Economy and Waste-to-Energy Integration:** While **ISABEL** and **ISAAC** have demonstrated the potential of biogas in circular economy models, challenges remain in optimising waste-to-energy integration. Research could focus on improving efficiency in biomass feedstock selection, upgrading biogas purification technologies, and addressing logistical constraints in biogas distribution. Furthermore, stronger regulatory support is needed to streamline biogas integration into existing energy infrastructures and ensure its alignment with broader circular economy goals.

4.1.5. Climate Policy and Global Cooperation

This thematic area brings together seven research projects focused on advancing climate governance, scientific modelling, and international collaboration. These projects span from 2016 to 2024, involving institutions across Europe, including Germany, Austria, Greece, Spain, and Norway, with global partnerships extending to Central Asia, Africa, the Middle East, and Southeast Asia (e.g., Palestine, Jordan, Vietnam, Thailand, etc.). They explore innovative policy-science interfaces, develop decision-support tools, leverage Earth Observation technologies, analyse sustainability transitions, and assess regulatory environments related to climate action.

As shown in the figure below, the factsheets highlight each project's core objectives and main information. Collectively, these projects reflect a shared commitment to enhancing global climate governance through inclusive policymaking, interdisciplinary modelling, and collaborative research across borders. Projects such as **NAVIGATE, ENGAGE and PARIS REINFORCE** refine Integrated Assessment Models (IAMs) to improve climate policy modelling and scenario-building, while integrating stakeholder-driven approaches to climate policymaking. **EIFFEL** explores AI-enhanced Earth Observation systems to support climate adaptation, and **5TOI_4EWAS** investigates the Water-Energy-Food (WEF) Nexus to enhance resilience strategies. **GLOBUS** critically assesses governance in international climate cooperation, emphasising justice-oriented perspectives, and **SMART** examines sustainability factors within trade, corporate governance, and regulatory environments, particularly concerning supply chain transparency.

By uncovering the technical, economic, and institutional factors that shape climate action at different levels, these projects contribute to a more detailed understanding of climate governance. Through empirical research, case studies, and modelling, they highlight the challenges of balancing emissions reductions with sustainable economic development, energy security, and social equity.

NAVIGATE	ENGAGE	PARIS REINFORCE
Title: Next generation of AdVanced InteGrated Assessment modelling to support climate policy making **Duration:** September 2019 – December 2023 **Coordinating Country:** Germany **Participating Countries:** Italy, Austria, Netherlands, United Kingdom, Greece, France, Switzerland, Sweden, Germany, Norway, Poland, Brazil, China **Objective:** To improve Integrated Assessment Models (IAMs) for better climate policy design by enhancing their ability to model economic transitions and policy impacts. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-LC-CLA-2018-2019-2020	**Title:** Exploring National and Global Actions to reduce Greenhouse gas Emissions **Duration:** September 2019 – December 2023 **Coordinating Country:** Austria **Participating Countries:** Netherlands, Austria, China, Germany, India, Italy, Japan, Poland, Greece, Hungary, Brazil, Russia, South Korea, Thailand, Vietnam, Indonesia **Objective:** To create advanced decarbonisation pathways integrating social science and IAMs to support Paris Agreement goals. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-LC-CLA-2018-2019-2020	**Title:** Delivering on the Paris Agreement: A demand-driven, integrated assessment modelling approach **Duration:** June 2019 – November 2022 **Coordinating Country:** Greece **Participating Countries:** Brazil, Japan, India, Russia, China, Spain, Belgium, Norway, Greece, Austria, Belgium, France, Germany, Italy, Netherlands, Switzerland, United Kingdom **Objective:** To develop a demand-driven IAM framework, enhance science-policy integration, and create an open-access platform to support climate policy and Paris Agreement goals. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal:** H2020-LC-CLA-2018-2019-2020

Table 20 Climate Policy and Global Cooperation projects factsheet (part 1)

