



European
Commission

Place-based innovation for sustainability

Philip McCann,
University of Sheffield Management School

Luc Soete,
Institute for European Studies, VUB

2020

This publication is a report by the Joint Research Centre (JRC), the European Commission's science and knowledge service. It aims to provide evidence-based scientific support to the European policymaking process. The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of this publication. For information on the methodology and quality underlying the data used in this publication for which the source is neither Eurostat nor other Commission services, users should contact the referenced source. The designations employed and the presentation of material on the maps do not imply the expression of any opinion whatsoever on the part of the European Union concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

EU Science Hub

<https://ec.europa.eu/jrc>

JRC121271

PDF

ISBN 978-92-76-20392-6

doi:10.2760/250023

Luxembourg: Publications Office of the European Union, 2020

© European Union, 2020



The reuse policy of the European Commission is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Except otherwise noted, the reuse of this document is authorised under the Creative Commons Attribution 4.0 International (CC BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated. For any use or reproduction of photos or other material that is not owned by the EU, permission must be sought directly from the copyright holders.

All content © European Union 2020.

Mccann, P. and Soete, L., Place-based innovation for sustainability, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-20392-6, doi:10.2760/250023, JRC121271.

Place-based innovation for sustainability¹

Philip McCann

(University of Sheffield Management School)

And

Luc Soete

(Institute for European Studies, VUB)

¹ This report is the outcome of the Expert Group “Linking smart specialisation and mission-oriented policy for sustainable development”. We are particularly grateful to comments received from invited colleague experts as well as representatives of the European Commission present at the Workshop on Place-based innovation-led transformation for sustainability on 4 March 2020 at the Institute for European Studies, VUB in Brussels. Views and opinions expressed are our own.

Foreword

In 2019, the European Commission introduced sustainability and European values at the centre of its long-term policy agenda. The European Green Deal sets out the direction for the EU to become climate-neutral by 2050. The UN Sustainable Development Goals will orient policy efforts and reforms in the years to come, in Europe and beyond. This is an innovation-driven policy agenda for new systemic solutions and employment creation reaping the opportunities from the ecological and digital transitions. The challenge now facing the EU is to implement it.

The JRC is the science service of the Commission. We provide science for policy supporting public policy makers at all levels in the EU. JRC Directorate B, led by Mikel Landabaso, develops scientific evidence for innovation and growth policy relevant for all Commission priorities. Unit B3, under the leadership of Alessandro Rainoldi, focuses on territorial development. How can regions, cities and communities engage in the EU policy agenda in a bottom-up approach to create jobs and value added for its citizens? How can scientific evidence ensure continuous policy learning, detecting the effects of EU policies across Europe, and enabling policies to be refined for the benefit of society? For a successful implementation of the European Green Deal, these questions are more relevant and timely than ever.

To construct the academic and conceptual base for these questions, JRC turned to two internationally recognized experts in innovation and place-based policy, Professor Philip McCann and Professor Luc Soete to explore how science for policy can support the implementation of the European Green Deal and the new EU policy for sustainable development. Their report presents their reflections, backed up by a consultation with a broader academic community gathering expertise in both innovation policy and regional development policy.

The report highlights the historical opportunity for the EU, with a policy agenda placing sustainability in the front seat. The authors take inspiration from two experimental innovation policies in the EU: the smart specialisation policy, implemented through the European Regional Development Funds, and the mission-oriented policy, implemented through the upcoming Horizon Europe programme for research and innovation. As the authors, eloquently phrase it: the European Green Deal is at the same time the EU's Moonshot mission and its global smart specialisation strategy. However, they stress that this travel will not be without adventures. A place-based innovation policy for sustainability will require a solid multi-level governance and a policy flexibility to address possible trade-offs early on. Smart specialisation strategies have built the foundations but would now need to marry bottom-up leadership with the new directionality of sustainability and inclusiveness. The authors formulate this as the move from S3 to S4+.

The scene is set. A scientific debate is open. But also a science for policy reflection on how to go from theory to practice. This will no doubt be an inspiring and relevant journey in the coming months, in which the JRC is well-placed to contribute.

Dr. Johan Stierna
Science for Policy Adviser, JRC, unit B3

Expert Group

Linking smart specialisation and mission-oriented policy for sustainable development

Over the last five years, most regions in Europe have developed smart specialisation strategies. This new policy approach has improved the capacity of regions to focus their European structural fund investment for innovation and growth. The regions have elaborated long-term strategies and identified priorities building on their strengths in business and research. Evidence-based policy making has been enhanced by the use of statistical analysis, monitoring and evaluation as support to the strategy. Last but not least, a broader consultation with local business and research institutions has enabled a more open and entrepreneurial policy making.

The Territorial Development Unit of the European Commission Joint Research Centre has provided evidence-based strategic intelligence to support the regions in the elaboration of regional smart specialisation strategies.

As from November 2019, the new European Commission sets new political guidelines highlighting that Europe must lead the transition to a healthy planet, the digital economy and a sustainable development guided by the SDGs. The post 2020 budget of the EU is a major instrument to implement these guidelines. It will orient investment programmes such as Horizon Europe and ERDF to support the objectives of a European Green Deal, strengthening capacities to develop innovative solutions to climate and environmental challenges. In this context, new EU innovation policy approaches such as smart specialisation strategies and mission-oriented policy should play a role.

This expert group will propose ways in which regions and cities in Europe can develop and deploy innovations in line with the new Commission guidelines. In particular, it will explore how policy makers at regional and city-level could build on the smart specialisation strategies and, when relevant, complement them with a mission-oriented policy approach for innovation.

The “expert group” which was created to link such smart specialisation strategies with mission-oriented innovation policies aimed at sustainability, consisted of Philip McCann and Luc Soete. They wish to thank for valuable input and comments expert colleagues, most of whom were present at the joint JRC/R&I Workshop in Brussels on March 4th, 2020, in particular Bjorn Asheim, Federica Bertamino, Nicola Dotti, Kirsten Dunlop, Tatiana Fernández, Dominique Foray, Teis Hansen, Jennifer Harper, Jana Kollar, Goran Marklund, Kevin Morgan, Murk Peutz, Slavo Radošević, Andrea Renda, Artur Rosa Pires, Sylvia Schwaag-Serger, Andre Spithoven, Elvira Uyarra, Matthias Weber and Walter Ysebaert, as well as members from the European Commission, first and foremost Johan Stiern (JRC) and Neville Reeve (RTD), Manuel Palazuelos-Martinez (JRC), Monika Matusiak (JRC), Mark Boden (JRC), Alessandro Rainoldi (JRC), Carmen Madrid-Gonzalez (JRC), Lukas Borunsky (RTD), Anabela Marques-Santos (JRC), Fernando Hervas (JRC) and last but not least Dimitrios Pontikakis (JRC).

Preamble: pre corona structure and post corona purpose

*This report written before the onslaught in Europe of the corona crisis, was meant to contribute to the role of Science for Policy in the design and implementation of the European Green Deal; in particular, strengthening the conceptual ground for a new JRC Science for Policy platform on ‘**Place-based innovation for Sustainability**’. The aim of this platform would be to bring together researchers in the field of science, technology and innovation as well as regional development providing evidence-based insights on how local innovation processes might contribute to sustainability within the context of the European Green Deal (EGD) and the global SDGs, as well as analysing the local economic and social effects of the EGD.*

The paper followed intensive discussions in Brussels during a dedicated Workshop on March 4th, a couple of days before the introduction of confinement policies in many European countries.

The present report discussed at length at the Brussels meeting brings to the fore the importance of local, place-based processes of innovation in addressing sustainability and in implementing the European Green Deal. At first sight, there appears a surprising degree of similarity, an analytical “mirror picture” one might say, between the way the corona virus spread between different regions in Europe and the way innovation processes take place in particular locations and then diffuse across society. The European outbreak of COVID-19 started in Lombardy in Northern Italy and quickly spread across the border to the Southern Tyrol region² in Austria. It then spread through human travel and contacts to a wide diversity of locations³. If anything, the current COVID-19 crisis illustrates in a dramatic way, how places matter when dealing with innovation and diffusion.

We believe, in other ways, that once the current corona crisis is over, one will be able to learn a great deal from the differentiated regional impact of the corona virus outbreak. One may think of topological as well as structural variables such as the density of population density, its age and health but also other, more behavioural variables such as cultural, food and drink habits. Such comparative analyses will be instrumental in developing further the mutual learning models, sketched out only briefly here in Section 3.

At present the paper does not deal with such more speculative reflections⁴ but concentrates on its major task: to provide support for the implementation of the EGD in the coming 5 years through a bottom-up, hopefully continuing learning process from local places to European policy making.

² In particular, the Tyrolean ski resort town of Ischgl.

³ Among others: Iceland, Baden-Württemberg and Heinsberg in Germany, Mulhouse in France³, Noord-Brabant in The Netherlands and many other regions where local mass events, some religious as in the case of Mulhouse or the Dutch so-called bible communities, some cultural as in the case of carnival events in Heinsberg, became breeding ground for local contamination and the subsequent national and international spreading of the virus.

⁴ To list just a few: one may wonder to what extent the particular local “breeding ground” of sustainable innovations might be conducive to a more rapid diffusion of innovations and to what extent one can create conditions in regions’ and locations’ situations of “super-propagation” of sustainable innovation? What role do particular communities play in such propagation, locally or elsewhere? Can one detect or calculate, as in the case of the corona virus, a “reproductive number” above which the diffusion of innovation might be more or less automatic not needing any specific diffusion policy support; or by contrast, is there a level at which innovations will not diffuse and even fade away? How is the diffusion process accompanied by changes and adaptations of the innovation itself, in function of the interaction with the local environments in which the innovation spreads? Etc.

Providing insights on who e.g. engages where and where not, and why? What should and what should not be changed in processes of place-based innovation contributing to sustainability? How to detect early signals of possible trade-offs between sustainable, smart and inclusive development?

The paper consists of three sections.

In a first section the EGD is presented as a new narrative for the EU, comparable to other, previous European integration narratives such as the Single Market, the Lisbon Strategy or the EU2020 strategy. The EGD differs most radically from such earlier strategic visions, in bringing sustainability at the forefront of the European strategy. This opens up new opportunities in EU multilevel governance, where a full use of subsidiarity is relevant for an effective innovation-driven policy. New governance levels which were more or less absent in previous European narratives, will now play a more significant role: not just regions but also cities, communities. The EGD enables - and needs – a place-based innovation narrative, we argue in the first section of the paper.

In the second section of the paper, a first analysis is presented of what this might imply for implementing what is called here a place-based innovation policy for sustainability. The focus is now on what such a policy could be in practice and how it could be supported: effectively design and develop “learning modules” for place-based innovation for sustainability. It focuses amongst others on strategies followed, reforms needed, instruments as well as impact on people and jobs in different winner and losing places and how particular cities or regions might benefit from an explicit EGD alignment articulated in place-based diversity.

