European Forum on Science & Education for Sustainability 2020

From Ambition to Action – Together for an Innovative and Sustainable Europe
Berlin, 6 October 2020

– Conference Paper –

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This document is a conference paper. It is based on the input and discussions of many participating experts and stakeholders of the "European Forum on Science & Education for Sustainability" (EFSES). The document highlights the positions and beliefs expressed by participants from across Europe during the conference. The German Federal Ministry of Education and Research hosted the EFSES conference under Germany's EU Council Presidency on 6 October 2020 to emphasise its support of the 2030 Agenda and its Sustainable Development Goals in the context of research and education. The conference paper intends to stimulate further discussions at national and European level on the potential of education and research in the sustainable transformation of Europe's economy and society. Participation in the conference does not constitute formal commitment to the content of the conference paper.

Approximately 2,400 participants from 64 countries attended the digital conference. The participants' contributions made during the workshop sessions of the conference were consolidated by the following experts based on their personal scientific or educational expertise.

Workshop – Making Europe climate-neutral:
Daniela Jacob (Climate Service Center Germany, Hamburg); Gernot Klepper (Institute for the World Economy, Kiel); Frank McGovern (JPI Climate, Brussels)

Workshop – Reversing inequalities:
Olaf Groh-Samberg (University of Bremen, Bremen); Imme Scholz (German Development Institute (DIE), Bonn)

Workshop – Moving education towards sustainability:
Ellen Fetzer (University of Nuertingen-Geislingen, Nuertingen); Barbara Hemkes (German Federal Institute for Vocational Training, Bonn); Nele Hoge (netzwerk n – Students for Sustainability, Berlin); Marco Rieckmann (University of Vechta, Vechta); Sébastien Thierry (Agency for ERASMUS + France, Bordeaux); Arjen Wals (Wageningen University, Wageningen)

Workshop – Establishing a scaled and functional circular economy:
Daniel Goldmann (Technical University Clausthal, Clausthal-Zellerfeld); Christoph Herrmann (Technical University Braunschweig, Braunschweig); Susanne Kadner (acatech- National Academy of Science and Engineering, Munich); Holger Kohl (Technical University of Berlin, Berlin); Vera Rotter (Technical University of Berlin, Berlin); Bernd Schäfer (EIT Raw Materials, Berlin); Tilmann Vahle (SYSTEMIQ Ltd., Munich)

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I. Executive Summary

Research and education have great untapped potential to achieve the UN Sustainable Development Goals (SDGs) and to advance a resilient, innovative and sustainable Europe. Realising this potential can make Europe fit for an uncertain future shaped in part by challenges such as pandemics, climate change and inequality. To support these objectives, the participants of the "European Forum on Science & Education for Sustainability" elaborated recommendations with regard to research and education. The conference was held by the German Federal Ministry of Education and Research on 6 October 2020 as part of the German Council Presidency.

The recommendations are intended for consideration when drafting future research and education programmes and policies including Horizon Europe and Erasmus+. They are thus directed towards the representatives of the European Commission, the member states and the associated countries as well as the institutions and committees that are in charge of the respective national and European programmes. The following recommendations are some of the most noteworthy:

- Develop attractive science-based narratives about sustainable futures to guide positive change on all levels – from research to implementation, from individual action to policy-making.

- Expand socioeconomic research, particularly to make sustainable, climate-neutral solutions, products and services an easy (attractive, available, affordable) choice for individuals, companies and institutions, e.g. by developing visible and transparent carbon footprints.

- Boost climate research, for example by assessing the potentials, challenges and risks of negative emissions technologies and natural carbon sinks.

- Advance research on inequalities, in particular by promoting a culture of thinking beyond traditional boundaries through incorporation of transnational and global perspectives and connecting research on inequalities and environmental sustainability more efficiently.

- Leverage the full transformative power of Education for Sustainable Development (ESD) by promoting synergies with research programmes such as Horizon Europe and by continuing to mainstream ESD in educational programmes such as Erasmus+.