EIFFEL	5TOI_4EWAS	GLOBUS
Title: Revealing the Role of GEOSS as the Default Digital Portal for Building Climate Change Adaptation & Mitigation Applications **Duration:** June 2021 – May 2024 **Coordinating Country:** Greece **Participating Countries:** Greece, Germany, Italy, Netherlands, Spain, United Kingdom, Lithuania, Switzerland, Finland **Objective:** To enhance GEOSS-based Earth Observation applications using AI-driven tools for data enrichment, supporting climate adaptation and mitigation across multiple societal benefit areas. **Second Thematic Area:** Sustainable Cities and Urban Planning **Programme**: H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials **Call for proposal**: H2020-LC-CLA-2018-2019-2020	**Title:** Quintuple Helix Approach to Targeted Open Innovation in Energy, Water, Agriculture in the South Mediterranean Neighborhood **Duration:** May 2016 – April 2019 **Coordinating Country:** Spain **Participating Countries:** Algeria, Egypt, France, Germany, Italy, Jordan, Lebanon, Morocco, Tunisia, Turkey, Belgium, Greece, Palestine, Libya **Objective:** To foster open innovation in energy, water, and agriculture in the Southern Mediterranean through a quintuple helix approach, enhancing research capacity, regional cooperation, and socio-economic impact. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.6. - SOCIETAL CHALLENGES - Europe In A Changing World - Inclusive, Innovative And Reflective Societies **Call for proposal:** H2020-INT-2014-2015	**Title:** Reconsidering European Contributions to Global Justice **Duration:** June 2016 – May 2020 **Coordinating Country:** Norway **Participating Countries:** Norway, Belgium, Germany, Ireland, Italy, South Africa, Brazil, India, China **Objective:** To analyse the EU's role in global justice and assess its impact on climate, trade, and migration policies. **Second Thematic Area:** Environmental Justice and Social Inclusion **Programme:** H2020-EU.3.6. - SOCIETAL CHALLENGES - Europe In A Changing World - Inclusive, Innovative And Reflective Societies **Call for proposal:** H2020-INT-2014-2015

Table 21 Climate Policy and Global Cooperation projects factsheet (part 2)

4.1.5.1. Key objectives

The main objectives identified across the 7 projects include:

- **Advancing Climate Modelling and Policy Assessment:** Projects such as **NAVIGATE** and **ENGAGE** refine Integrated Assessment Models (IAMs) and introduce new scenario-building approaches that integrate socio-economic, technological, and environmental factors.
- **Analysing Climate Governance and International Cooperation: GLOBUS** and **PARIS REINFORCE** study global governance structures, assessing the effectiveness of climate justice frameworks in international negotiations.
- **Applying Earth Observation and AI for Climate Adaptation: EIFFEL** explores AI-enhanced Earth Observation applications, improving real-time climate risk assessments and long-term environmental planning.
- **Studying the Water-Energy-Food (WEF) Nexus and Resource Management: 5TOI_4EWAS** investigates integrated resource management approaches that balance economic and environmental priorities.

- **Examining Sustainability in Trade and Market Regulation: SMART** evaluates corporate governance, regulatory frameworks, and trade policies to identify sustainability gaps and promote accountability.
- **Exploring Participatory Approaches in Climate Policy: PARIS REINFORCE** incorporates stakeholder engagement and multi-actor collaboration in climate modelling, while **GLOBUS** evaluates representation and justice in climate governance
- **Assessing Social and Equity Dimensions of Climate Action:** Many of these projects incorporate justice and equity considerations, ensuring the socio-economic implications of climate policies are fully explored, particularly for vulnerable communities.

Through their diverse research contributions, these projects enhance interdisciplinary knowledge on climate governance, social aspects of technological applications, and sustainability transitions, providing scientific foundations for more effective and inclusive climate action strategies.

4.1.5.2. Key results and contribution to knowledge

The implementation of these projects has generated new knowledge, methodologies, and analytical tools that contribute to understanding climate governance, policy innovation, and sustainability transitions. Through advancements in scientific modelling, interdisciplinary research, and stakeholder engagement, these projects have refined approaches to energy transition, emissions reduction, and climate adaptation. Their findings provide empirical insights into the technical, economic, and social dimensions of decarbonisation, helping to address uncertainties and trade-offs in long-term climate strategies.

The projects have contributed to both theoretical and practical advancements in climate research by testing new modelling techniques, refining uncertainty analysis, and incorporating behavioural and socio-economic factors into energy transition studies. Their findings enhance the understanding of systemic interactions between energy, the economy, and the environment, shaping future sustainability research. By clustering key results under Climate Policy and Global Cooperation, the projects highlight progress in computational modelling, governance analysis, and stakeholder-driven decision-making. Collectively, they offer critical insights into the adequacy, scalability, feasibility, and trade-offs of different decarbonisation pathways, helping to inform future climate strategies.