In the third section, we discuss in more detail how the implementation and design of the European Green Deal would benefit from a “Science for Policy” Platform on Place-based innovation for Sustainability. Such a platform could both support local actors and channel findings on local innovation barriers or early trade-off alerts to the EU and national policy making.

It is here, we believe, and broadly in line with the corona crisis, that one might well be able to draw additional, new insights about the regional and local impact of sustainable innovation. Highlighting amongst others the importance of social and cultural diversity in Europe for sustainable innovation and hence also for local and regional dynamics. And at the same time, illustrating that diffusion can be very rapid if adapted to flows of human capital and anchored into place-based cultural meanings. In short, that also within the context of climate change and sustainability we need local solutions responding to global challenges.

Doing so, the analysis presented here will hopefully also contribute to a reflection on how such place-based innovation processes for sustainability could be at the centre of the COVID-19 exit and recovery strategies currently debated in many European regions and countries.

Introduction

The new Commission has made “sustainable development”, together with the digital agenda, the core element of its overall growth strategy for the present decade. From a global perspective the European Green Deal (European Commission 2020a,b) represents on the one hand the EU’s contribution to the Sustainable Development Goals (SDGs) – Europe’s Moonshot mission of the 21st Century – and on the other hand the EU’s “smart specialization strategy” – Europe’s attempt to develop at world level a leading position in sustainable development. The Paris Convention provides from this perspective the overall European framework for national, regional and local city commitments with the EC designing and organizing the accompanying financial and regulatory incentive schemes (such as the climate pact, the Green Deal investment plan and the Just Transition fund, the necessary reforms in the European semester, etc.). Viewing the European Green Deal as a combination between a European 21st Century “Moonshot mission” and an internal, “smart specialization strategy” raises though also many, new challenges as to the respective governance responsibilities of the different actors.

In this short paper, we present some first reflections on the way insights from science, technology and innovation studies on the one hand and regional studies on the other could help in the design of “green deal” policies at European, national and regional/urban level and pulled together provide an intellectual framework for multi-level governance. Such “science for policy” reflections can serve as basis for more in depth discussions between EU policy makers as well as research scholars in the academic community.

In a first section, we first review some of the arguments as to why the European Green Deal represents today primarily an innovation-led development strategy for Europe. We describe how historically the new EGD strategy represents a re-arranging of priorities, making sustainable development as the overriding strategic priority: the opportunity for Europe to position itself globally and locally as green specialisation area through innovation. Second and more specifically at the governance level, the new EGD strategy raises several crucial multi-level governance challenges. Players who were not really at the centre of the European integration process such as regions; or totally absent, such as cities and communities are now likely to play a crucial role. We claim that an effective innovation-driven policy with a directionality requires a proper division of tasks between the EC, national and regional/local governance levels. Third, we focus on how to detect and overcome possible trade-offs involved in prioritizing such a green development strategy compared to the more traditional objective of smart growth as put forward in the previous EU strategies. Through a more explicit recognition and analysis of these trade-offs, we believe a better framework can be sketched for the real, new growth opportunities linked to the Green Deal.

In the second section of the paper, we discuss in more detail each of the relevant challenges and trade-offs facing different types of regions in their movements towards the goals of the Green Deal and the issues which will need to be explicitly considered in the appropriate design of regional policy schemes. Second, we address the particular role cities might play in this process. Contrary to many other regions in the world, Europe’s population is heavily urbanized with cities accounting for the majority of carbon production and consumption-related emissions. This observation provides again greater opportunities for targeted interventions aimed at enhancing sustainability. For the Green Deal to be embraced locally throughout Europe it will be essential to engage all cities and regions across the EU. We argue that the accumulated experience of smart specialization strategies is very

valuable in this context, but that these will need to take the next step embracing transformative innovation for systemic transitions, reaping the opportunities and alleviate the threats of the global ecological and digital transitions. We make some concrete proposals, what we call “learning modules” on how this could be done.

In a third section, we address the need for a continuous “science for policy” approach, particularly in case of a radically new strategic policy framework such as the European Green Deal. The implementation and design of the European Green Deal would benefit, we argue from a Science for Policy Platform on Place-based innovation for Sustainability. This platform could both support local actors and channel findings on local innovation barriers or early trade-off alerts to the EU and national policy making.

Section I: The European Green Deal: a new innovation narrative

1.1 From research excellence and innovation missions to the European Green Deal

The European integration process has been built over the last 50 years or so around narratives each time with a dominant purpose or leading claim. Security as with the European Community's precursor, the European Coal and Steel Community focusing on both peace and energy security; scientific and technological independence as with the creation of Euratom; industrial research competitiveness such as with the Framework programmes established under the European Community; regulatory harmonization as with the Single market; and smart and inclusive growth as in the Lisbon strategy.

While over the period up to 2000, the number of European policy instruments in parallel to the national ones increased significantly – the European policy to establish a "European Scientific Area"⁵ and a European Research Area⁶ triggered the creation of a multitude of instruments at European level – attention shifted following Lisbon, to the supply side fragmentation and overlaps in European knowledge creation and diffusion. However, as European research and innovation funding grew and the challenges confronting societies became more urgent, the extent to which all those European research and innovation policy investments were likely to have a real impact on those societal challenges became more urgent. Growth has not only a rate, but also a direction and a reach. This argument became increasingly voiced in both Northern and Southern European countries, each though with a different focus⁷.

The urgency of environmental sustainability (WMO 2020) and the need for reductions in greenhouse gas emissions (GHG) became encapsulated into the Paris convention with commitments of the EU, member states as well as many local authorities. Such commitments went well beyond commitments in carrying out excellent research but now include also transformative innovations for so-called "systemic transitions" including also non-technological driven innovation, diffusion, experimentation, regulation, new business models, behavioural changes, etc. It was encapsulated in the concept of "missions" and the notion of mission-oriented innovation policy⁸.

The new European Green Deal (European Commission 2020a,b) narrative represents in many ways the final recognition that the focus in research and innovation policy should no longer be on the research and innovation process as such but on the achievement of the required transformative change, where innovative solutions can accelerate the shift towards sustainability. The purpose is no longer the change in itself but ensuring a more sustainable development path within a global perspective, contributing e.g. to the UN Sustainable Development Goals. New instruments are needed to deliver on this, which was the main reason for thinking about the new mission-oriented approach to R&I investment. Ideally, R&I policy should be designed and implemented in synergy with other policy areas in a long-term vision. To quote from the RISE Tour d'Europe 101 Ideas paper: *"Specifically with respect to the environmental sustainability challenge one might reflect on the introduction (complementing the recently introduced "innovation principle") of a "sustainability principle" giving priority in regulation, procurement and state aid to the application and rapid*

⁵ Initiative by Commissioner Ralf Dahrendorf, 1973

⁶ Initiative by Commissioner Philippe Busquin, 2000

⁷ As highlighted in the so-called Tour d'Europe of the RISE group of experts (see RISE, 2019).

⁸ See Mariana Mazzucato (2018) and the ESIR group of experts (2018) reports on the subject for the EC.

*diffusion of sustainable technologies and innovation. Whereas the “innovation principle” gave priority to **change** in a perceived European overregulated landscape; the “sustainability principle” would give priority to the **sustainable direction** of such change. In this sense, one should be less concerned about the fact that local regulatory experimentation might now and then restrict and limit the free exchange/mobility of goods and services. At the same time more EC intervention/regulation is being called for, e.g. in providing an indicative emission price fixing system, allowing MS to levy taxes on the import of fossil-fuel based goods and services and raise new forms of excise duties on such goods and services.” (RISE, 2019).*

If the EU takes the global lead in the attempt to achieve a sustainable development path, the link with the UN SDG agenda appears obvious. The SDGs provide a global, multi-lateral framework very much in line with European values and the EU’s position as a “soft power” global player. It enables the EU to position itself as internationally responsible actor, concerned with humanity’s future rather than with Europe’s future first. The UN’s SDGs appear from this perspective an ideal policy framework for a new strategic positioning of the EU.

However, at the more practical level, the EU has a much wider portfolio of relevant policies at its disposal to lay the basis of a real new green deal strategy. To do that it can build not only on national strategies but also on what one could call regional “smart specialisation strategies for sustainability” (see more in Section II): strategies based on local policy initiatives confronted in different ways with regional environmental challenges, which have learned from their own “smart specialisation strategies” how to motivate, induce and coordinate entrepreneurship and learn from other regions confronted with similar challenges. Doing so, diversity in Europe diversity could finally become an asset: creating value from diversity not just between national countries but also between local environments (physical diversity such as population density, topographic characteristics, but also proximity to knowledge and/or trade hubs, core-periphery relationships, cultural diversity, ageing, specialization and trade skills, etc.).

It is in this sense that the debate about the direction of research and innovation, will also have to be anchored in a regional setting. The new mission-oriented innovation policy will, we argue, be more effective at a local level. The European Green Deal allows this move by setting the overall directionality and traction with the scale and power of EU-wide instruments. In a place-based approach, innovation policy should combine the diversity of smart specialisation strategies with the transformative potential of local mission-oriented innovation policy. It fits within the broader need for a new approach to European innovation policy: one based on an internally driven “green deal” process based on place-based innovation: *“A vision less designed top-down as in the case of e-Europe or Lisbon but more in line with bottom-up experiments based on national or local strengths... address[ing] the fundamental question rarely addressed up to now in European integration: how to reap the intrinsic European advantages of “economies of scope”, of the diversity in culture, languages, needs, experiences. It is this question which in my view should be leading in framing and guiding policy action not just in the area of AI and digital applications... and in the area of sustainability..., but in the combination of both. How can countries/regions/cities develop different models of “digital circularity” depending on the different behavioural responses to incentives and regulations in Europe? Can we learn at European level from those different local “nudges”? How can we design and develop European missions which in their implementation might require different national or local action?”* (Soete, 2019b).

The focus on place-based innovation involves by definition paying particular attention to local governance as one of the most relevant policy makers and “first in line” providers of local public services, and also as signallers of societal challenges, unexpected impacts, disruptions or deteriorations resulting from national/regional policy measures. Following subsidiarity arguments, one could argue that there is a strong economic rationale for local governments/authorities to drive innovation-led transformation. They can best identify and capture industrial opportunities from the European Green Deal, engaging and co-creating with citizens, while using the new EU directionality to overcome local lock-ins and path dependency.

1.2 The Green Deal’s multi-level governance challenges

As a result, the new Green Deal will have to involve a multi-level governance framework with clear responsibilities for different governance layers between European, national and regional/local policy making. That governance framework will only be successful if each level of governance contributes to the mission in what it is most capable at doing best. On the one hand the EC should take more direct responsibility in designing and implementing policies raising so to say the level-playing field; while local authorities on the other hand following on from their experience with smart specialization should be given more freedom to experiment with what could be called smart decisions: local choices, sometimes based on similar regions experiences, capitalizing on the potential for inter-regional learning.

