



Practical Handbook for Regional Authorities

EUR 28744 EN

Joint
Research
Centre

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Introduction

This handbook is inspired by the longstanding, fruitful cooperation between the Directorates-General Joint Research Centre (JRC), Regional and Urban Policy (REGIO), as well as other departments of the European Commission, plus the Committee of the Regions (CoR) and local and regional authorities in European Union Member States.

As the European Commission's science and knowledge service, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle. Its work has a direct impact on the lives of citizens by contributing with its research outcomes to inter alia a healthy and safe environment, secure energy supplies, sustainable mobility and consumer health and safety. Working with policy Directorates-General, key societal challenges are addressed. JRC also shares its know-how with the Member States, the scientific community and international partners.

This handbook is one such example, sharing existing JRC knowledge, expertise and tools which can be used by regional and city authorities to support their work. It also provides an opportunity to showcase JRC activities and how they support EU citizens.

The content is structured in concise topic-based fiches, according to the following thematic areas:

- I. Smart Specialisation
- II. Research and Innovation
- III. Energy and Transport
- IV Environment
- V. Multi-territorial dimension (region, urban, macro-regional strategies)
- VI. Crisis management and resilience

The scope of knowledge, information and tools is extensive, ranging from databases and indicators to specific support and to models and interactive tools in the above-mentioned areas. Each fiche provides relevant background information, the objectives and the most likely users of the tools taking into consideration the potential needs of a local authority. For example, do you wish to know how to better undertake green procurement? Then consult the fiche on "Development of Green Public Procurement (GPP) criteria". Want to learn more about smart specialisation and universities? See the fiche on "Higher Education for Smart Specialisation" which explains the role of higher education institutions and their interactions with local actors.

Each fiche follows a common structure, providing evidence-based advice on how certain policy challenges might be addressed using the plethora of instruments and methodological approaches developed by JRC. This knowledge builds on our experience, on case studies and is supported by successful concrete examples. At the same time, we describe the impact of the use of the provided support focusing on the policy perspective of a region tackling an issue covered by the fiche. The information, services and tools available are comprehensively described and illustrated by visualisations where possible. In general, all the information, services and tools are publicly available. This makes the handbook a ready-to-use tool in the daily activities of local authorities.

We invite you to contact us to explore where and how we can best add value to your work. Should you have general questions or suggestions, please send them to: JRC-Regional-Handbook@ec.europa.eu



Smart Specialisation

01 Smart Specialisation Platform (S3P) services

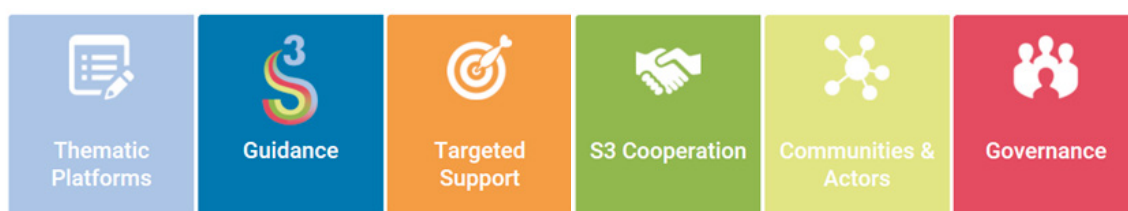
Type of support / service available

The S3 Platform¹ assists EU countries and regions to develop, implement and review their research and innovation strategies for smart specialisation (RIS3). Established in 2011, the role of the S3 Platform is to provide information, methodologies, expertise, peer-reviews and advice to national and regional policy makers, as well as promote mutual learning, trans-national co-operation and contribute to academic debates around the concept of smart specialisation. Support includes technical assistance (e.g. linking regions), training, joint reports, analysis, study visits/mutual learning, modelling, use of interactive platforms, etc.

Relevance for regional authorities

The S3 Platform aims at facilitating regional and national administration in governing the smart specialisation process across its six steps: Analysis of the regional context; Governance; Vision; Priorities; Policy mix; Monitoring. To this end it provides a comprehensive support for the design, implementation and monitoring of smart specialisation strategies, including a number of web tools and data sources².

Conceived within the EU regional and cohesion policy, Smart Specialisation is a place-based approach characterised by the identification of strategic areas for intervention in R&D and innovation, based both on the analysis of the strengths and potential of the economy and on an Entrepreneurial Discovery Process (EDP) with wide stakeholder involvement. It is outward-looking and embraces a broad view of innovation including but certainly not limited to technology-driven approaches, supported by effective monitoring mechanisms.



S3 Platform: information, expertise and advice to national and regional policy makers.