The key results and areas of impact are discussed below.

- **Advanced Climate Modelling and Policy Insights**

Projects such as **NAVIGATE** and **ENGAGE** have enhanced Integrated Assessment Models (IAMs) to better inform climate policymaking, ensuring that models account for technological transformations, behavioural changes, and social justice concerns. **NAVIGATE** developed the IAM Navigator, improving accessibility and usability for policymakers, while **ENGAGE** created a Scenario Explorer to visualise global and national decarbonisation pathways. These tools have directly contributed to shaping global mitigation strategies in alignment with the Paris Agreement and EU Green Deal objectives.

- **Stakeholder-Driven Governance and International Cooperation**

Projects such as **PARIS REINFORCE** have strengthened science-policy interfaces through demand-driven IAM frameworks that incorporate stakeholder insights into climate models. The project facilitated over 15 co-creation workshops engaging policymakers and industry leaders to address carbon pricing, energy transition strategies, and the feasibility of national energy and climate plans (NECPs). Additionally, **5TOI_4EWAS** fostered cooperation between the EU and Mediterranean Partner Countries (MPCs), integrating climate resilience into governance through the Joint Action Plan (JAP) and Nexus Think Tank (NTT).

- **Energy Transition and Energy Equity Contributions**

NAVIGATE and **ENGAGE** have demonstrated how ambitious climate policies can significantly reduce EU oil and gas imports by 60% by 2040, enhancing energy security while accelerating renewable energy adoption. **PARIS REINFORCE** further explored hydrogen deployment and offshore wind expansion, providing detailed simulations that contributed to EU-wide "Fit for 55" climate targets.

- **Social Inclusion and Climate Justice**

Projects such as **GLOBUS** and **SMART** have explored the intersection between climate policy and global justice, analysing how the EU's climate diplomacy impacts developing countries. **GLOBUS** developed a conceptual framework for climate justice, distinguishing between non-dominance, impartiality, and mutual recognition as approaches for equitable climate governance. Meanwhile, **SMART** assessed how EU trade and corporate sustainability policies align with global climate and development goals, identifying gaps in regulatory coherence that impact emerging economies.

- **Capacity Building and Knowledge Sharing**

ENGAGE and **5TOI_4EWAS** played a pivotal role in training over 200 researchers and policymakers in climate mitigation strategies, just transition frameworks, and integrated climate-energy-water governance. ENGAGE's research exchange program facilitated collaborations with institutions in Brazil, India, and Europe, ensuring knowledge transfer across different policy landscapes. **5TOI_4EWAS** focused on youth and gender inclusivity, ensuring that at least 50% of innovation voucher recipients were women, promoting equitable participation in climate innovation.

- **Sustainable Markets and Trade Policies for Climate Action**

SMART and **PARIS REINFORCE** investigated how carbon border adjustments (CBAs) and sustainable trade policies can mitigate carbon leakage while ensuring fair transitions for developing economies. **SMART**'s analysis of EU supply chains and corporate responsibility led to policy recommendations that integrate climate mitigation with fair trade regulations, while **PARIS REINFORCE's** assessment of **CBAs** projected a potential 25% reduction in carbon leakage.

- **Contributions to Climate Diplomacy and Global Agreements**

NAVIGATE and **ENGAGE** made substantial contributions to IPCC reports and COP26 & COP27 discussions, providing over 500 scenarios for limiting global warming to 1.5°C. PARIS REINFORCE engaged with the Global Stocktake process, ensuring that climate action remains evidence-based and aligned with equity considerations.

The Climate Policy and Global Cooperation research projects have collectively advanced interdisciplinary knowledge on climate governance, equity, and sustainability transitions. By combining quantitative modelling, empirical research, and stakeholder engagement, they have deepened the understanding of the systemic and cross-sectoral dynamics that shape climate action. Their contributions span the refinement of Integrated Assessment Models, analysis of international cooperation, urban resilience, environmental justice, and industrial decarbonisation. Together, these projects provide a comprehensive evidence-base that presents the complexity of implementing just and effective climate strategies across diverse policy and regional contexts.