Schematically:

- the **EU-level** sets both the direction and organizes the “traction” for the other levels of governance. The reasons for doing so are straightforward:
 - (i) It is only at EU-level that one will be able to mobilize and attract a sufficient scale of investment/resources needed for the Green Deal (€ 1 trillion);
 - (ii) It is the only level at which one can set a regulatory green “level playing field” (climate law and the revision of all relevant EU regulations);
 - (iii) It is also the only level at which one can impose/negotiate at global level through trade and investment deals a green global transformation process (through the imposition of environmental standards in internationally traded goods and services).
- the **national level** has the capacity to reinforce this directionality and traction positioning their industry and entrepreneurs in the emerging global markets of sustainable products and services. They should recognize the economic rational of place-based innovation, and focus on policy learning, connecting local and regional innovation dynamics to broader national and EU-wide networks.
- the **regional and local level** (regions, cities, communities) play a significant role for an effective implementation of the European Green Deal based on what could be called regional “smart specialisation strategies for sustainability”. Strategies based on local policy initiatives confronted with different regional environmental challenges which have learned from their own smart specialisation strategies how to motivate, induce and coordinate entrepreneurship and learn from other regions confronted with similar challenges.

In a certain sense the new Green Deal brings to the fore the importance within the EU of diversity as opposed to scale: the potential for a successful Green Deal will depend on the recognition of diversity in local, as opposed to national characteristics of particular territories: cultural and social diversity, urban vs rural, access to water/sea vs land-locked, core vs periphery, below sea level vs

mountainous, etc. Local/regional missions based on a bottom-up approach using e.g. both outcomes of Horizon 2020 projects as well as structural funds as test beds for experiments in “green deals” could be one example of such policy instruments. Green Deal synergies at European level will not always trickle down well and need often a bottom up approach, resulting in “chimney” rather than trickling down effects.

This opens up for real synergies in the implementation of EU innovation investment programmes, in particular between the European Regional Development Funds and the Horizon Europe programme. The new innovation policy required for the European Green Deal mobilises systemic innovation, where new solutions emerge from the combination of technologies, infrastructure, skills, entrepreneurship, citizens engagement and local administrative capacity. All objectives of the structural funds are relevant as well as the breakthrough innovations from Horizon Europe. The European Green Deal opens up for these synergies at local level, in a bottom up process. Institutional capacity building will be even more crucial than today to ensure that public authorities also in economically lagging regions can step up as an “entrepreneurial state”. The EU level, supported by national innovation agencies, is well placed to coordinate where needed the diversity of green specialization strategies, diffuse local “green experiments” knowledge; and where necessary align incentives. The implementation of the European Green Deal must of course be flexible, allowing for possible redesign and learning by doing. However, this may be unfeasible in very rigid systems of public policy where formal accountability is the guiding principle. Kanellou, Radosevic and Tsekouras (2019) have highlighted how trade-offs between experimentation and accountability might limit such flexibility. Therefore, it is crucial to design well the EU innovation investment programmes so they can fully drive place-based innovation for sustainability.

In short, a successful Green Deal strategy will have to be based on a rich set of multi-level governance policy options in which it will become essential to clearly delineate responsibilities at European, national and regional/local level.

1.3 Smart, inclusive and green – addressing complementarity and trade-offs

Since the so-called Lisbon knowledge growth strategy of March 2000, the EU’s growth and development strategy has centred around the achievement of smart and inclusive growth as in the original Lisbon formulation⁹ to which sustainability was subsequently added and later on in 2010 translated into the creation of a ‘smart, sustainable and inclusive economy’, known as ‘Europe 2020’¹⁰. Underlying each set of policy goals is the assumption that those policy aims would by and large be complementary to each other.

⁹ Translated in specific targets such as raising investment in research and development to three per cent of gross domestic product (Barcelona target) and increasing the rate of employment within the EU from 61 to 70 per cent of the working-age population (Rodrigues, 2009).

¹⁰ Within the framework of the Europe 2020 strategy five specific objectives were set for innovation, employment, education, social inclusion, and climate change and energy policy: again now by 2020, three per cent of EU GDP should be invested in R&D and innovation; 75% of 20-64 year-olds should be in employment; early school leavers should be under 10% and 40% under 35 should have completed tertiary education; at least 20 million fewer people should be in poverty and social exclusion; and the ‘20-20-20’ strategy for climate change and energy policy (greenhouse gas emissions 20% lower than in 1990, energy efficiency 20% higher and 20% of energy generated from renewables) should be achieved in 2020.

Back in 2000, and within a framework of the internet growth decade of the 90's, the Lisbon strategy focused explicitly on the employment creation and skill adjustment characteristics linked to the diffusion and use of new digital technologies (the so-called "new economy"). The trade-off between technology and employment has been studied by economists for decades if not centuries and the arguments about the skill biases and the role of technological competitiveness for jobs growth had been well recognized since the OECD Job study (1994). Interestingly the failure of the Lisbon strategy¹¹ was already early on identified with too many competing goals, based on the assumption that employment growth, the knowledge economy, social solidarity and environmental protection were inherently consistent and mutually reinforcing. Twenty years later with the advent of AI and Robotics, it is, if anything, even more difficult to assume that "smart" and "inclusive" would be inherently complementary.

Now, focusing on sustainability, which is put to the forefront in the new EGD, we can see that the relation between smart and sustainable is also complex. On the one hand, green investments can create high-quality jobs, often local as customized systemic solutions will become a relatively more important part of the value added. The potential of the EU as first mover at global markets (competing with China) would most likely create jobs and value added in Europe producing products and services combining digital and sustainable innovation. On the other hand, a strong case can be made that giving priority to "smart" growth and in particular, innovation-led consumer-based growth, might be contradictory with any green growth objective, once the driving forces of international, technological competitiveness are taken into account¹². The EGD requires that ultimately "smart" should not be leading in science, technology and innovation but "sustainability".

Finally, sustainable and inclusive growth can be both complementary and enter into conflict. The point here is that both effects are mostly visible locally. On the one hand, there are good reasons to think that sustainability and inclusiveness are mutually reinforcing. Environmentally unsustainable production represents an assault on the commons, with a possible rent extraction by the few at the expense of the majority of citizens, suffering the mutualisation of the costs to human health and life expectancy of the local population. On the other hand, increasing prices to take into account emissions will have distributional effects as illustrated in the "gilets jaunes" revolt. Sustainable green policies may have regional distributional implications affecting much poorer, already "excluded" non-urban ("*la France profonde*") regions and sections of the European population. We come back to this issue in Section 2.

In this context of complexity, it is more important than ever to recognise the principle of continuous policy learning. There is a need for a structured and multilayer system of policy learning

¹¹ For an excellent overview of the Lisbon agenda see Rodrigues, 2009.

¹² "This can be neatly illustrated through carbon emission accounting... Such accounting attributes carbon emissions to the final demand of a country and is based on the US System of National Accounts. They... include private consumption by households; government consumption through the public expenditure on final goods and services; and investment (private and public) in construction, equipment, infrastructure and so on. The first one, consumption by households accounts for about 64% of global emissions. In short it is the intrinsic expansionary growth of household consumption which is behind the dramatic growth in carbon emissions. At the same time, the global integration in trade and global value changes has of course altered the balance of emissions and widened the gap between territorial (production) and consumption emissions of both North and South. A country such as Sweden can claim that it has achieved carbon neutrality in production, its household consumption will remain carbon emission dependent. This becomes even more visible once looking at agriculture with its more protected production structure such as in the EU." (Soete, 2019a)

accompanying the implementation of the European Green Deal, as we highlight in Section 3 of this paper. The EU should set up such a learning system to channel early signals of complementarity and trade-offs spotted at local level enabling rapid policy pivoting at national and EU-level. The system should start locally, with place-based innovation and experimentation (also in local policy making) combined with consistent directionality. EU science for policy assistance should support local authorities and stakeholders in understanding the continuous evolution of the transitions of the – interrelated – socioeconomic systems highlighted in the EGD: the energy system, manufacturing system, agri-food system, housing system, and mobility system. Only this way, can the local SWOT process and the Entrepreneurial Discovery Process (EDP) capture opportunities and adapt to threats for the region or city in a given moment in time. At the same time, the EU policy can pivot and alleviate trade-offs. Only EU policy can address the global trade-offs implicit in the new Green Deal strategy: the trade-off between free, international trade, global value chains, increased transport and international specialisation and increased CO-2 emissions; the likely impact of levying CO-2 tariffs on imports *and* exports and the transition towards a sustainable economic union, both internally and externally, from a free trade area to a sustainable one; the trade-off between the EU's participation in global agriculture production and specialisation and local, sustainable agriculture; the trade-off between local circularity and international competitiveness; but above all the trade-off between sustainability and regional cohesion and social inclusiveness.

Indeed, and as discussed in more detail in the next section, the European Green Deal is likely to have very different regional implications: for some rural regions, the transition is likely to be severe, for other rich urban environments, the new Green Deal might offer new development and growth opportunities. At local level, policy making will be confronted with all the problems of alignment, of holding out, of coordination between a variety of different, often contradictory stakeholders. Regional/city authorities might sometimes be confronted with one agent holding out/opposing: effectively obtaining a local hold-out monopoly position fighting city authorities. In short, a radically new policy position will be needed at regional and local level from previous, traditional S3 policy, with policy makers finding themselves confronted with incentive alignment and horizontal and vertical coordination problems. This will be even more the case for weaker regions. It is here that cohesion policy and the European structural funds can make the difference.

Section II: The European Green Deal: Cohesion and place-based innovation for sustainability

2.1 Towards a “Smart Specialisation Strategy for Sustainable and inclusive growth” agenda

Building a unifying EU-wide narrative is essential if the Green Deal is to be embraced by the widest range of societal stakeholders. However, this EU perspective must be complemented by a place-based perspective. Understanding the bottom-up perspective on EU policy is essential to engage local stakeholders and to implement the European Green Deal in a flexible manner for optimal impact.

Firstly, local policy makers have different opinions on the role of public policy. There are deeply held conflicting views which are evident in many countries and regions regarding how best to respond to carbon neutrality challenges. Thus, there will be views which favour government policy intervention, taxation and regulation as the primary means to help drive movements towards carbon neutrality whereas there will be other views which favour private enterprise as being the main driver of appropriate technological change, largely unencumbered by regulation or government intervention. The political economy trade-offs associated with these conflicting views are different in different countries and regions, with these views being relatively less mis-aligned in some cases than in others. However, overcoming this split and harnessing both differing sets of perceptions in all EU member states is essential if European society as a whole is to progress towards the Green Deal objectives.