- Multiply Education for Sustainable Development (ESD) actions among youth as well as strengthen youth participation in ESD, e.g. by integrating ESD into formal curricula, and involving young people in transformation processes and projects as active citizens.

- Help economic actors take better-informed decisions on circular economy approaches by supporting the improvement of appropriate metrics, data availability, decision-making tools and by leveraging the potential of digital technologies for an optimal life cycle-based management of products based on economic, environmental and social criteria.

II. Introduction

All across Europe the coronavirus crisis has a tremendous impact on our lives, societies and economies. This new pandemic constitutes an unprecedented challenge for Europe and the whole world. It underlines at the same time the fragility of our current socioeconomic system in its response to shocks. The frequency and severity of such shocks and crises will likely increase in the future, triggered e.g. by overstepping of planetary boundaries, climate change, dwindling resources and inequality of living conditions in the world.

A Europe ready for these challenges will look different than today. It will be a more innovative, sustainable and resilient Europe. It will be a Europe that leaves no one behind and fosters close links with the world. The United Nations 2030 Agenda with its Sustainable Development Goals (SDGs) sets an ambitious framework of targets for such a European future. Numerous initiatives of the member states and the European Commission are already on their way to turning these ambitious goals into opportunities for Europe – to move from those ambitions to action. For instance, the European Green Deal outlines a roadmap for a sustainable economy and society, and the billion-euro investment programmes for economic recovery of the EU and member states are stimulating a transition towards sustainability, too. These initiatives are in line with the call of world leaders at the SDG Summit in September 2019 for a decade of action to deliver on the SDGs by 2030.

Moving from ambition to action in order to create an innovative, sustainable and resilient Europe can only succeed if we adequately deploy and harness the potential of education, research and innovation. This encompasses providing technical and social innovation and facilitating the transfer of knowledge across borders on the one hand, and on the other hand, building acceptance for change by engaging with and inspiring people right where action is needed – in our communities, whether this means villages or megacities. For this reason, research and education hold an enormous potential to accelerate the process of change towards a sustainable future.

In this context, the German Federal Ministry of Education and Research organised the "European Forum on Science & Education for Sustainability" (EFSES) in a digital format on 6 October 2020 within the framework of the German Council Presidency.

The objective of the EFSES conference was to take a step forward to make full use of the potential of research and education for an innovative and sustainable Europe. The participating experts and stakeholders from all across Europe expressed concrete recommendations on how to best maximise the benefit of research and education.

Two different formats were employed to collect and structure the input and recommendations of EFSES participants.

Firstly, participants could take part in **thematic workshops** that aimed at formulating suggestions for increasing the impact of education and research for achieving the SDGs, with particular emphasis on the European programmes Horizon Europe and Erasmus+ (Chapter III). These workshops were entitled:

- **Making Europe climate-neutral;**

- **Reversing inequalities;**

- **Moving education towards sustainability;**

- **Establishing a scaled and functional circular economy.**

Secondly, participants had the opportunity to use a **digital notebook** (Chapter IV) throughout the conference to voice their ideas and recommendations on the role of research and education for achieving an innovative and sustainable Europe.

The recommendations of EFSES participants are directed towards the representatives of the European Commission, the member states and the associated countries as well as the institutions and committees that are in charge of devising and implementing Horizon Europe, Erasmus+ and national programmes. The recommendations shall be used for discussion and consideration when drafting future programmes and policies, particularly in committees such as the programme committees set up to provide advice on programme design in Horizon Europe and Erasmus+.

SUSTAINABLE DEVELOPMENT G⬤ALS

1 NO POVERTY

2 ZERO HUNGER

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

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III. Recommendations from the workshop participants

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A. Overarching recommendations for increasing the impact of research and education for sustainability

The workshop participants of the EFSES conference appreciate the new orientation of Horizon Europe and Erasmus+ towards a greater 'directionality' and the increased implementation of necessary solutions in the context of the European Green Deal. Moreover, the conference participants encourage the representatives of the institutions and committees outlined above to continue on this path with increased efforts and suggest:

1. Strengthening the dialogue and multi-stakeholder cooperation between research, education, politics, economy and society;