Policy context

Following the 2010 Communication³ “Regional Policy contributing to smart growth in Europe 2020”, the establishment of smart specialisation strategies is an ex-ante conditionality for the release of European Regional Development Fund support under its thematic objective 1 (research and innovation) in the 2014-2020 period⁴.

The validity and effectiveness of smart specialisation as a place-based innovation policy approach has been endorsed by the European Institutions⁵. More recently, the Communication⁶ “Strengthening innovation in Europe’s regions: towards resilient, inclusive and sustainable growth at territorial level” states that smart specialisation strategies “contribute to making the European economy more competitive and resilient to globalisation”.

1. <http://s3platform.jrc.ec.europa.eu/>

2. <http://s3platform.jrc.ec.europa.eu/s3-tools>

3. http://ec.europa.eu/regional_policy/sources/docoffic/official/communic/smart_growth/comm2010_553_en.pdf

4. http://ec.europa.eu/regional_policy/sources/docgener/informat/2014/smart_specialisation_en.pdf

5. Council Conclusions of 10 June 2016 on “A more research and innovation friendly, smart and simple Cohesion Policy and the European Structural and Investment Funds more generally”, European Parliament resolution of 14 January 2014 on smart specialisation: networking excellence for a sound Cohesion Policy (2013/2094(INI)), European Parliament resolution of 13 September 2016 on Cohesion Policy and Research and Innovation Strategies for Smart Specialisation (RIS3) (2015/2278(INI)), The Committee of the Regions opinion of 22 March 2017 on “Smart Specialisation Strategies (RIS3): impact for regions and inter-regional cooperation”.

6. http://ec.europa.eu/regional_policy/sources/docoffic/2014/com_2017_376_2_en.pdf

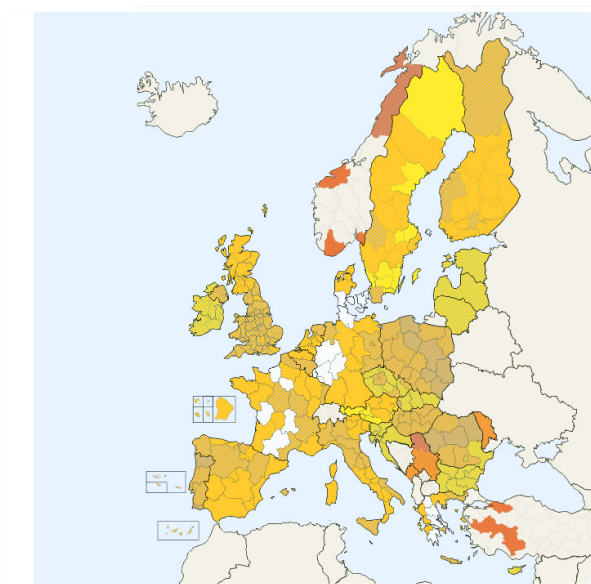
How to use

The S3 Platform is accessible online⁷. Current membership includes 170 EU regions, 18 EU member States, as well as 2 non-EU countries and 9 non-EU regions.

Facilities include a monthly newsletter⁸, a twitter account *@S3Platform*, an online repository of good practice⁹ and news on media coverage on smart specialisation in the European Media Monitor¹⁰.

An example of the web tools developed by the S3 Platform is the online database Eye@RIS3¹¹, which provides information on the envisioned priorities of regional smart specialisation strategies. The purpose of the database is to give an overview of regions' priorities in order to enable others to position themselves, to find their unique niches and to seek out potential partners for collaboration.

Another example is the regional benchmarking tool¹², which allows to identify regions that share similar structural conditions which are relevant for innovation-driven development (social, economic, technological, institutional and geographical characteristics). That is, characteristics that cannot be easily changed in the short term and that are demonstrated to affect the way innovation and economic evolution take place in a region.



The S3 Platform includes currently 170 EU regions in 18 EU MS and 9 non-EU regions in 2 non-EU countries.

The “RIS3 Assessment Wheel”¹³ has been widely used by regional and national authorities in the design phase of their strategy and in preparation to peer reviews and mutual learning processes, as well as presentations, benchmarking exercises, discussions with experts, etc. It allows for a synthetic representation of the progress made in drafting/designing a smart specialisation strategy condensing a huge amount of information in one visual modality. The wheel is built on the basis of the six steps described in the RIS3 Guide¹⁴ and the identification of 3 critical factors for each step.