Secondly, there is now a profound ‘geography of discontent’ (McCann 2019) emerging in different countries (Henrickson et al. 2018; OECD 2018a, 2019a) and across Europe (Dijkstra et al. 2019) in which many citizens, and *especially those in economically weaker regions*, feel increasingly disenfranchised and disconnected with high-level governance and policy-making narratives, to the extent that they are willing to object to, subvert or even undermine, top-down policy initiatives (*The Economist* 2019). More specifically, across the EU there are now large differences in the levels of sustainable development reached, and also major differences in public attitudes towards the attainment of SDGs via broader EU policy-engagement (Pîrvu et al. 2019), with a close correlation between levels of overall economic development and support for such measures. Finding ways to encourage these less prosperous communities to embrace the Green Deal is essential if there is to be an EU-wide engagement with the Green Deal.

A way to achieve both of these challenges is by setting many of the Green Deal challenges in the context of place-based innovation supported by EU Cohesion Policy in economically less developed regions, and in particular, in the smart specialisation and its results-oriented logic. There are three reasons for this.

- Firstly, the S3 Smart Specialisation agenda of Cohesion Policy has already led to the building of innovation-led and entrepreneurial-led capabilities at local, city and regional scales which can serve as a platform on which movements towards the Green Deal can be built.

- Secondly, the financial means that Cohesion Policy can bring to these at a more detailed spatial and institutional level means that incentives can be better structured to make this bottom-up driven process meaningful across local actors, stakeholders and places.
- Thirdly, Cohesion Policy has as a primary focus the goal of enhancing the prosperity and viability of economically weaker and less resilient regions, so many governance elements are already in place to drive forward this agenda.

Regarding the first reason why the Smart Specialisation agenda provides an ideal platform on which substantial EU-wide movements towards the Green Deal can be built, it is the combination of both innovation-led and entrepreneurial-led activities alongside enhanced governance capabilities at the local, city and regional scales which provide the ideal setting for driving forward the Green Deal.

The entrepreneurial-led and innovation-led core of Smart Specialisation ensures that it is the creative, scientific, imaginative, and technological prowess of the Europeans that will drive the Green Deal agenda. Econometric evidence confirms that new green technologies tend to build on existing capabilities (Santoalha and Boschma 2019). At the local and regional scales 'dirty' technologies inhibit the shift towards green technologies but this can be overcome where local technological relatedness to green technologies is already evident. Moreover, in shifting towards green technologies, the existing relatedness features of regional capabilities in green activities and technologies dominates any effect of political or policy support at the national level, although political and policy support for green technologies at the local level strengthens the local diversification processes into green technologies (Santoalha and Boschma 2019). In other words, local policy design and delivery is essential for driving green technologies.

The driving of the Green Deal agenda via Smart Specialisation can be made consistent with market principles by re-orienting the broad macro-level incentives shaping the enterprise activities of European commerce, although this 'mission-oriented' (Mazzucato 2018) type of approach will only be successful across a broad base if it is accompanied by widespread bottom-up engagement and mobilisation. There is no single ideal green growth model (World Bank 2012), nor mission oriented institutional design (Breznitz et al. 2018) suitable for driving the agenda. Rather, the challenges faced by different contexts differ, and therefore actions need to be tailored to the local context. In particular, the mix of incentives and regulations should be tailored to the local innovation potential, as well as the sequencing of activities (World Bank 2012). In this regard Smart Specialisation in the context of the European Green Deal provides a unique combination of both top-down macro-level directionality and widespread bottom-up micro-level and enterprise-led engagement which ensures that the creative energies of Europe can be targeted and focused on medium and long-term Green Deal goals. Smart Specialisation is the only policy-schema in the EU policy portfolio which can combine top-down directionality with bottom-up enterprise engagement on the requisite scale and breadth to ensure EU-wide engagement.

In terms of the local governance capabilities needed to drive the Green Deal forward, this can be achieved because Smart Specialisation has mobilised new forms and modes of meso-level sub-national decision-making and coordination, which could provide the lynchpin between the top-down macro and the bottom-up micro actors and actions. In terms of meso-level decision-making and coordination, the distributed local and bottom-up nature of Smart Specialisation offers the maximum

potential buy-in for addressing Green Deal challenges. At the local, city and regional levels, within the Smart Specialisation agenda these governance capabilities centre on collaborative engagement and policy-formulation across the public, private and civil-society spheres.

In the context of the European Green Deal, requiring systemic innovation, further institutional capacity building is crucial. This implies e.g. increased team-working across institutions rather than siloed policy-thinking; the elevated importance of results-oriented policy-design; much improved evidence-gathering and awareness of local strengths and weaknesses, opportunities and threats in times of global transitions; greatly improved understandings of the need for ongoing monitoring and ex post evaluation; and major efforts aimed at learning from the experiences of other localities across Europe. Over the last years, local capacities have improved in these various arenas (McCann and Ortega-Argilés 2016; Guzzo et al. 2018; Marinelli and Perianez-Forte 2017; Marinelli et al. 2018, 2019), and while there are still major challenges for the very weakest regions of the EU (McCann and Ortega-Argilés 2016), many of the less prosperous parts of Europe have made significant strides forward in recent years in terms of policy design and delivery (McCann and Ortega-Argilés 2016).

Smart specialization is also promising for a widespread enhancement of stakeholder engagement in the European Green Deal including collaborative team-working for Smart Specialisation policy design and development. After seven years of implementation and policy refinement, the Smart Specialisation agenda provides an already-understood, well-rehearsed and practicable policy-prioritisation framework which local stakeholders can deploy to develop appropriate policy actions and interventions. The design of policy actions and interventions focuses on the fostering of local bottom-up entrepreneurial discovery processes aimed at promoting diversification in and around domains in which a locality already has significant levels of both scale and embeddedness. This diversification can be variously technical, technological, skills-related, or even institutional in nature, as well as different combinations of these. But the important point is that local policy-makers, working in parallel with market-makers, aim to ensure that their local economies grow in a robust and resilient manner in which knowledge-related entrepreneurial-led and innovation-led activities spearhead the new growth trajectories of their local economies.

A reorienting and updating of the smart specialisation logic towards the European Green Deal goals can provide a basis for a reconciliation between opposing narratives around sustainability by harnessing the entrepreneurial and innovative spirit of EU economies – the smart growth agenda - in the service of sustainable growth and inclusive growth agendas. Such a reorienting of Smart Specialisation would build on the European Green Deal to develop a policy-framing narrative which provides a third way between what are often seen as being conflicting views. Such a reconciliation is essential in order to build a narrative which gains widespread stakeholder engagement and support across the political spectrum and across countries.

Achieving such a reorientation will nevertheless require also with respect to Cohesion Policy, as highlighted in the previous sections, a move away from the previous Europe 2020 goals of smart

growth, sustainable growth and inclusive growth to the new European Green Deal narrative of smart growth *for* sustainable growth and inclusive growth¹³.

A shift in policy logic from S3 to **smart specialisation strategies for sustainable and inclusive growth (S4+)** would change the logic on which regional development strategies would be based in Europe. The S3 programming elements which local stakeholders have become accustomed to working with – including the prioritising of local entrepreneurial search processes, stakeholder engagement and collaboration, and the fostering of related local diversification built on potential scale and embeddedness features - would remain in place. However, there would now be an explicit and unambiguous EU-wide focus of the required trajectory of locally driven innovation-led and enterprise-led policies eligible for Cohesion Policy funding, namely those that are explicitly intended to make progress towards enhancing sustainability and inclusiveness. As such, the top-down directionality of smart specialisation can be explicitly targeted at achieving the European Green Deal objectives, and the Green Deal agenda can therefore be spearheaded by building on and exploiting an already well-rehearsed and widely engaged programme.

In order to do this, this also requires an explicit shift in the ordering of the relationships between the setting of policy priorities and their responses to societal challenges. Specifically, instead of being perceived of as an end in itself, as was the case with both the Lisbon Strategy and the Europe2020 agenda, enhancing innovation would now be seen as *intermediate* step towards the longer-term goals of fostering sustainability and inclusiveness. In other words, the evaluation of innovation-led and enterprise-led activities would be assessed with respect to their potential contributions to promoting sustainable growth and/or inclusive growth.

A newly-focused **S4+** Smart Specialisation agenda will ensure the correct structuring of innovation-related and enterprise-related incentives at the local and sub-national scales as is necessary to make engagement with the Green Deal attractive to private sector as well as civil society and public sector actors. Moreover, **S4+** Smart Specialisation, set within the scale and sub-national focus of Cohesion Policy, will foster movement towards the European Green Deal objectives across a wide range of fronts and across all places at the local decision-making and institutional levels. It will foster a real innovation-led policy in regions, cities and communities where the transformation builds on

¹³ This shift of narrative implies an explicit re-ordering of priorities. In the Europe2020 agenda the three growth dimensions of smart, sustainable and inclusive tended to be treated by national, regional, city and rural stakeholders and decision makers as a menu from which one could choose. Naturally, most ERDF investments focused on the smart element, while ESF interventions largely focused on inclusive elements. Although 21% of ERDF and Cohesion Fund Resources along with 1.4% of ESF funds (European Union 2017) during the programming period 2014-2020 were targeted at combatting the effects of climate change, the sustainable aspects of growth were often rather overlooked in many ERDF and ESF interventions, and typically tended to be programmed into ERDF and ESF activities as something of an afterthought. This is largely because they are much harder to achieve requiring much more careful thought, and also because the time-period over which such actions can realise demonstrable outcomes tends to be much longer than in the case of other forms of ERDF and ESF-funded activities. The only real exceptions to this are where the sustainability theme was explicitly programmed from the outset into interventions via the Cohesion Fund or via the much smaller EAFRD and EMFF funds. However, the eligibility criteria meant that interventions by these latter three funds are not typical of the majority of the Smart Specialisation-related policy-prioritisation decisions taken by most European regions.

synergies between all areas of the future ERDF and ESF programmes, also infrastructure, skills, local leadership and direct actions addressing sustainability and climate change.

2.2 Local Green Deal Challenges and Opportunities: the role of European cities and communities

Prosperous cities have led much of the growth of Europe over the last decade (European Union 2017) and prosperous cities tend to have many advantages in responding to climate change. Cities are responsible for two thirds of global energy consumption and also generate some 70% of GHG emissions (JRC 2019; OECD 2019b). Indeed, Heating and air conditioning systems in buildings today alone contribute about 7% of global emissions (Henderson et al. 2020). However, cities are also critical to finding potential solutions to the current environmental challenges (European Union 2017, JRC 2019). Cities and regions play a crucial role in investment related to climate mitigation actions, across the OECD accounting for some 55% of expenditure and 64% of public investments in climate and environmental matters (OECD 2019b). Moreover, the fact that Europe is so urbanized, with the whole EU population living in less than 5% of the total European land area, means that that urban-focused policy actions and interventions intended to foster sustainable growth can potentially reach a large share of the EU economy and population by being targeted over relatively very small geographical areas.