2. Enhancing the science-policy-interface by accelerating the process to systematically address policy-relevant knowledge gaps across Europe and facilitating the co-creation of solutions by engaging science and policy practitioners;

3. Promoting even better coherence and coordination among EU policy instruments, key research areas in Horizon Europe and cohesion funds like European Structural and Investments Funds (ESIF) and Connecting Europe Facility (CEF);

4. Employing research and innovation more stringently to strengthen communities and foster action on local level, e.g. through real-world experimentation and living labs;

5. Advocating policy and regulatory frameworks changes in favour and support of upscaling and implementing scientific results and already developed solutions for broad application in society and economy;

6. Fostering and supporting knowledge and best practice sharing with regard to sustainable practises and measures;

7. Ensuring that actions funded in support of the European Green Deal incorporate co-creational approaches and support necessary transformation processes for a sustainable Europe;

8. Further promoting the use of unconventional scientific and educational approaches and allocating adequate funding;

9. Pushing the implementation of Education for Sustainability in the policy frameworks of Erasmus+, Horizon Europe and national programmes to utilise its full transformative power;

10. Advancing the toolbox for fostering behavioural change by furthering the development of engaging narratives about attractive and sustainable futures.

B. Recommendations for making Europe climate-neutral

With the aim of making Europe climate-neutral by 2050, the participants of the workshop encourage viewing climate protection as a great chance for Europe to present itself now and in future as an attractive societal, business and industrial location. For this purpose, it is crucial to address policy-makers, stakeholders and citizens directly to set and accelerate the path towards climate-neutrality, to integrate climate change in educational curricula, to strengthen profound (basic) research, and to implement social and technical innovations on a large scale.

The European programmes Horizon Europe and Erasmus+ will play major roles in achieving climate-neutrality and reaching the SDGs as well as the goals of the Paris Agreement in the next decade. In order to allow the programmes to fully unfold their potential, the participants suggest the following set of single targeted measures:

Aligning EU policies on the basis of scientific evidence and results, by

- Advancing pan-European, regional and local monitoring of climate change in an integrated manner building on existing structures such as Global Climate Observing System (GCOS) and Copernicus;

- Expanding socioeconomic research in order to establish effective, consumer-friendly systems for making "carbon footprints" transparent for all. The choice for climate-neutral actions and products must be "easy and visible";

- Integrating social and economic aspects of the transition processes towards climate-neutrality more strongly, particularly concerning fundamental questions about the transformation capacity of societies, social justice, modernisation of finance and climate economics.

Strengthening regions and communities through research and innovation, by

- Enabling communities to make more decisions and develop more community-based solutions through research;

- Multiplying living labs and pilot studies for climate protection involving local and regional communities.

Mobilising all relevant stakeholders for a science-based approach to climate action, by

- Integrating citizens better into the science policy discussion and investing in a culture of dialogue to strengthen exchange on the urgency of actions and their potential contributions on local, regional, national and European level;

- Taking on a systematic approach to education and schools and working towards broad adoption of the topic of climate change into curricula including actions and responses;

- Supporting climate economic research in order to harmonise a transparent and comprehensive pricing of CO_2 – this will help to develop and apply more innovations;

- Fostering the knowledge pipeline through research in order to motivate the financial industry to start thinking systemically in terms of climate protection.

Strengthening basic research in climate science, by

- Intensifying support of research on the interdependencies of global warming and local extreme weather events and, in turn, their influence on global climate change;

- Supporting further assessment of the potentials, opportunities and risks of negative emissions technologies and how to ensure the resilience of natural carbon sinks and stocks;

- Improving the understanding of slow onset changes and thresholds for irreversibility (e.g. loss of the Greenland ice sheet).

Supporting better understanding of interconnected natural and human systems to develop more system-oriented solutions by

- Strengthening research on the impact of natural and human systems on climate change and their interactions through integrated and transdisciplinary research and innovative approaches;

- Focusing more strongly on the water-energy-food-ecosystem nexus, e.g. how to satisfy growing demands in water consumption whilst ensuring the sustainability of ecosystems, food supply and energy consumption;

- Reinforcing research on how to enhance and implement land management systems for carbon-reduction and biodiversity benefits and nature-based resilience solutions;

- Pushing the transition from a fossil-based energy system towards a renewable system by adequately funding the development and improvement of energy storage systems.