7. <http://s3platform.jrc.ec.europa.eu/>

8. <http://s3platform.jrc.ec.europa.eu/newsletter>

9. <http://s3platform.jrc.ec.europa.eu/implementation-examples>

10. <http://emm.newsbrief.eu/NewsBrief/alertedition/en/SmartSpecialisation.html>

11. <http://s3platform.jrc.ec.europa.eu/eye-ris3>

12. <http://s3platform.jrc.ec.europa.eu/regional-benchmarking>

13. <http://s3platform.jrc.ec.europa.eu/ris3-assessment-wheel>

14. <http://s3platform.jrc.ec.europa.eu/s3-guide>

Impact

A number of insights of “Smart Stories”¹⁵ show that Smart Specialisation has gone far beyond the mere fulfilment of the ex-ante conditionality criteria linked to Cohesion Policy allocations. It has triggered a change in the way innovation-driven regional development policies are dealt with across Europe, confirmed by the outcome of a number of recent surveys.

In fact, according to the latest (2016) survey of policy makers by the Fraunhofer Institute for Systems and Innovation Research¹⁶, 60% of regional policy makers think that smart specialisation introduced significant adaptations in the stakeholder involvement process (and 20% speak of a “completely new process”); more than two thirds of respondents stated that smart specialisation triggered the introduction of “new elements of governance”. This reveals that, at the governance level, the change in behaviours introduced by smart specialisation is real. This has been possible also thanks to the work of the S3 Platform, which has namely been explicitly acknowledged by the European Parliament¹⁷.

15. <http://s3platform.jrc.ec.europa.eu/smart-stories>

16. http://www.isi.fraunhofer.de/isi-wAssets/docs/p/de/projektberichte/Kroll_2016_Policy_Brief_on_Smart_Specialisation.pdf

17. EP Report on cohesion policy and research and innovation strategies for smart specialisation (A8-0159/2016) – Point 8 – The Parliament ...is of the opinion that “the S3 platform ... plays a key role in advising regions and setting benchmarks on their innovation strategies, helping lagging regions and enhancing multi-level governance and synergies between regions, by providing information, methodologies, expertise and advice to national and regional policymakers.”

02 Higher Education for Smart Specialisation (HESS)

Type of support / service available

Targeted support to regional authorities on how to engage their local Higher Education Institutions (HEIs) in the process of design and implementation of Smart Specialisation Strategies (S3).

Relevance for regional authorities

Most regional authorities have the responsibility of designing and implementing S3. This includes engaging with institutions in their territories such as higher education institutions through the adoption of participatory methods. In order to promote constructive partnerships based on mutual understanding, it will be necessary to bridge the cultural differences that sometimes may exist between policy makers and academics. This project provides support for regions to bridge this cultural gap, through analysis of the opportunities and challenges, and participatory activities with representatives of the local higher education institutions. The project can also support regional authorities in making better decisions on how to use European funds as well as other programmes and reforms to increase the contribution of higher education to their S3.

Policy context

Smart Specialisation is an approach to knowledge-based development that is central to the Europe 2020 strategy for smart, sustainable and inclusive growth. Furthermore, it underpins the new Cohesion Policy, taking on a place-based dimension. Smart specialisation calls for regions to identify, through an 'entrepreneurial process of discovery', the innovative domains that have most potential, and establish these as priorities for public investment. Yet these priority domains should not be inward looking; they should be demand led, focusing on global value chains and societal challenges. The last five years have seen the design of more than a hundred 'Smart Specialisation Strategies (S3)', which underpin innovation on spending from the European Regional Development Fund, as well as other EU and national funding programmes.

Higher education has a key role to play in smart specialisation because it sources highly-skilled human capital that is vital for knowledge-based regional development. This has been underlined by the Commission in its recent Communication on a Renewed EU Agenda for Higher Education¹.

While innovation is usually associated with new technologies, it is their use not their invention that provides most economic and social value - hence the need for skilled human capital that can absorb and adapt to technological change. Furthermore, Higher Education Institutions (HEIs) are uniquely placed to act as 'boundary spanners' by integrating their different missions of teaching, research and external engagement in 'knowledge triangles' that can drive regional development.

How to use

The main activity of Higher Education for Smart Specialisation (HESS) is 'action research' in selected regions that aims to nurture closer partnerships between regional authorities and higher education institutions while collecting examples of how higher education is demonstrably contributing to the implementation of S3. Two pilots in Navarra (Spain) and North East Romania have been completed and three more have been launched in Puglia (Italy), Centre Val de la Loire (France), and South Moravia (Czech Republic). The methods are illustrated in the next figure. Regional authorities are invited to contact the JRC² if they are interested in participating in this programme. In addition, regions can access a developing repository of good practice on the S3 Platform website³, as well as ongoing analysis of how European funds are being spent on higher education and its role in regional development.