In particular, there are many European cities with strong innovation-led economies enjoying widespread local knowledge spillovers. These cities are ideally placed to undertake these types of policy interventions aimed at enhancing sustainability because the economic and social infrastructure is already largely in place to undertake these activities (EU & UN 2016). Moreover, many of these cities have significant media and brand profiles (especially capital cities), are well connected in global knowledge and scientific networks, and display significant lobbying abilities which allow them to shape EU-wide policy-thinking and to also to better negotiate with (often multinational) technology providers on something of an equal footing.

The combination of city-level decision-making, local stakeholder engagement and dense populations means that these types of settings can provide ideal testbeds where new innovations aimed at enhancing sustainable growth and inclusive growth can be piloted (JRC 2019). This is potentially very efficient from a policy-targeting perspective, because the costs involved in transformational schemes towards enhanced sustainability often require significant economies of scale which can most effectively be realized by a spatial concentration of interventions. This type of urban-focused logic is widespread in policies aimed at combatting urban heat islands, reducing urban pollution (a major cause of mortality), promoting sustainable mobility and carbon-neutral transportation, as well reforms to as health care service provision.

Yet, while many of the dominant narratives about the links between new technologies and sustainability tend to be focused on cities there are also some serious challenges in these arguments. In particular, it is important that our thinking about the role played by cities in EU-wide attempts at combating climate change are not overly driven by narratives emerging from primarily prosperous or capital cities, because these will not be reflective of Europe as a whole (EU & UN 2016). The reason is

that many of Europe's cities which have faced severe post-2008 crisis shocks, and their institutional capabilities are now much weaker precisely because of these shocks.

While much of Europe's growth since the 1990s has been dominated by prosperous and capital cities (European Union 2017), many parts of urban Europe are struggling, with between one in four and one in three cities facing economic and population decline (McCann 2018; Kamal-Chaoui 2019). During the 1990s much of the economic growth across all of Europe was led by cities in general. In the EU13 member states this broad city-led growth has remained intact more or less until now. In contrast, in the EU15 countries, economic growth during the first decade of the 21st century became more heavily driven by intermediate regions (small towns and peri-urban regions) and rural regions close to cities during the years after the Millennium, while primarily urban areas and remote rural regions fell behind (Dijkstra et al. 2015). Most notably, across the EU urban areas were amongst the worst hit and least resilient localities in the aftermath of the 2008 crisis and amongst the slowest places to recover to their pre-crisis prosperity levels (Dijkstra et al. 2013). Similarly, while many parts of rural Europe are struggling, there are also parts of rural Europe which are very prosperous and have been enjoying strong growth over recent years (Dijkstra et al. 2015; Kamal-Chaoui 2019). As such simple stories of urban-rural divides are of little use in really understanding European regional growth or policy context (McCann 2015; EHA 2019; Wochner and Holzhausen 2019) or the likely trade-offs associated with making significant movements towards the Green Deal.

Those cities which experienced severe post-2008 crisis shocks have typically also suffered major losses to their local institutional capabilities (including capacities to drive innovation-led policies) due to a combination of cut-backs in central government funding and also declines in their local tax base, as well as a loss of key personnel, and as a result these cities are now much weaker institutionally precisely because of these shocks. Many of these same cities also have media and brand profiles which are much lower than more prosperous and capital cities, less buoyant private sectors with more limited resources for joint-venture and cooperative-type engagements with the public sector, and these weaker cities are also consequently also in less advantageous positions to negotiate locally-specific innovative actions with technology service providers. As such, in order for these types of weaker cities to embrace new innovative actions aimed at enhancing sustainable and inclusive growth it will be necessary for them to address additional economic, social and institutional challenges which many more prosperous cities will not face. The mix of challenges they are likely to encounter in driving Green Deal responses is likely to be more complex and adverse than in more prosperous places. As such, these weaker cities will need to be assisted in different ways and to a greater extent than more prosperous cities in order to realise the European Green Deal ambitions in these types of places.

Indeed, this urban example reflects a more general EU-wide theme, in that the same broad principles also apply to intermediate regions and rural areas as well as to primarily urban regions. Less than one third of the EU population live in functional urban areas of more than 1.5 million, while across most EU member states some 10-20% of the population live in functional urban areas of between one half and 1.5 million. Similar 10-20% shares of the national populations typically live in functional urban areas between one quarter and half a million, as well as those living in functional urban areas between 50,000 and 250,000 (OECD 2018c). As such, across EU member states, typically some 40-50% of people do not live in functional urban areas of more than 50,000. Therefore, in order for the

European Green Deal to be embraced by all of Europe, it is necessary to consider the challenges facing all types of regions, cities and communities.

2.3 Local Green Deal Challenges and Opportunities: the Role of European Regions

In order to counter the ‘geography of discontent’ (McCann 2019; Henrickson et al. 2018) that was mentioned at the outset, so as to encourage all parts of Europe to embrace the European Green Deal, it is necessary to be clear about the potential and implications for different regions to address the Green Deal challenges. In line with the arguments in the previous sections, this will also require an open and transparent approach towards the likely Green Deal trade-offs, as they manifest themselves at local, city and regional level, because they may well be profoundly different from those implied by national and/or international narratives. Yet, although such local trade-offs will be different in different places depending on economic, geographical and governance characteristics, we do know already quite a lot about many of their typical features.

Firstly, we know that many economically weaker regions are relatively more vulnerable to climate change than more prosperous regions (European Union 2017; OECD 2019a). At the same time, however, many of the weaker regions are also, ironically, more economically and institutionally vulnerable to climate change-mitigation strategies (OECD 2019a). For example, many carbon-intensive extraction and manufacturing industries activities often tend to be concentrated in economically weaker regions (OECD 2019a; NEF 2019). Therefore, movements away from carbon-intensive activities will especially affect these regions adversely during the transition period towards new forms of employment. In order to be genuinely sustainable any actions and interventions in the built environment aimed at climate change mitigation must also be aligned with the broader social inclusion agenda at the local level (Urban Land Institute 2020). Indeed, it has been one of the central factors behind the creation of the Just Transition Fund in the EGD. Similarly, in the short term many geographically peripheral regions will be especially adversely affected by new modes of transport pricing which incorporate full environmental costs, because these cost increases which will relatively reduce their market accessibility in comparison to more centrally located and higher population regions.¹⁴ In addition, without policy interventions, employment growth related to leading-edge innovations tends to be clustered in a small number of core prosperous locations (Atkinson et al. 2019; OECD 2019a), and without explicit policy interventions, there is no reason to assume that this will be anything different for innovations related to climate change mitigation. As such, movements towards carbon reductions will imply even greater challenges of restructuring for many lagging regions than is currently already the case.

Many of these same regions are also potentially more vulnerable to the implications of automation than more prosperous regions, due to the nature of activities present there (OECD 2018a, b; OECD 2019a; MGI 2019a, b; Muro et al. 2019a). In contrast, although much of the evidence on Artificial Intelligence (AI) points to more prosperous parts of the world being the major winners from these

¹⁴ As an aside, if we consider the effects of the coronavirus crisis on disrupting or closing down supply chains, the industries and places most exposed to the adverse implications of the coronavirus shocks on supply-chains appear to be similar to those same transport-related and carbon-intensive industries and activities facing severe challenges in the ecological transition (Muro et al. 2020)

emerging technologies (MGI 2018a,b,c), the evidence of the implications of AI on regions is more mixed, depending on how long-run AI development trajectories play out (OECD 2019a; Muro et al. 2019b). AI is likely to increase income polarisation in advanced economies (MGI 2017) and job polarisation already tends to be greater in weaker regions (Ernst et al. 2018). Related to this, weaker regions also typically exhibit relatively greater outflows of younger and more highly educated workers, resulting in adverse demographic transitions (McCann 2017; OECD 2019a). The combination of being relatively more carbon-intensive, more technology-vulnerable, more employment polarised and more rapidly ageing, suggests that many of these economically weaker regions face something of a 'perfect storm' in having to address the twin ecological and digital transitions.

Another major risk and set of trade-offs encountered especially by economically weaker regions in addressing the sustainability and inclusiveness challenges is the risk of increasing partitioning of regions into those producing tradeables from those producing non-tradeables. Tradeables are those goods and services which are readily exportable whereas non-tradeables are those goods and services primarily oriented towards local consumption. This partitioning process which is already well underway across the EU and OECD countries (OECD 2019a) and those regions which are increasingly locked into the production of non-tradeables are falling behind those which are specializing in the production of tradeables (OECD 2019a).

Regions specialised in producing tradeables tend to be characterised by higher skills, higher human capital and more diverse economies, whereas regions increasingly locked into the production of non-tradeables tend to be characterised by lower skills, lower human capital and less diverse economies (OECD 2019a). If movements towards the European Green Deal are primarily interpreted as being based on a re-localising of existing production systems, then many of these regions may well become more successively locked into the local production of non-tradeables for local consumption and will fall further behind in terms of overall prosperity. In order to counter such trends, the Green Deal needs to foster high quality employment, and the value of the jobs thereby created must be also considered in the context of broader societal goals (Partridge and Weinstein 2014) and overall labour market conditions (World bank 2014).

From the perspective of inclusive growth, this provides a powerful rationale for S4+, in which the S3 elements focused on enhancing knowledge connectivity now become even more critical for helping these regions to transition to a lower carbon footprint by fostering high quality and sustainable employment. Access to global value-chains can significantly help to foster new green technologies (UN 2018), allowing firms to find niches for promoting development along the value chains. S4+ policies aimed at promoting green activities and investments along with engagement with global value chains can play a significant role in fostering sustainable development, but there is no one-size-fits-all model of such a policy, as it depends on the context (UN 2018), exactly as S4+ advocates.

When one considers the possible Green Deal trade-offs at the urban, rural and local levels, the picture emerging is therefore often more complex and different from what is generally understood. Understanding the changing vulnerability and resilience features of different types of European places is critical in order to make sense of the different options available for places as well as the likely trade-offs in different places which are inherent in pursuing the Green Deal. Economic diversification, as is central to the S4+ agenda, can be used as a means of building resilience to both

climate change and also policies which have been implemented in order to mitigate climate change (United Nations 2016a,b). However, the diversification into green technologies and activities should also be seen as a broader sustainable development strategy because of the broader growth and development opportunities that diversification offers (United Nations 2016a,b).