Global Climate Policy Leadership	• **NAVIGATE** developed the IAM Navigator, expanding access to 1,000+ policy scenarios used in international climate assessments. • **ENGAGE** contributed 500+ decarbonisation scenarios to the IPCC AR6, shaping global climate strategies. • **PARIS REINFORCE** supported the Global Stocktake process and developed science-based mitigation pathways aligned with the Paris Agreement.
Stakeholder Driven Governance and International Cooperation	• **PARIS REINFORCE** hosted 15+ co-creation workshops, engaging 300+ policymakers and industry leaders to inform climate policy. • **GLOBUS** introduced a justice-based climate governance framework, influencing 10+ EU and global policy dialogues on equitable climate action. • **5TOI_4EWAS** trained 90+ researchers and policymakers in Mediterranean Partner Countries, strengthening international cooperation on climate adaptation.
National and Regional Policy Integration	• **PARIS REINFORCE** analysed 27 national energy and climate plans (NECPs), identifying a 15% policy gap in achieving EU renewable and energy efficiency targets. • **NAVIGATE** and **ENGAGE** explored carbon dividends and equitable burden-sharing, demonstrating that redistributive policies can reduce climate policy resistance.
Sustainable Trade and Economic Policy for Climate Action	• **SMART** assessed the sustainability impact of EU trade policies on 2 major global supply chains (garments & electronics), informing regulations for sustainable corporate practices. • **PARIS REINFORCE** modelled the impact of carbon border adjustments (CBAs), showing a potential 25% reduction in carbon leakage while minimising economic disruption.
Capacity Building and Knowledge Sharing	• **ENGAGE** facilitated knowledge exchange through research partnerships in 50+ countries, ensuring that climate mitigation strategies are globally applicable. • **5TOI_4EWAS** promoted local participation, ensuring 50% of innovation voucher recipients were women, supporting equitable access to climate solutions.

Table 22 Key Results: Climate Policy and Global Cooperation

4.1.5.3. Contribution to secondary thematic areas

The Climate Policy and Global Cooperation projects have also contributed significantly to secondary thematic areas, expanding knowledge on the interactions between climate governance, urban resilience, energy transitions, circular economy, and social equity. Their findings provide a scientific foundation for understanding decarbonisation pathways, policy feasibility, and interdisciplinary linkages between sustainability domains.

One major secondary area of contribution is Environmental Justice and Social Inclusion, where several projects have analysed the distributional impacts of climate mitigation policies, governance mechanisms, and the role of justice in global climate strategies. **NAVIGATE** assessed how carbon pricing and redistribution policies affect different socioeconomic groups, offering insights into the challenges of ensuring equity in carbon taxation frameworks. **ENGAGE** explored the social and political feasibility of deep decarbonisation, identifying barriers to climate action that arise from institutional and economic inequalities. Additionally, **GLOBUS** examined the role of justice frameworks in climate governance, critically assessing how different interpretations of fairness influence international cooperation on emissions reductions. These findings expand the evidence base on climate justice, providing insights into how climate strategies can be more inclusive and socially responsive.

The projects have also advanced research in Sustainable Cities and Urban Planning, particularly in how climate mitigation and adaptation strategies can be integrated at the urban level. **PARIS REINFORCE** analysed city-scale decarbonisation models, demonstrating the role of urban electrification, land-use planning, and mobility transitions in achieving climate goals. **ENGAGE** investigated urban adaptation measures, evaluating governance approaches that ensure equitable access to resources amid climate-induced risks. **EIFFEL** focused on data-driven urban planning, leveraging AI-enhanced climate models to optimise climate adaptation in cities. These projects contribute to understanding multi-level governance in climate action, informing future research on how cities can integrate climate resilience into planning and infrastructure development.

In the field of Bioeconomy and Circular Economy, several projects have explored the intersection between climate mitigation, resource efficiency, and sustainable production models. **NAVIGATE** integrated circular economy principles into IAMs, assessing how bio-based alternatives and material efficiency contribute to long-term emissions reductions. **SMART** examined the impacts of circular economy policies on international trade and sustainable supply chains, identifying challenges and opportunities for decarbonising global production systems. **PARIS REINFORCE** provided an empirical assessment of emissions trading schemes and carbon pricing mechanisms, exploring how policy instruments can drive material efficiency. These findings strengthen knowledge on the synergies between climate mitigation policies and resource sustainability, offering insights into how circular economy strategies align with climate objectives.