10 REDUCED INEQUALITIES

C. Recommendations for reversing inequalities

To reverse inequalities within Europe and beyond, the participants of the conference workshop emphasise that understanding the dynamics of inequality, its drivers, causes, effects and interdependencies with other factors is key for a sustainable transition to a more inclusive society and achieving the objective of leaving no one behind. They stress that research delivers contextual knowledge about the different forms of inequalities and counteractive measures, and that it provides knowledge and orientation for reaching the SDGs. Targeted actions to reduce inequalities need research and knowledge about the specific targets of SDG 10 and other targets related to inequalities in the 2030 Agenda. European research funding needs to supply a framework adequate for the complexity and interconnectedness of the social, environmental and economic dimensions of inequality. This will include a further strengthening of inter- and transdisciplinarity and global research cooperation. In order to achieve these goals the participants suggest:

Connecting research on inequalities and environmental sustainability, by

- Initiating and promoting interdisciplinary research on the interrelations between inequalities and the trespassing of planetary boundaries;

- Supporting research on the influence of inequalities on the transformation towards environmental sustainability.

Promoting science- and research-based utopian narratives about attractive and sustainable futures, by

- Intensifying support of research on new socioeconomic models or social contracts that allow for qualitative social, economic and environmental improvements;

- Supporting exploration of how common interests in more equality and sustainability can be justified and mobilised to constrain detrimental societal effects of inequality.

Improving investment in new and innovative research topics on inequality, by

- Directing funding at the consequences of inequality on society as a whole;

- Focusing on who benefits from inequalities and extrapolating who benefits from reducing them;

- Fostering sustainability perspectives in analysing the drivers of inequality;

- Addressing the development of intra- and intergenerational inequality and how mobility, migration and demographic changes affect inequalities and their perceptions;

- Supporting a better understanding of which inequalities will arise from COVID-19 in the medium and long term.

Promoting a culture of thinking outside of traditional boundaries, by

- Addressing inequalities from a transnational and global perspective, e.g. which institutional setups reduce, maintain, create inequalities within and between world regions;

- Supporting research on the potential environmental effects of rising incomes and the relation of inequality (SDG 10) to other SDGs.

Supporting efforts to share and harness existing knowledge, by

- Strengthening the dialogue between research, society and politics on reversing inequalities and sustainability;

- Supporting training programmes for researchers on communication with the general public or different stakeholders and fostering of cooperation with experts from practice or journalists.

D. Recommendations for moving education towards sustainability

To move education towards sustainability, the participants of the workshop emphasise that education is a powerful long-term lever with which to achieve the 2030 Agenda and potential sustainability frameworks that will follow. Education for Sustainable Development (ESD) enables a critical, yet empathetic, transnational and comprehensive way of thinking and taking action. This is the basis for acquiring much-needed competences in Europe while it faces major technological, climatic and other shifts and crises. ESD addresses decisive questions on the interlinkages and possible trade-offs between and among all SDGs. The participants thus advocate a transformation-oriented science-policy interface as, encouragingly, has been taken up in the European Green Deal and a recent Communication of the European Commission.

Therefore, the participants urge strengthening the role of ESD with its cognitive, socio-emotional and action-oriented dimensions of learning in the Erasmus+ Programme as well as Horizon Europe and other research programmes. To achieve this, the participants suggest increasing the synergies between these European funding programmes and the UNESCO Programme on Education for Sustainable Development [1] with its five priority action areas by:

Advancing policy in order to mainstream ESD into both education and sustainable development policies and thus enhance SDG-related learning processes and capacity building, by

- Making a clear reference to ESD in Erasmus+ and Horizon Europe priorities to reinforce the already existing priority on greening these programmes;

- Developing a common project framework for ESD competences and minimum standards to be embedded in all Erasmus+ and Horizon Europe projects;

- Setting up ESD-specific funding priorities for international projects with multiprofessional and cross-sectoral teams;

- Facilitating structures for multi-stakeholder peer learning/good practise sharing at global, European, national and regional level through existing or new analogue or (sustainably designed) digital networking platforms.