In order for the Green Deal agenda to be embraced locally throughout Europe it will be essential that the weaker cities and regions are also sufficiently incentivised and supported to engage in the development of innovations aimed at fostering sustainable growth and inclusive growth. Indeed, the urgency of engaging the economically weaker parts of Europe in the Green Deal has increased with the current coronavirus pandemic. On the one hand the pandemic has increased societal awareness of the need for resilience and reduced vulnerability to shocks (OECD 2020a), and the partial shutdowns of economies has temporarily reduced climate change processes. On the other hand, there is a real danger that the economic stimulus interventions put in place by governments to foster a rapid economic recovery could reduce or even reverse progress in climate adaptation (OECD 2020a). Collapsing fossil fuel prices in the wake of the coronavirus pandemic currently make many green technologies non-viable in the short run. Yet, in the medium and long-term it is critical that the recovery process does not set back the climate change agenda (Bennett 2020), and the best way to ensure this is to treat the recovery as an opportunity to invest in new climate adaptation technologies (OECD 2020a) which benefit all sections of society. One of the lessons arising from the coronavirus crisis is that promoting inclusiveness in cities is essential for promoting the types of environmental health and quality necessary to build resilience to pandemics (OECD 2020a,b). Yet, weaker localities will often encounter more difficult trade-offs than more prosperous regions and with more limited resources and capabilities to manage those trade-offs. Using Cohesion Policy and S4+ smart specialisation to incentivise weaker cities and regions to engage with the sustainable growth and inclusive growth agendas will be essential if one wants to avoid sustainability becoming the preserve of the more prosperous places, an outcome which could undermine the success of the European Green Deal.

Section III: Strengthening the scientific underpinning of the European Green Deal

3.1 Strengthening the scientific underpinning of the European Green Deal

Today, and as most drastically illustrated in the case of COVID-19 and public health, public policy must be based on, and continuously fed by science. Societal challenges are too complex and changes too rapid. Just as the current COVID-19 crisis shows the dramatic need in moments of uncertainty for a continuous scientific underpinning of policy decisions, so the climate crisis needs a continuous flow of scientific evidence and analysis on the structural nature of the climate change crisis. And whereas the time perspective of the climate crisis appears much broader: counted in decades as opposed to days and months in the case of COVID-19, the urgency to act is unfortunately also perceived as less. Yet, urgency there is, as scientists continue to repeat. It is a matter of policy rationality, but also of legitimacy, as formulated by the youth movement fighting climate change: *“We know that most politicians don’t want to talk to us. Good, we don’t want to talk to them either. We want them to talk to the scientists instead. Listen to them, because we are just repeating what they are saying and have been saying for decades.”*¹⁵

The European Green Deal is the EU’s public policy response to the climate change. For scientific advice, the first obvious reflex is to turn to natural sciences. The IPCC reports gather insights from many natural sciences defining and understanding the ongoing climate change. For the European Green Deal, natural sciences can provide support on real life impact, on the decrease in CO2 emissions, in air pollution or in the rate of depletion of natural resources.

However, we will argue here for a parallel and complementary need of social sciences for a successful implementation of the European Green Deal¹⁶. Climate change is closely linked to our current economic model of production and consumption; and all processes of change and adaptation are grounded in socio-cultural structures and behavioral change. Social sciences can provide limited insights on planetary boundaries, but they are indispensable for identifying pathways to prosperity and equality. The European Green Deal aims at accelerating and tilting the transitions in five socio-economic systems: the energy, the agri-food, the manufacturing, the housing, and the mobility systems. The social sciences can help public policy understanding these systems and their actors, detecting what is at stake in the transitions, and – last but not least - track the effects of the EU policy on people and places.

¹⁵ Greta Thunberg, speech at European Economic and Social Committee, Brussels, 21 February 2019. In fact, this call for a scientific underpinning of policy can be tracked back to the MIT pioneer project on the “Limits to growth” in the early 1970s.

¹⁶ In particular the role for facilitating interaction (dialogue) between science and policy practice. As highlighted by Radosevic, the notion of science for policy should not assume that there are ready made solutions just to be implemented, there is rather *‘a need for explicitly policy motivated analysis grounded in a broad evolutionary perspective. Innovation policy studies are an area in pre-paradigmatic stages whose dynamism originates from the interaction of theory, policy, and policy learning. The limited usefulness of policy implications derived directly from either conceptual or empirical analysis requires more explicitly policy focused research’*. See Radosevic (2012).

In the new multi-layer governance model of the European Green Deal, a structured platform of “social science for policy” model is lacking. In its first 100 days, the new European Commission has launched an impressive package of public policy initiatives: an investment fund, climate regulation, industrial policy, focused actions on circular economy or other processes of systemic change. These top-level EU initiatives have the scale and scope to trigger traction across Europe. The annual policy dialogue in the European semester will allow for a continuous information flow and policy dialogue on national commitment and reforms.

However, as we argued here, innovation is predominantly local, and there are currently no structured instruments to channel a continuous flow of information and knowledge between the EU policy level and dynamics at the local levels. This was a mayor weakness in the unsuccessful Lisbon strategy. The policy framework designed at EU level was never challenged with information from its effects on places and people throughout Europe. At best this information was anecdotal, shaped by vested interests or simply arriving too late for any policy revision.

Today, this is even more worrying given the unpredictable nature of Green Deal policy effects. While placing sustainability up-front, the European Green Deal does not free itself from the potential trade-offs between sustainability, competitiveness (smart), and social inclusiveness. A policy for sustainability can create new jobs and alleviate pollution for vulnerable groups, but it can also increase inequality between those who benefit from the transition and those who suffer from unemployment or increasing housing prices. The point is that for such a systemic policy as the European Green Deal these effects cannot be planned up front; they have to be detected in continuous policy learning. The earlier the signals arrive to public policy makers the easier it is to regain traction or alleviating socio-economic trade-offs. Clearly, a well-structured “social science for policy” system is needed to capture evidence bottom-up.

How would this “science for policy” learning system look like?

First, a “science for policy” learning system should reflect the interaction of sustainability, competitiveness and inclusiveness. It should provide evidence on both positive feedback loops and real trade-offs between these three objectives.

Second, a “science for policy” learning system should be place-based, building on Europe’s social, cultural, economic and geographical diversity. An innovation-driven EU policy must learn from local dynamics, which is where innovation takes place. It should nurture and detect effects on people and places.

Third, a European Green Deal “science for policy” system should be comprehensive, capturing the full spectra of innovation, from action to impact. It should provide evidence on three dimensions: Actors (Do actors engage? Are they reorienting their strategies and investment? Why not?); Innovation (Is innovation policy successful? Do sustainable innovations and firms emerge and grow?); Impact (What is the impact on planet, prosperity and people? Are new jobs or growing inequality emerging?).

In short, for the European Green Deal, such a “Science for Policy” Platform would serve two functions throughout its implementation: a) engaging local actors of innovation; and b) gather evidence for continuous policy learning allowing the readjusting of EU policy to optimize its impact.

3.2 Engaging local actors

In previous sections, we have argued how the European Green Deal is innovation driven. Our analysis demonstrated the importance of local engagement since innovation is fundamentally place-based in its nature. However, we also stressed that a successful innovation is nurtured by bottom-up decisions, where local stakeholders lead in an entrepreneurial discovery process. Hence, policy makers and stakeholders in firms, regions, cities and rural communities can decide to engage in the European Green Deal or not. Both choices are equally valid from a bottom-up or actor perspective.

The new insight is that the twin ecological and digital transitions, tilted by the EU public policy of the Green Deal, are also changing the framework conditions for the local Entrepreneurial Discovery Process. In addition, the European Green Deal accelerates the ongoing transitions in the five socio-economic systems mentioned above. Therefore, from 2020 onwards, local SWOT analyses will have to take this into consideration.

The local assets should be reconsidered as new opportunities and threats in a framing of long-term transition thinking. Traditional strengths and weaknesses may change, while new industrial opportunities or threats emerge. For instance, the energy transition towards electrification and rapidly falling prices of renewable energy sources, give places with abundance of sun or wind new comparative advantages. This would favour an Entrepreneurial Discovery process of new products, services or business models, such as a new autonomy through decentralized local energy enabled by micro-grids solutions, an export model of cheap energy, international test-beds of innovative storage solutions, economies of scope through user-driven deployment, or a diversification towards industrial ecosystems of energy-intensive industries. Naturally, the reverse situation can also occur, with places forced into painful industrial transitions when fossil-intensive industries are faced out. In both cases, well designed placed-based innovation for sustainability is the response.

The new transition context will also influence the implementation process. Solid evidence and mutual learning will be needed to support the local authorities to take a more entrepreneurial role. Science for policy will be needed in subsequent institutional capacity building, in reforms, and in skills of human resources. The consolidation of local governance which started in the first generation of smart specialization policy will need to be strengthened and opened up to co-create and co-design a more comprehensive systemic transformation. The new governance will have to go beyond departments and sectors to a comprehensive approach, beyond technologies to innovative solutions, beyond the national innovation system to innovation for a transformation of societal and industrial systems.

The innovation instruments are also partly different. Investments in local infrastructure or skills development, as well as any regulatory change, would have to be designed to optimize an innovation-driven policy. Naturally, the monitoring and evaluation system would also be affected, starting with which impact the policy efforts and investments intend to achieve. The system also has

to be more flexible to allow place-based experimentation incentivizing continuous policy learning among actors.

In short, the advisory strand of a “Science for Policy” Platform should provide evidence for local policy makers to launch and implement place-base innovation for sustainability and inclusiveness, what we have called here S4+.

In the Table below we have identified six Learning Modules which are needed to support this evolution of smart specialization embracing an EU-wide directionality. The Table below sets out the intervention logic in strengthening sustainability in the S3 and S4 smart specialisation strategies based on these six learning modules:

Table: Overview summary of Mutual Learning Modules

Intervention logic	S3	S4	Learning Modules
SWOT analysis	<p>Appraise endowments in assets</p> <p>Assess innovation potential in a territory</p> <p>Appraise entrepreneurial base and dynamics</p> <p>Identify international networks and value chains</p>	<p>Strengthen S3, and ...</p> <p>S4: Position the SWOT analysis in the ecological and digital transitions of the energy, manufacturing, agri-food, housing, and mobility systems.</p>	1
Governance	<p>Management structure in place</p> <p>Participation of stakeholders in quadruple helix</p> <p>Institutional and human resources capacity</p>	<p>Strengthen S3, and ...</p> <p>S4: Role of the state goes beyond being facilitator and catalyst to co-create system transformation. This requires management reforms and capacity building to work cross-domains, cross-departments, cross-sectors and cross-disciplines.</p>	2
Vision	<p>Shared vision on present and future innovation challenges</p> <p>Strategy medium-term</p>	<p>Strengthen S3, and ...</p> <p>S4: Vision goes beyond the R&I system. Could be a societal vision: “Which is the future we want – here?” or an industrial vision: “promising areas for the future”. The vision should be linked to overall target(s) set in time (medium-term) which is understandable, measurable, ambitious but realistic.</p>	3

Prioritisation	<p>Revision of previous priorities</p> <p>Identify areas of competitive advantage</p> <p>Verify critical mass of budget for achieving each priority</p>	<p>Strengthen S3, and ...</p> <p>S4: If the priorities are aligned or in the same overall direction as the overall EU-level investments (and regulatory changes), then the potential of reaching critical mass and of crowding-in of private investment and of EU funds increases.</p>	4
Implementation	<p>Broad definition of innovation</p> <p>Balance between focused and horizontal measures</p> <p>Upgrading existing industry using KETs and digital</p> <p>Experimentation in pilot actions</p> <p>Innovation ecosystems</p> <p>International collaboration search for value chains</p>	<p>Strengthen S3, and ...</p> <p>S4: The Implementation is driven by innovation but mobilises in synergy with other policy areas and investments, such as infrastructure, skills, etc. The scope is broader with systemic innovation and industrial transitions.</p> <p>Programmes create portfolio of projects and focus on development, testing or deployment of innovative solutions. Place-based experimentation and testbeds of local or foreign innovations are linked to user-driven innovation, economies of scope and public procurement. The strategy for positioning in value chains is proactive in new value chains emerging from the transitions and they create a local articulation of EU alliances.</p> <p>S4: The local framework conditions to innovation are now also European. When local entrepreneurs detect barriers or resistance to innovation for sustainability this can be channelled in “Green Deals” to the national and EU policy level.</p> <p>S4: Cooperation and mutual learning with other actors of change is facilitated by regional thematic network but the new network externalities are broader emerging from the reorientation of EU network of actors (European technological platforms, European partnerships, industrial alliances, EIT Knowledge and Innovation Communities, etc.) moving in the same direction.</p>	5

<p>Monitor & Evaluate</p>	<p>Indicators with targets and baseline</p> <p>Mechanism for data collection and analysis</p> <p>Information used for updating the strategy</p>	<p>Strengthen S3, and ...</p> <p>S4: The monitoring and evaluation goes beyond the R&I system; indicators and targets correspond to the granularity of the vision in the regional or urban strategy. A continuous policy learning dynamism is introduced. Particular attention is given to early detection of signs of trade-offs between sustainable/smart/inclusiveness.</p>	<p>6</p>
--------------------------------------	---	--	----------

Let us now come to the second function.