1. https://ec.europa.eu/education/sites/education/files/he-com-2017-247_en.pdf

2. Smart Specialisation Platform email address: jrc-ipts-s3platform@ec.europa.eu

3. <http://s3platform.jrc.ec.europa.eu/hess>



Proposal of target support for regions to engage with local higher education institutions.

Impact

Working with JRC on higher education and smart specialisation will help regions to understand and cooperate more closely with higher education institutions in their region. In addition to a better implementation of S3, these partnerships may be able to help in the monitoring and evaluation of S3 in the future. Finally, regions will be doing a service to the HEIs by raising their profile among networks of regions and universities, which can potentially lead to new European projects.

03

Smart Specialisation Platform (S3P) Peer Reviews Activities

Type of support / service available

To support the design and implementation of research and innovation strategies for Smart Specialisation (S3), the S3 platform of the Joint Research Centre is developing methodological and benchmarking tools to facilitate the S3 processes in regions and member states. One of the methodological supports provided is the S3 peer reviews developed by the platform.

Peer review means that an action of an individual person is looked at by an entity of similar competence. Applied to S3 processes it means that the design and implementation activities of S3 of regional and national governments is looked at by peers, which are other entities being responsible for the same activity. It entails a process of self-regulation by involving qualified individuals or qualified representatives of given authorities within the relevant field. The methodology has been designed to maintain standards, to improve performance and to provide credibility, thus the S3 platform has been organizing the peer reviews to facilitate trans-regional or transnational learning, to discover good practices in relation to challenges regions are facing and to overcome these challenges by understanding the institutional context.

The developed methodology requires a community of experts in a given (and often narrowly defined) field, who are qualified and able to perform impartial review. Throughout the experiences of the S3 platform, the peer reviews organised have achieved to create an atmosphere that promoted an open and dynamic dialogue to the region or member state having been peer reviewed.



Peer eXchange & Learning (PXL) builds on the S3 Platform peer-review approach.

In the implementation phase, the methodology has been adjusted to the needs of regional and national authorities implementing S3 strategies. The new format is called Peer eXchange & Learning (PXL) that builds on the well-established peer-review approach of the S3 Platform. It supports transnational learning by bringing together regions and countries for knowledge and experience exchange, and the exploration of ways in which innovation and development strategies can be effectively implemented, adjusted and revised.

Relevance for regional authorities

Peer reviews help regions and member states to identify challenges or weaknesses within the design and implementation of their S3 processes and improve them in a timely manner.

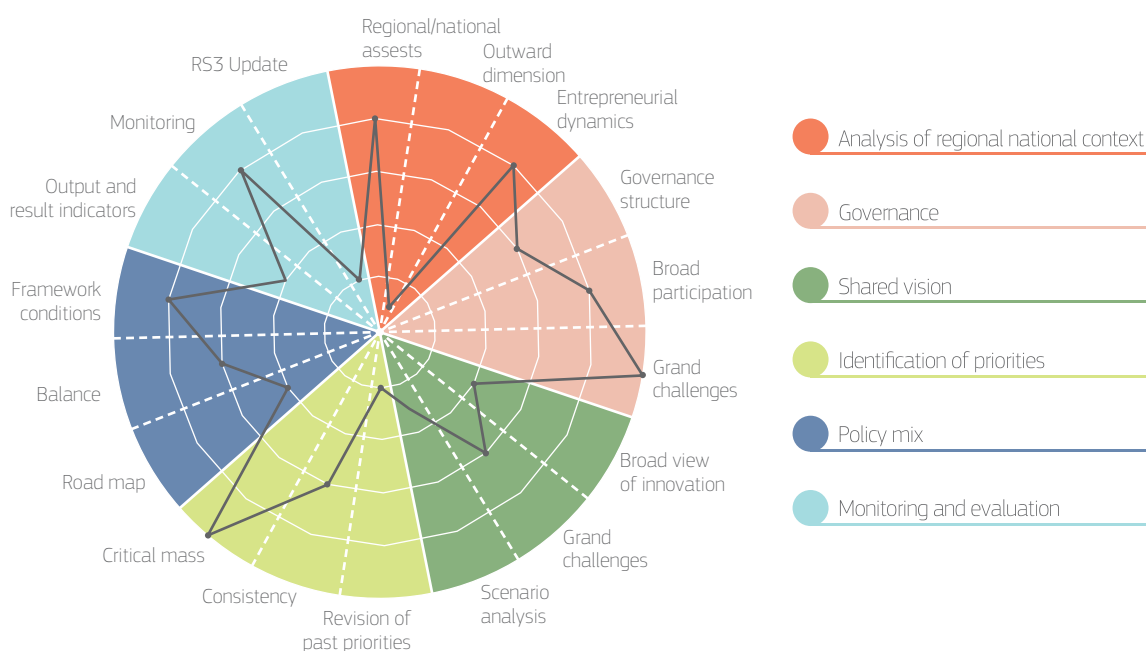
To this end, regions and member states present their S3 processes. Regions and countries volunteer to be reviewed in an attempt to source both critical and well-timed advice addressing specific issues they are

currently facing in the implementation of innovation and development strategies.