In Energy Transition and Energy Equity, the projects have contributed technical, economic, and governance insights into the transition to low-carbon energy systems. **PARIS REINFORCE** assessed the economic feasibility of carbon border adjustment mechanisms (CBAs), estimating their potential to reduce carbon leakage by 25% while maintaining trade stability. **ENGAGE** analysed fossil fuel phase-out scenarios, identifying conditions under which coal transitions can occur with minimal socio-economic disruption. **5TOI_4EWAS** examined decentralised renewable energy models in the Mediterranean region, highlighting the role of community-led energy projects in enhancing energy security and equity. These projects advance research on energy justice, governance frameworks, and market-based mechanisms, deepening understanding of how different energy transition models can address systemic inequalities.

Through these contributions, Climate Policy and Global Cooperation projects have advanced research on climate governance, sustainable urban planning, energy transitions, and circular economy integration, providing insights into the complex interactions between policy, technology,

and social equity. Their findings expand the scientific knowledge base on the feasibility, scalability, and trade-offs in decarbonisation strategies, offering a critical foundation for interdisciplinary research on sustainability transitions.

4.1.5.4. Areas to Work on for the Future

While the Climate Policy and Global Cooperation projects have advanced research on climate governance, decarbonisation pathways, and international collaboration, several areas have been identified by the projects as requiring further attention to enhance methodological rigor, interdisciplinary integration, and applicability across diverse socio-economic and political contexts:

- **Strengthening the Representation of Social and Behavioural Dimensions in Climate Models**

Projects such as **NAVIGATE** and **ENGAGE** have highlighted the limited integration of behavioural, cultural, and social feasibility factors in Integrated Assessment Models (IAMs). While existing models account for technological and economic transformations, the role of societal behaviour, lifestyle changes, and political constraints remains underrepresented. These projects call for improved approaches to incorporate public acceptance, behavioural responses and policy implementation constraints into model frameworks, including the development of methodologies to assess social and political feasibility alongside technological scenarios.

- **Expanding Regional and Sectoral-Specific Climate Pathways**

Findings from **PARIS REINFORCE** and **ENGAGE** emphasise the need for greater granularity in IAMs. While IAMs deliver global-level insights, regional differentiation particularly for emerging economies – and sectoral modelling for hard-to-abate industries such as aviation, shipping, cement, and steel remain challenging. These sectors remain difficult to decarbonise due to cost and technological constraints and improve climate modelling for emerging economies and lower-income regions, which face distinct policy and infrastructure limitations that are often overlooked in global models.

- **Deepening Research on Climate Justice and Equitable Transitions**

Projects such as **GLOBUS** and **5TOI_4EWAS** have contributed to understanding the justice implications of climate policies, particularly from a governance perspective. While existing models focus on emissions reductions, equity considerations in adaptation and resilience strategies remain underexplored. Key areas for future research include development of justice-oriented conceptual frameworks, improving strategic coordination, capacity-building, and regional inclusivity in science, technology, and innovation governance.

- **Improving Economic Instruments for Climate Action**

Several projects, including **SMART** and **PARIS REINFORCE**, highlight gaps in economic mechanisms and the need for more rigorous assessments of carbon pricing, border adjustment mechanisms, and green finance models. Identified gaps include the long-term effects of carbon pricing and emissions trading schemes, particularly their economic feasibility in different market conditions. These projects also discuss the importance of improving the alignment of finance with long-term sustainability and resilience objectives.

- **Improving Data Transparency and Accessibility in Climate Research**

Projects such as **NAVIGATE** and **ENGAGE** stress the importance of open-access data and transparency in climate modelling, yet accessibility remains a challenge, particularly in lower-income regions. Project recommendations include the development of standardised platforms for climate data integration, ensuring that models, datasets, and research findings are easily accessible for policymakers and stakeholders and expanded capacity-building programmes to enhance data literacy, equipping researchers and policymakers - especially in the Global South - with tools for climate analysis.

- **Strengthening the Integration of Climate Adaptation in Climate Models**

- The **EIFFEL** and **ENGAGE** projects point to the need for more comprehensive modelling of adaptation alongside mitigation. This includes the incorporation of climate risk impacts such as drought, biodiversity loss, and extreme weather into long-term planning. **EIFFEL** specifically focuses on adaptation modelling improvements using Earth Observation data, while **ENGAGE** has identified gaps in how adaptation options are addressed within IAM frameworks.

- **Advancing Participatory Governance and Multi-Stakeholder Collaboration**

Several projects, including **GLOBUS** and **5TOI_4EWAS**, have highlighted the importance of stakeholder engagement in climate governance. Their findings underscore the importance of participatory processes but also point to methodological and institutional challenges in effectively integrating multi-actor perspectives into decision-making. These projects recommend advancing research into co-creation processes and transdisciplinary collaboration models to support more inclusive and legitimate governance outcomes.