3.3 Continuous policy learning

The Science for Policy Platform would gather evidence for a continuous policy learning allowing the readjusting of EU policy to optimize its impact. This knowledge and early alert system must be based on objective qualitative and quantitative evidence, free from vested interest or adjusting to policy sensitivity.

The good news is that after seven years of smart specialization policy 2014-2020, objective evidence is emerging. Each region has elaborated a smart specialization strategy linked to their overall regional development plan. Planned and executed investment can be tracked. Peer reviews and workshops have identified blockages to successful innovation. Local data sources and monitoring systems have been set. Place-based effects on employment, prices, inclusiveness or competitiveness can be analysed with new tools such as the Rhomolo or Luisa models. Equally, private business dynamics can be tracked over time with evidence on corporate innovation strategies and investment.

If all this evidence is properly structured, it is now possible to establish a state of the art, a “bilan” on where we are when the European Green Deal was launched. Naturally, the next step is to collect and *understand change*. Has the European Green Deal had sufficient traction to engage local actors, regions, cities and firms? Do their new strategies and investment shift from 2020 onwards? How and why? Are the new EU framework conditions sufficient to overcome local barriers to innovation? Do the socio-economic systems transform and how? Are new local jobs created? Is equality improved in cities? Which places benefits and which do not?

In short, the implementation and design of the European Green Deal would benefit from a Science for Policy Platform on Place-based innovation for Sustainability. This platform could both support local actors and channel findings on local innovation barriers or early trade-off alerts to the EU and national policy making.

Conclusions

The European Green Deal will have to be based on sound and well-informed science-based policy advice. Just like natural sciences play today an essential role in providing evidence on the impact of further fossil fuel emissions on climate change, on air and soil pollution, on declining bio-diversity, as well as appearing crucial in monitoring adaptation towards the 2050 target of a climate-neutral Europe, social sciences are essential in providing evidence on the relevance of policy measures on individual as well as social behaviour, mitigation and economic impacts, the contribution of technological change and innovation, etc. This also holds for the level at which such policy measures are best implemented.

As we argued here the European Green Deal brings to the fore not only the importance within the EU of diversity in regional and local as opposed to national environments, but also, and by implication, in the relevance and “subsidiarity” in local/regional as opposed to national governance levels. As we put it here: the European Green Deal might not trickle down well at national or regional level but needs first and foremost a bottom up approach: exploiting “chimney” rather than trickling down effects.

Following EU subsidiarity arguments, one can argue that local governments/authorities will be more capable of innovation-led transformation than national or European governments/authorities, and indeed these subsidiarity arguments are consistent with worldwide trends in economic development policy (OECD 2019c). However, the sub-national or sub-state governments, often working in a multi-level governance context, will need to be provided with the best up-to-date scientific advice for aiding policy and practice, for fostering stakeholder engagement and mobilising actors, for promoting enhancing policy-sharing and policy-learning, and for enhancing local institutional and governance capacity building.

The Joint Research Centre in Seville has developed an accumulated capacity in innovation economics at national, regional, urban and community level. Its focus is on place-based innovation paying particular attention to local governance as one of the most relevant policy makers and “first in line” providers of local public services and signallers of societal challenges, proving evidence on unexpected impacts, disruptions or deteriorations resulting from European and national policy measures.

The JRC Seville has already made readily-available a wide range of specially designed and detailed S3 material and support services to local policy-makers across Europe by the JRC Seville, and these knowledge-assets and these resources could be significantly enhanced and reoriented explicitly to drive S4+. The take-up of this S3 material and these services has been almost universal across EU regions and this is critical because it provides a key EU-wide focal point for policy-advice, policy-dissemination, and best-practice policy-learning across regions. The material and services provided by the JRC-Seville are extensive and comprehensive and have offered assistance on all aspects of S3 policy design and delivery, which can then be translated and tailored to the specific local challenges being addressed. The shift from S3 to S4+ would necessarily involve enhanced guidance, along with new evidence and best-practice sharing, in order to facilitate the re-orientation of local development

trajectories from S3 to S4+. These resources would need to be based on the best EU-wide scientific evidence and advice available, with inputs provided by many different European Commission directorates.

As well as local policy-making assistance, these enhanced resources will also need to include the facilities to provide broader pictures. In particular, the JRC-Seville also hosts expertise in regional and urban governance models as well as modeling tools such as the EU Rhomolo and LUISA Models and their associated analytical teams. Together, they provide a unique resource for intelligence on the EU-wide regional impacts of different policy frameworks and settings. This is essential in order to properly understand how the movements towards the Green Deal are progressing across cities and regions and how the advances in certain regions may interact with the activities undertaken in other regions.

Many of the sustainability and innovation-related challenges we face also spillover across international borders and jurisdictions. As such, addressing the Green Deal challenges involves tackling complex externalities and spillovers between sectors and places and place-based governance expertise from the smart specialization platform, the urban observatory and modeling such as the EU Luisa and Rhomolo Models. A science for Policy platform would provide the uniquely detailed and comprehensive analytical framework to observe these linkages and to track macro-level and meso-level progress towards Green Deal objectives. This information will be critical for assessing progress towards the top-down reoriented S4+ directionality principles. In addition, this information will also help to provide specific guidance to local policy makers on the likely spillover and externality type problems they will encounter in S4+, and this will also help to point to potential interregional and cross-border policy collaborations.

The range of knowledge assets, capabilities and facilities provided by the Joint Research Centre Seville is ideally suited to supporting and helping to drive the S4+ transformation across Europe's regions and member states.

The task, however, is huge and the perspective different from the European integration process as we have known it for the last fifty years.

References

- Atkinson, R.D., Muro, M., and Whiton, J., 2019, *The Case for Growth Centers: How to Spread Tech Innovation Across America*, Brookings Metro Program, December, See: https://www.brookings.edu/wp-content/uploads/2019/12/Full-Report-Growth-Centers_PDF_BrookingsMetro-BassCenter-ITIF.pdf
- Bennett, V., 2020, "How to Stop the Coronavirus Pandemic Disrupting a Green Future", European Bank for Reconstruction and Development, 20 May See: <https://www.ebrd.com/news/2020/how-to-stop-the-coronavirus-pandemic-disrupting-a-green-future.html>
- Breznitz, D., Ornston, D., and Samford, S., 2018, "Mission Critical: The Ends, Means, and Design of Innovation Agencies", *Industrial and Corporate Change*, 27.5, 883-896
- Dijkstra, L., Garcilazo, E., and McCann, P., 2013, "The Economic Performance of European Cities and City-Regions: Myths and Realities", *European Planning Studies*, 21.3, 334-354
- Dijkstra, L., Garcilazo, E., and McCann, P., 2015, "The Effects of the Global Financial Crisis on European Regions and Cities", *Journal of Economic Geography*, 15.5, 935-949
- Dijkstra, L., Poelman, H., and Ridriguez-Pose, A., 2019, "The Geography of EU Discontent", *Regional Studies*, <https://doi.org/10.1080/00343404.2019.1654603>
- EHA, 2019, *Is There Really an Ever-Widening Rural-Urban Divide in Europe?*, Euler Hermes Allianz Economic Research, 17 July, See: https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/economic-research/publications/specials/en/2019/20190717-TheView-FinalConvergence.pdf
- Ernst, E., Merola, R., and Samaan, D., 2018, "The Economics of Artificial Intelligence: Implications for the Future of Work", *Research Paper 5: ILO Future of Work Research Paper Series*, International Labour Organization, Geneva
- ESIR, 2018, "Towards a mission-oriented research and innovation policy in the European Union An ESIR memorandum", EC, DG RTD, March, see <https://op.europa.eu/en/publication-detail/-/publication/4177ae56-2284-11e8-ac73-01aa75ed71a1/language-en>
- European Commission, 2020a, "The European Green Deal", Communication from the Commission to the European Parliament, The European Council, The Council, The European Economic and Social Committee and the Committee of the Regions, COM(2019) 640 final, Brussels, 11.12.2019, See: https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf
- European Commission, 2020b, "The European Green Deal Investment Plan and Just Transition Mechanism Explained", Brussels, 14 January 2020, See: https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_24
- European Union, 2017, *My Region, My Europe, Our Future: Seventh Report of Economic, Social and Territorial Cohesion*, Directorate General for Regional and Urban Policy, EU Publications Office, Luxembourg

European Union, 2019, *Study on National Policies and Cohesion: Final Report*, Directorate General for Regional and Urban Policy, EU Publications Office, Luxembourg

EU & UN, 2016, *The State of European Cities 2016: Cities Leading the Way to a Better Future*, European Commission and UN Habitat, European Union and United Nations Human Settlements Programme, Brussels

Guzzo F., Gianelle C., and Marinelli E., 2018, *Smart Specialisation at Work: The Policy Makers' View on Strategy Design and Implementation*, JRC Technical Reports, No. JRC114141

Henderson, K., Rogers, M., Smeets, B., Tryggestad, C., 2020, "Climate Math: What a 1.5-degree Pathway Would Take". McKinsey Quarterly, See:

<https://www.mckinsey.com/~media/McKinsey/Business%20Functions/Sustainability/Our%20Insights/Climate%20math%20What%20a%201%20point%205%20degree%20pathway%20would%20take/Climate-math-What-a-1-point-5-degree-pathway-would-take.ashx>