Transforming learning and training environments in order to integrate sustainability principles into education and training settings ("whole institution approach"), by

- Involving relevant stakeholders in programme activities with the aim of setting up and implementing sustainable learning and training environments;

- Addressing the motivation of institutional leaders and their organisations within projects and enabling them to develop and implement their own inclusive sustainability strategies;

- Focusing on capacity building regarding transformation processes as well as impact evaluation, including the development of research-based evaluation schemes.

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1   UNESCO Programme "Education for Sustainable Development: Towards achieving the SDGs" (ESD for 2030, 2020–2030)

Increasing the capacities of educators and trainers to deliver ESD and to enhance structural change more effectively, by

- Embedding the key topics covered by the SDGs in programmes and projects supporting teacher education;

- Improving access to project results via more targeted dissemination in order to create visibility and sustainable impact.

Multiplying ESD actions among youth as well as strengthening youth participation and advocacy for ESD, by

- Integrating sustainability/ESD into formal curricula via European Credit Transfer Systems and statutory training regulations and framework curricula;

- Involving youth in transformation processes and encouraging them to be active citizens (local to global level, e.g. by cooperating with the local communities or co-educating youth in political decision-making and policy framing).

Developing strategies and instruments to scale up ESD programmes and multi-stakeholder ESD networks at community level, by

- Increasing the number of cross-sectoral projects, bringing universities, schools, businesses, NGOs, cities and civil society together;

- Encouraging meaningful learning environments situated in local contexts which cooperate with various local stakeholders working on their sustainability challenges, e.g. through citizen science and living labs;

- Including more support for impact evaluation with regard to sustainable development objectives.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

E. Recommendations for a scaled and functional circular economy

To establish a scaled and functional circular economy, the participants of the workshop highlight that a circular economy in Europe is key to achieving SDG 12 (Responsible Production and Consumption) as well as to building a climate-neutral, resilient and sustainable Europe. Workshop participants drew up transferable recommendations on the basis of dedicated discussions on traction batteries. In order to better utilise the dynamic of the European research community for a circular economy the participants suggest:

Driving digitalisation to enable improved solutions for asset and materials management, by

- Identifying the data needs for each value chain step – considering a systemic, value network oriented perspective – to support circular economy business models;

- Describing incentives for each actor to cooperate, defining standards of data and digital systems, and leveraging technical solutions like big data analysis and machine learning;

- Making material/ product passports and data spaces a reality by supporting regulation and industry collaboration that enhance intersectoral interoperability while building on existing structures such as IDIS (International Dismantling Information System), IDS (International Data Spaces) or GS1 (international process standards).

Continuing to strengthen networks for circular economy across the European Union, by

- Supporting and financing the implementation of joint research projects of industry and academia which bridge different fields along the value chain across European member states (e.g. exploring and scaling of a pan-European vehicle traction battery disassembly network), building on existing (remanufacturing) networks of industry and research clusters;

- Increasing support of applied and implementation-focused research while ensuring interdisciplinarity through the combination of technological, behavioural and economic perspectives in joint research projects to assist the development of e.g. a competitive, sustainable European battery value chain.

Fostering the commercialisation of advanced technologies for circularity, by

- Supporting research on the development of digital product management tools, on the interactions of life extension and end-of-life approaches, the development to higher Technology Readiness Levels (TRL), as well as commercialisation of circular economy measures beyond recycling (including multi-use, repair, or remanufacturing);

- Helping to develop supportive framework conditions by identifying appropriate economic incentives for high value management of end-of-life products, including ambitious recycling and recovery targets, analysing barriers to secondary use of products and exploring support for novel ownership models.