Exchanging good practice and experience is one of the core objectives of the S3 platform peer reviews. To help not only the peer reviewed region but all regions and national authorities present at the events to learn from each other's experiences.

Driving economic change through smart specialisation/RIS3

Informal assessment - region XXX



The self-assessment wheel represents the progress made in drafting/designing a RIS3 and condenses a huge amount of information in one image.

The S3 Platform has published one working paper¹ describing this newly developed peer review methodology and another working paper² presenting experiences and perceived impact from the regions and countries which were reviewed in the first twelve workshops during 2012 and 2013. The self-assessment wheel (accompanying image) is a part of the methodology.

Policy context

Smart Specialisation Strategies (S3) are an ex ante conditionality for using the European Regional Development Fund (ERDF) for the support of research and innovation for the period 2014-2020.

During the current programming period, investments are to be concentrated on four key priorities: innovation and research; digital agenda; support for small and medium-sized businesses; and the low-carbon economy. Article 9 of the general Regulation on the EU Structural and Investment Funds (ESIF) lists the 11 'thematic objectives' which are to be supported. In this framework, thematic objective 1 focuses on investments in research and innovation. This objective envisages that all regions or Members States develop research and innovation strategies for smart specialisation (RIS3) which should guide the spending of both ESIF and other public/private investments. Over EUR 37 billion, which represents 19% of the total ERDF available, are allocated to strengthening research, technological development and innovation (Thematic Objective 1).

1. Midtkandal, Inger and Ruslan Rakhmatullin (2013): "The S3 Platform Peer Review Methodology. S3 Working Paper Series No. 02/2014." Publications Office of the European Union, Web. <<http://publications.jrc.ec.europa.eu/repository/bitstream/JRC85133/jrc85133.pdf>>.
2. Midtkandal, Inger and Fatime Barbara Hegyi (2013): "Taking stock after two years of S3 Peer Review Workshops. S3 Working Paper Series No. 07/2014." Publications Office of the European Union, Web. <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC92890/final_workingpaper_peer%20review%20under%20review.pdf>.

How to use

If a region or country is registered to the S3 Platform and wishes its smart specialisation strategy to be peer-reviewed, please contact the S3 Platform³.

Peer reviews allow regions and countries to put targeted questions to their peers and get relevant feedback. During the period 2012-2014, seventeen peer-review workshops were organised, allowing a total of 53 regions and 15 member states to be peer-reviewed. So far, 21 events were organised with an average of 40 participants per event. The concrete outputs are available through the S3 Platform website⁴.

Since 2015, the peer review workshops have taken a slightly different format, focusing on fewer regions per workshop. The more the S3 process is progressing, the more topics for discussions move towards dimensions reflecting the implementation of the S3 Strategies rather than the development of the strategies itself.

During the workshop, the S3 Platform team members collect relevant information and data covering different elements of each PXL exercise. To ensure regions and countries under review receive adequate feedback from their peers, the S3 Platform triangulates the feedback and information provided by three groups of participants through an online survey: regions and countries under review; their peers; and experts. Based on the feedback from three groups of participants, the S3 Platform team further develops summary/feedback reports.

Impact

A survey run by the S3 Platform together with around 50 regions/countries having had their strategy peer-reviewed showed that 90% of the respondents rated the usefulness of the overall exercise with 5 and 4 (out of a scale of 5). Over 50% of the respondents confirmed that the peer review made them introduce changes in the on-going work with the RIS3 process. Most importantly the exercise appeared to be useful in terms of making the participants more conscious of the elements in the RIS3 process. One value of the exercise seems to have been to really understand what Smart Specialisation is. This might have been particularly the case in the early stage of workshop series and early stage of Smart Specialisation itself.

3. jrc-ipts-s3platform@ec.europa.eu

4. <http://s3platform.jrc.ec.europa.eu/s3-design-peer-review>

04 Organisational development for Smart Specialisation

Type of support / service available

This activity supports organisational development in the public sector in EU enlargement and neighbourhood countries. It aims to improve the evidence base of innovation policies, thus contributing to develop smart, sustainable and inclusive economies with clear priorities. Mutual learning and targeted trainings build critical capacities in these countries for effective economic policies that improve local well-being.