Henrickson, C., Muro, M., and Galston, W.A., 2018, *Countering the Geography of Discontent: Strategies for Left-Behind Places*, Brookings Metropolitan Program, November, See: https://www.brookings.edu/wp-content/uploads/2018/11/2018.11_Report_Countering-geography-of-discontent_Hendrickson-Muro-Galston.pdf

JRC, 2019, *The Future of Cities: Opportunities, Challenges and the Way Forward*, Joint Research Centre of the European Commission, European Union Publications Office, Luxembourg

Kamal-Chaoui, L., 2019, "Five Facts about Regional Inequalities and What to Do About Them", OECD Observer, March, See:

https://oecdobserver.org/news/fullstory.php/aid/6166/Five_facts_about_regional_inequalities_and_what_to_do_about_them.html

Kanellou, D., Radosevic, S. and G. Tsekouras, 2019, The trade-off between accountability and experimentation in innovation and industrial policy: learning networks as a solution? GROWINPRO Working paper 24/2019, <http://www.growinpro.eu/the-trade-off-between-accountability-and-experimentation-in-innovation-and-industrial-policy-learning-networks-as-a-solution/>

Marinelli E., and Perianez-Forte, I., 2017, *Smart Specialisation at Work: The Entrepreneurial Discovery as a Continuous Process*, Publications Office of the European Union, Luxembourg

Marinelli E., Guzzo, F., Gianelle, C., and Guy, K., 2018, *Monitoring Smart Specialisation Strategies*, JRC Massive Open Online Course, available at: <https://iversity.org/en/courses/monitoring-Smart-Specialisation-strategies>

Marinelli E., Guzzo, F. and Gianelle, C., 2019, "Building Smart Specialisation Strategies Monitoring Systems: Evidence from the EU", *L'Industria, Rivista di Economia e Politica Industriale/Review of Industrial Economics and Policy*, No. 1., 27-44, January-March

Mazzucato, M., 2018, *Missions: A Problem-Solving Approach to Fuel Innovation-Led Growth*, European Commission Directorate General for Research and Innovation, European Union Publications Office, Luxembourg, see

<https://op.europa.eu/en/publication-detail/-/publication/5b2811d1-16be-11e8-9253-01aa75ed71a1/language-en/format-PDF/source-search>

McCann, P., 2015, *The Regional and Urban Policy of the European Union: Cohesion, Results-Oriented and Smart Specialisation*, Edward Elgar, Cheltenham

McCann, P., 2017, "Urban Futures, Population Ageing and Demographic Decline", *Cambridge Journal of Regions, Economy and Society*, 10, 543-557

McCann, P., 2019, "Perceptions of Regional Inequality and the Geography of Discontent: Insights from the UK", *Regional Studies*, 53.5, 741–760

McCann, P., and Ortega-Argilés, R., 2016, "The Early Experience of Smart Specialisation Implementation in EU Cohesion Policy", *European Planning Studies*, 24.8, 1407-1427

MGI, 2017, *Lost Jobs, Jobs Gained: Workforce Transitions in a Time of Automation*, McKinsey Global Institute, December, See:

<https://www.mckinsey.com/~media/mckinsey/featured%20insights/Future%20of%20Organizations/What%20the%20future%20of%20work%20will%20mean%20for%20jobs%20skills%20and%20wages/MGI-Jobs-Lost-Jobs-Gained-Report-December-6-2017.ashx>

MGI, 2018a, *Notes from the AI Frontier: Modeling the Impact of AI on the World Economy*, McKinsey Global Institute, September, See: <https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-modeling-the-impact-of-ai-on-the-world-economy>

MGI, 2018b, *Skill Shift, Automation and the Future of the Workforce*, McKinsey Global Institute, May, See: <https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce>

MGI, 2018c, *Superstars: The Dynamics of Firms, Sectors and Cities Leading the Global Economy*, McKinsey Global Institute, October, See: <https://www.mckinsey.com/featured-insights/innovation-and-growth/superstars-the-dynamics-of-firms-sectors-and-cities-leading-the-global-economy>

MGI, 2019a, *The Future of Work in America: People and Places, Today and Tomorrow*, McKinsey Global Institute, July, See: <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-in-america-people-and-places-today-and-tomorrow>

MGI, 2019b, *Navigating a World of Disruption*, McKinsey Global Institute, January, See: <https://www.mckinsey.com/~media/mckinsey/featured%20insights/innovation/navigating%20a%20world%20of%20disruption/mgi-briefing-note-navigating-a-world-of-disruption-jan-2019.ashx>

Muro, M., Maxim, R., Whiton, J. and Hathaway, I., 2019a, *Automation and Artificial Intelligence: How Machines are Affecting People and Places*, Brookings Metropolitan Program, Washington DC, January, See:

<https://www.brookings.edu/research/automation-and-artificial-intelligence-how-machines-affect-people-and-places/>

Muro, M., Maxim, R., and Whiton, J., 2019b, *What Jobs are Affected by AI? Better-Paid, Better-Educated Workers Face the Most Exposure*, Brookings Metropolitan Program, Washington DC, November, See:

<https://www.brookings.edu/research/automation-and-artificial-intelligence-how-machines-affect-people-and-places/>

Muro, M., Maxim, R., and Whiton, J., 2020, "The Places a Covid-19 Recession Will Likely Hit Hardest", Brookings Metropolitan Program, Washington DC, See:

https://www.brookings.edu/blog/the-avenue/2020/03/17/the-places-a-covid-19-recession-will-likely-hit-hardest/?utm_campaign=Brookings%20Brief&utm_source=hs_email&utm_medium=email&utm_content=85088802

OECD, 1994, *The OECD Jobs Study*, Organisation for Economic Cooperation and Development, Paris.

OECD, 2018a, *Productivity and Jobs in a Globalised World: (How) Can All Regions Benefit?*, Organisation for Economic Cooperation and Development, Paris

OECD, 2018b, *Job Creation and Local Economic Development: Preparing for the Future of Work*, Organisation for Economic Cooperation and Development, Paris

OECD, 2018c, *OECD Regions and Cities at a Glance 2018*, Organisation for Economic Cooperation and Development, Paris

OECD, 2018d, *Divided Cities: Understanding Intra-Urban Inequalities*, Organisation for Economic Cooperation and Development, Paris

OECD, 2019a, *OECD Regional Outlook 2019: Leveraging Megatrends for Cities and Rural Areas*, Organisation for Economic Cooperation and Development, Paris

OECD, 2019b, "Financing Climate Objectives in Cities and Regions to Deliver Sustainable and Inclusive Growth: Case Study", OECD Environmental Policy Paper No.17, See: <https://www.oecd-ilibrary.org/docserver/ee3ce00b-en.pdf?expires=1588671398&id=id&accname=guest&checksum=4435197DB11AA4F443AF2BC9FDDE9EDD>

OECD, 2019c, *Making Decentralisation Work: A Handbook for Policy-Makers*, OECD Multi-Level Governance Studies, Organisation for Economic Cooperation and Development, Paris

OECD, 2020, *From Containment to Recovery: Environmental Responses to the COVID-19 Pandemic* See: https://read.oecd-ilibrary.org/view/?ref=126_126460-1tg1r2aowf&title=From-containment-to-recovery_Environmental-responses-to-the-COVID-19-pandemic

Partridge, M.D., and Weinstein, A., 2014, "Green Jobs and the Need to Use Benefit-Cost Analysis not Employment in Policymaking", in Haab, T., and Whitehead, J., (eds.), *Encyclopedia of Environmental and Natural Resource Economics*, Greenwood Press, Inc., Westport CT

Pîrvu, R., Drăgan, C., Axinte, G., Dinulescu, S., Lupănescu, M., Găină, A., 2019, "The Impact of the Implementation of Cohesion Policy on the Sustainable Development of EU Countries", *Sustainability*, 11, 4173-4193

Radosevic, S., 2012, 'Innovation Policy Studies Between Theory and Practice: A Literature Review Based Analysis', *STI Policy Review*, Vol. 3, No 1, 2012, pp. 1-45 http://stipolicyreview.net/http://stipolicyreview.net/sub/issues01_view.asp?idx=12

Rodrigues, M., 2009, *Europe, Globalization and the Lisbon Agenda*, Edward Elgar, Cheltenham

RISE, 2019, '101 ideas on the future of research and innovation in Europe', EC, Research and Innovation March, https://ec.europa.eu/info/publications/101-ideas-future-research-and-innovation-europe_en

Santoalha, A., and Boschma, R, 2019, "Diversifying in Green Technologies in European Regions: Does Political Support Matter?", *Regional Studies*, DOI: 10.1080/00343404.2020.1744122

Soete, L., 2019, "From 'destructive creation' to 'creative destruction': Rethinking Science, Technology and innovation in a global context", Cooper memorial lecture, UNU-MERIT Working Papers 2019-001 https://www.merit.unu.edu/publications/working-papers/?year_id=2019

Soete, L., 2019, Reflection paper for the Finnish presidency, May, mimeo

The Economist, 2019, "Happy Helmut: Why Germany has no Gilets Jaunes Protesters", 9 February, See: <https://www.economist.com/europe/2019/02/09/why-germany-has-no-gilet-jaunes-protesters>

United Nations, 2016a, The Concept of Economic Diversification in the Context of Response Measures

Technical Paper by the Secretariat, United Nations Framework Convention on Climate Change, See: <http://unfccc.int/resource/docs/2016/tp/03.pdf>

United Nations, 2016b, The Concept of Economic Diversification in the Context of Response Measures

Technical Paper, United Nations Framework Convention on Climate Change

United Nations, 2018, *Climate Policies, Economic Diversification and Trade*, UNCTAD United Nations Conference on Trade and Development, New York

Urban Land Institute, 2020, *Decarbonising the Built Environment: 10 Principles for Climate Mitigation Policies*, Washington DC

Wochner, T., and Holzhausen, A., 2019, "Convergence of European Regions: Does the Narrative of the Ever-Widening Rural-Urban Divide Hold?", *Economic Research Working Paper 215*, Euler Hermes Allianz Economic Research, 17 July

World Bank, 2012, *Inclusive Green Growth: The Pathway to Sustainable Development*, Washington DC

WMO, 2020, *The Global Climate in 2015-2019*, WMO No. 1249, World Meteorological Organisation Geneva, Switzerland

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- at the following standard number: +32 22999696, or
- by electronic mail via: https://europa.eu/european-union/contact_en

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at:

https://europa.eu/european-union/index_en

EU publications

You can download or order free and priced EU publications from EU Bookshop at: <https://publications.europa.eu/en/publications>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

The European Commission's science and knowledge service

Joint Research Centre

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.



EU Science Hub

ec.europa.eu/jrc



@EU_ScienceHub



EU Science Hub - Joint Research Centre



EU Science, Research and Innovation



EU Science Hub



Publications Office
of the European Union

doi:10.2760/250023

ISBN 978-92-76-20392-6