Promoting a systemic view across sectors and lifetimes of products already in the research and development stage, by

- Further strengthening development of ecosystems for products that allow their most productive use throughout their lifetime, e.g. for smart and bi-directional charging and for traction batteries for pooled mobility systems;

- Promoting the assessment of viability and development of incentives for higher value re-use of products such as vehicle batteries in other applications, e.g. stationary storage, including effects on other sectors such as the energy system and manufacturing and digital sectors. In this context, total life cycle effects on energy and material streams should be considered based on the evaluation of system entropy.

Advancing circular business models by shifting focus to transdisciplinary and cross-functional research, by

- Supporting the improvement of appropriate metrics, data availability and decision-making tools to help economic actors take informed decisions on optimal end-of-life management of products based on economic, environmental, and social criteria (e.g. by developing model-based decision-making platforms for end-of-life vehicle batteries);

- Supporting research on product development with design for circularity in mind (design for recycling, remanufacturing, and/or second life, considering potential trade-offs) whilst ensuring integration of cross-European perspectives on design requirements, and informing regulation via science-based insights.

IV. Voices of EFSES participants

IV. Voices of EFSES participants

During the EFSES conference, participants were asked to voice their ideas and suggestions on the role of research and education for an innovative and sustainable Europe. In the following are some of the most notable statements, which represent only a fraction of the comments received. The statements are grouped into overarching themes.

Make sustainability the easy choice:

- "We should be working to make the sustainable choice the standard choice – and the comfortable choice. We need to make everyone feel safe – not to stay where they are, but to feel empowered to move forward."

- "Framework and incentive system change is the basis for 'behaviour change' – sustainable practices need to be cheaper, easier and become considered 'success' – 'renunciation' of certain behaviour is not motivating."

Bring society, policy makers and scientists together:

- "Transparency, credibility, visibility will be essential. Interaction among researchers on the one hand, and between science and politics on the other, should be driven by a spirit of collaboration, not of competition."

- "On one side, [research and education policy] should stress participation and methods of knowledge transfer that enable all interested parties in society to participate and apply findings. On the other side, there should be more research on how behaviour is changed and why there is such a big gap between knowledge and behaviour."

- "Integrate academia and academic research better into society, e.g. by initiating (sustainability) projects that involve academic, municipal/local, and business/private stakeholders simultaneously."

- "Give support and resources for social sciences and transdisciplinary research to drive cross sectional bridging of the transformation to sustainable development in Europe."

Communicate better and provide role models:

- "Leverage communication and conversation with key players of all areas involved in these innovations to pave the path of integrating these ideas into existing systems time efficiently. Sustainable innovations need to be made visible to the broader public to learn about possibilities and sustainable ways of living."

- "We do not want to hear what we may lose, but we want to hear what we can win. Instead, future politics and science will need to point out the immediate advantages of 'going green'."

Promote behavioural changes and public acceptance:

- "The successful implementation of the 2030 Agenda requires a fundamental change of human behaviour. Scientific research to determine the cognitive preconditions for sustainability is therefore likely to be one of the most innovative approaches to achieving the SDGs."

- "[We need to] focus on environmental justice concerns. Otherwise sustainable innovations might not be accepted or create even more social inequality."

- "The educational changes cannot only come from the top. People of all ages and educational levels need to be included to actually fulfil an educational approach and change that will reach society."

Think in terms of (social) systems:

- "The focus should be more on holistic system innovations; i.e. 'sustainable' innovations should be thought of in system contexts and include societal or social innovations."

- [Research and education policy should particularly address] "how to affect the system in which the innovation should be applied in such a way that the innovation will be accepted and will lead to a breakthrough."

Devote more attention to the grassroots level:

- "There are many great performing startups building jobs with sustainable innovations, but only if they get more attention, it will influence behavioural change (including inspire more people to start their own company and speed up by this innovation oriented to local needs)."

- "Emphasise also on the grassroot level actions, i.e. ordinary people integrated better in the innovation processes."

Foster synergies between education and research:

- "We need to link research and education more strongly to foster societal acceptance of innovation and empower future generations for the breakthrough."

- "The role of research and education is not to promote behavioural change but to empower everyone to change."

- "Sustainability, sustainable finance and the transformation of economy needs to become integrated in all curricula of social sciences, not only in engineering or environmental sciences."