Relevance for regional authorities

MAIN CHALLENGES FOR SMART SPECIALISATION ORGANISATIONAL DEVELOPMENT			
KEY ACTORS' CHARACTERISTICS		CONTEXTUAL ASPECTS	
EDUCATION/HUMAN RESOURCES	GOVERNANCE	POLICY SIDE	KNOWLEDGE
Weak or non-existing vocational training	Political instability	Innovation-unfriendly context	Lacking experience with Innovation policy instruments
Outdated school curricula	Unclear competences	Limited access to finance	Dearth of Monitoring and Evaluation results
Brain drain	Lack of Policy-making/Science coordination	Fiscal/economic crisis	Low level of internationalisation of R&I and Higher Education
Role of Higher Education in regional development	Lack of structured dialogue with stakeholders	Difficult socio-economic transformation	Lack of integration in transnational R&I communities and value chains
Too few experienced innovative managers	Lack of strategic thinking	Rural poverty	
Firms shunning innovation activities	Low priority given to innovation	Weak infrastructure	
	Poor financial management	Underdeveloped innovation system	
	Line Ministries w/o dedicated innovation units	Bumpy harmonisation with EU law	
	Insufficient analysis of policy impacts	Sluggish GDP growth	
		Low GERD	

This activity offers regional authorities guidance to establish an institutionalised process to generate evidence-based innovation policies

Many countries and regions neighbouring the EU have historical ties with EU Member States. Cross-border regions are conducting projects to address common challenges and embark on joint policy learning. While administrative capacities in some of the countries neighbouring the EU may be limited, designing participatory and evidence-informed innovation policies in such contexts can provide important insights for regional authorities in the EU. It provides new perspectives on how local and regional authorities can design innovation strategies following a 3-step approach:

1. http://ec.europa.eu/regional_policy/en/policy/cooperation/macro-regional-strategies/danube/
The Danube region covers parts of 9 EU countries (Germany, Austria, Hungary, Czech Republic, Slovak Republic, Slovenia, Bulgaria, Romania and Croatia) and 5 non-EU countries (Serbia, Bosnia and Herzegovina, Montenegro, Ukraine and Moldova).

1. Map and analyse the economic, scientific and innovation potential to identify possible priority domains with critical mass
2. Mobilise and involve relevant stakeholders in these domains
3. Jointly agree on the priority domains and define how to develop those domains.

This activity can provide recommendations and be the basis for standardised templates for a continuous improvement of innovation strategies in the EU.

Policy context

Inside the EU, smart specialisation is a legal requirement for public authorities investing European Regional Development Funds to support research and innovation (Regulation (EU) 1301/2013). While neighbouring countries have no similar legal rationale to prepare innovation strategies for smart specialisation, several key documents and regulations underline how important this process is also in those places. The EU Strategy for the Danube Region¹ mentions smart specialisation specifically as a milestone for reaching the targets for creating a Knowledge Society. The funding regulation for enlargement countries specifically refers to smart specialisation as a driver of growth, job creation and cohesion (Regulation (EU) No 231/2014). At the Trieste Summit in July 2017, Western Balkan countries and the European Commission committed to support the design and implementation of smart specialisation strategies. Eastern Partnership countries have committed to adopt at least one such strategy by 2020. To support participatory and evidence-based processes outside the EU, JRC, through the S3 Platform, supports the development of innovation strategies for smart specialisation in a pilot project covering Serbia, Moldova and Ukraine.

How to use

The different stages of organisational development can be followed through a dedicated website². As the activity progresses, regional authorities will find here succinct guidance documents on how to prepare and execute a mapping of a territory's economic fabric, how to draw actionable insights to identify and involve stakeholders and how to define priority domains and related roadmaps for their development. This guidance will spell out recommendations to establish an institutionalised process so that these kinds of activities can be repeated periodically with minimal efforts. A conceptual description of this approach can already be read in a recent policy report *"Promoting innovation in transition countries: A trajectory for smart specialisation"*³.



Organisational development focuses on how to define priority domains and roadmaps for their development.

². <http://s3platform.jrc.ec.europa.eu/s3-beyond-eu>

³. <http://publications.jrc.ec.europa.eu/repository/handle/JRC106260>

Impact

The objectives of the activity related to EU enlargement and neighbourhood countries are:

- To focus on the process of strategic management and policy design and contribute to the organisational and staff development of relevant bodies for territorial development and innovation
- To provide support in the identification of economic competitive advantages and in the exploitation of the innovation potential, building on a process of entrepreneurial discovery and stakeholder dialogue
- To ensure a coherent, coordinated and sustainable approach to secure, develop and enhance engagement of all relevant stakeholders (business, academia, research organisations and civil society).