5. Key findings and insights

Findings from the research projects highlight opportunities to further strengthen sustainability governance, investment strategies, and climate action mechanisms. These findings confirm that justice and equity need to be at the core of climate, energy, urban, and circular economy policies. Ensuring that vulnerable communities actively benefit from transition measures is essential for long-term sustainability and public trust. Based on the analysis, the following insights emerge:

1. **Strengthen Interdisciplinary Research and Knowledge Integration**: Supporting cross-sectoral research collaboration and multi-disciplinary methodologies enables a more holistic approach to sustainability challenges. Future research could benefit from deeper integration of social sciences, justice frameworks, and behavioural insights to design fairer, more inclusive transition pathways

2. **Expand Mechanisms for Community-Driven Sustainability Transitions**: Research confirms that public participation, inclusion and transparency in financial decisions, and governance are key to successful sustainability transitions, expanding community-led funding models and participatory decision-making frameworks, especially in under-resourced regions, remains important.

3. **Enhance Policy Coherence and Data-Driven Decision-Making:** Fragmentation across sectors, urban, climate, energy, and circular economy, undermines just transition outcomes. Strengthening regulatory alignment, supported by inclusive data platforms and shared indicators, can make policies not only more effective but also fairer. Expanding open-data infrastructure and improving interoperability would further support transparent, evidence-based implementation.

4. **Develop Scalable and Adaptable Financial Mechanisms:** To deliver justice-oriented sustainability outcomes, financial instruments such as green bonds, impact investing models, and circular economy financial tools should be further developed to ensure long-term investment alignment with sustainability goals. This includes expanding community ownership models, ethical finance and inclusive investment practices that prioritise equity across territories and groups.

5. **Advancing Technological Innovation and Digital Transformation**: More efforts are needed for supporting the integration of indigenous and local knowledge into climate resilience frameworks, including through digital knowledge-sharing platforms. Research also identifies the need for strengthening AI-driven climate adaptation tools, citizen science platforms, and climate risk assessment models.

6. **Mainstreaming Circular Economy and Bioeconomy Strategies**: Harmonised regulatory frameworks are needed for facilitating circular resource use and waste-to-

energy integration across EU regions, while ensuring that the advantages, such as jobs, skills, and innovation, reach rural communities, as well as vulnerable groups. Strengthening urban-rural linkages and enhancing market incentives for bio-based products would help address regional disparities and foster inclusive, sustainable value chains.

7. **Advance Research on Social Equity and Fostering Data-Driven Policymaking and Long-Term Impact Assessment**: Tracking justice outcomes requires transparent, open-access platforms for climate, energy, and circular economy data to support evidence-based policymaking and improve transparency. Establishing shared tools allows tracking the effectiveness of policies in achieving a just green transition, ensuring continuous evaluation and improvement. In parallel, the projects analysed in this report revealed significant disparities in access to sustainability benefits. To address these gaps, future research could focus on developing equity metrics and governance models that embed social justice into climate, energy, and bioeconomy transitions. This integration of research and data infrastructures could create long-term impact assessment with the principles of fairness and inclusivity.

By leveraging research findings and refining transition strategies, sustainability initiatives can enhance inclusivity, increase policy coherence, and ensure systemic impact at scale.

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This report presents a selection of 55 EU-funded research projects hat examine key dimensions of a just green transition, offering valuable perspectives on how to shape this transition in a manner that is socially fair and inclusive from a global perspective. The projects explore how principles of fairness, equity, and inclusion can be meaningfully embedded across diverse fields, including climate action, sustainable urban development, circular and bio-based economies, energy systems, and environmental governance. They assess innovative approaches to engaging marginalised communities, enabling participatory decision-making, and strengthening social resilience. At the same time, they critically highlight persistent barriers such as structural inequalities, regulatory fragmentation, and limited access to decision-making for vulnerable groups. Insights from the projects reveal the importance of integrated governance, inclusive financing models, and citizen-led initiatives in building long-term sustainability. The report emphasises that a just green transition requires more than technological solutions, it demands social innovation, policy coherence, and global cooperation. By analysing these projects, the report contributes to a deeper understanding of how climate and sustainability policies can become more inclusive, equitable, and effective.

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