For EU regional and local authorities two relevant lessons can be drawn. First, many regions inside the EU are also undergoing a multi-faceted transition: from traditional sectors to more knowledge-intensive domains, and from top-down policy-making to more participatory approaches. An external perspective from countries where these transitions are much more pronounced can help manage these transitions in EU regions.

A second and related impact is hands-on guidance for continuously improving and updating innovation strategies. Given that non-EU countries are less bound by legal provisions for smart specialisation, they are freer to experiment with different approaches and think outside the box. At the same time, the JRC activity pays particular attention to codify what is being done so that it could be replicated elsewhere.

05

RIS3 support for lagging regions

Type of support / service available

The primary aim of this initiative is to support the implementation of the Research and Innovation Smart Specialisation Strategies (RIS3) in nine lagging regions in eight EU Member States. In so doing, it also aims to:

- Improve understanding of slow and limited growth in EU regions and links to macro-economic framework conditions, taking RIS3 as an entry point
- Develop and disseminate lessons and a tool box for other EU regions
- Contribute to advancing relevant theory on (implementation of) smart specialisation by codifying hands-on experiences.

This project has built on experience gained in supporting the refinement and implementation of the RIS3 in Eastern Macedonia and Thrace (Greece).

Relevance for regional authorities

The project provides concrete support to managing authorities in the partner regions in the refinement and implementation of their RIS3s. Central to the project is the structured engagement of the regional authorities, and the partner regions' stakeholders in business, academia, and society at large, to develop innovative ideas for potential funding in the region's identified research and innovation priority areas. The project also brings partner regions together to foster mutual learning in approaches to the monitoring and evaluation of RIS3 implementation and the effective governance of RIS3.

Policy context

The JRC "lagging regions project" implements three Preparatory Actions, initiated by the European Parliament. The first focused on Eastern Macedonia and Thrace. Two subsequent actions place a particular focus on Romania and its regions and a broader focus on lagging regions across Southern and Eastern Europe.

Its lessons serve the implementation and refinement of RIS3 strategies in other lagging regions both within the EU and beyond. The project is implemented by the JRC, in close cooperation with DG REGIO, as well as the regional and national authorities and stakeholders in industry, higher education and society at large in each partner country and region.

How to use

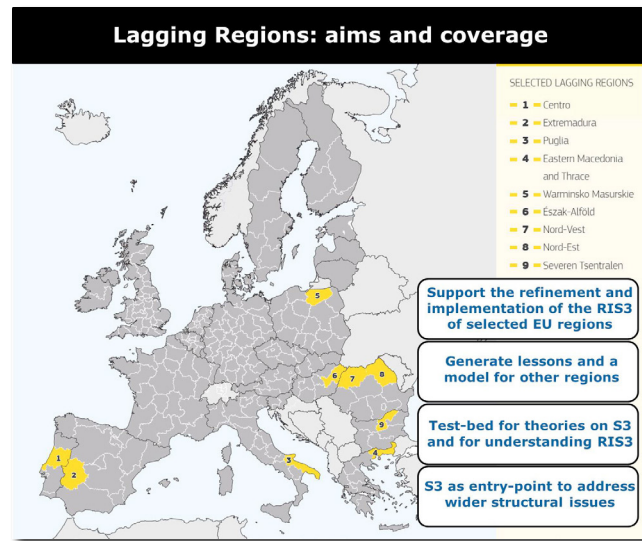
Based on stocktaking and assessment of the of the implementation of the RIS3 strategy of the partner regions, the JRC works closely with regions to identify appropriate activities to further support RIS3 implementation.

The project focuses on the structured engagement of the partner regions stakeholders. This centres on the organisation, together with each of the regional authorities, of dedicated participatory events. Work is also carried out with regional stakeholders to identify and address bottlenecks and challenges in RIS3 implementation. All the activities conducted in the project are codified to maximise its impact both within and outside the region. The information regarding RIS3 support in lagging regions is available on the RIS3 Lagging Regions section¹ of the Smart Specialisation website². The team is easily reachable through an email address³.

1. <http://s3platform.jrc.ec.europa.eu/ris3-in-lagging-regions>

2. <http://s3platform.jrc.ec.europa.eu>

3. JRC-B3-LAGREG@ec.europa.eu



Map of RIS3 support to 9 EU regions.

Impact

The support provided by JRC has contributed to building trust and improved mutual understanding between stakeholders, understanding of the realities of smart specialisation, developing capacities to better create and implement smart specialisation strategies and refining the smart specialisation strategies, underpinned by sustained stakeholder engagement.

The steps taken towards RIS3 implementation in the different regions, with a number of important project outcomes, include:

- The development of a highly constructive working collaboration with the authorities as well as with a critical mass of relevant regional stakeholders based on mutual understanding and trust
- Concrete steps in implementing respective RIS3 priorities through targeted support to entrepreneurial discovery process, project refinement and eventual preparation of calls
- Increased national and international networking and research-business collaboration, some of which resulted in successful project H2020 proposals
- Increased understanding of the concept of RIS3, its governance and its monitoring, as well as the complexity of its implementation challenges
- Particular progress has been in monitoring RIS3 implementation progress and impacts, through mutual structured learning between partner regions
- Awareness of the need for more coordination between national and regional governance, particularly in Romania. In the case of Bulgaria, the sub-regional (municipal) dimension and its relationship with the national level is also explored. In Eastern Macedonia and Thrace, both the Special Managing Authority and wider community of regional stakeholders have better access to international counterparts, both in governance of RIS3 and in performing research and innovation. The methodologies applied in Eastern Macedonia and Thrace has subsequently been applied to other Greek regions.

06 JRC support to Member States' Stairway to Excellence

Type of support / service available

The provision of assistance to regions and countries in order to close the innovation gap and promote excellence in all regions and EU countries. This can be through cross-cutting analysis or specific focused events.

Relevance for regional authorities

The S2E initiative provides support to Member States and Regions to support a more efficient and effective implementation of Smart Specialisation Strategies by building synergies between R&I funding instruments. Initially focused on EU13 Member States (the ones that joined the EU after 2004: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia), under the mandate from the current European Parliament, the geographical scope has been extended also to the EU15 Member States (the countries that joined the EU before 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom).

The initiative improves administrative efficiency and coordination in setting priorities and using public funds for the benefits of citizens and creating growth and jobs. Based on planned investments under different programmes, it provides regions, industry and research organisations with tailor-made support in research and innovation themes. The aim is to help them make the best use of community funding programmes such as the European Structural and Investment Funds (ESIF), Horizon 2020, and other funds in areas such as energy, bio-economy, health, aviation or agro-food. It also fosters dialogue and generates opportunities between regions and key stakeholders with common research and innovation priorities.

Support has initially focused on country-specific analysis, support and events. With the extension to all EU28 Member States, the project focuses more on both non-country specific analytical support and on policy and partnering support.

The analytical support aims to:

- Identify ways to address barriers in closing the innovation gap and enhancing the combination of different EU R&I funding sources in RIS3 implementation
- Increase the understanding of factors of success and failure in the H2020 programme
- Identify areas for targeted support, of common interest to different Member States and regions with regard to RIS3 implementation, H2020 participation and the optimal use of various R&I funding sources
- Examine progress in take-up of R&I funding, in particular from H2020 and from ERDF

The policy support and partnering support activities aim to:

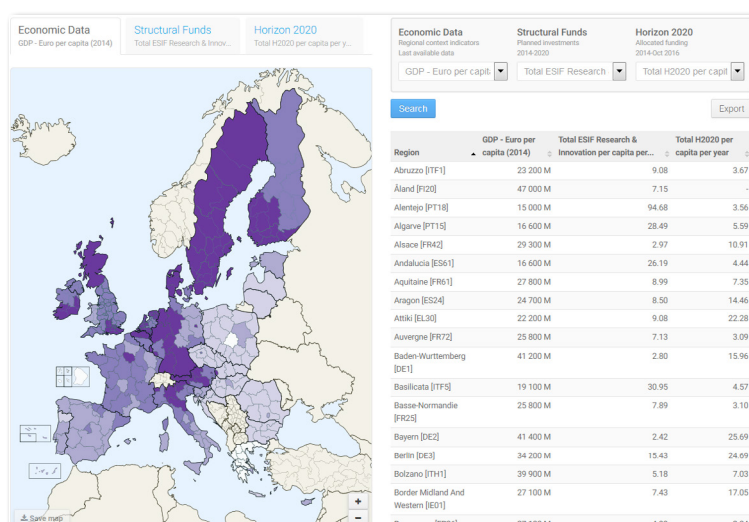
- Support EU Member States and regions in closing the innovation gap and in combining different EU R&I funding sources in RIS3 implementation
- Deliver policy support to national and regional managing authorities in areas of common interest in relation to building capacity, improving RIS3 governance, and optimal use of R&I funds
- Facilitate both partnering and mutual learning between more and less advanced regions

Policy context

Horizon 2020 is the EU's centrally managed primary funding mechanism for supporting collaborative, transnational R&D and innovation (R&I) across Member States. However, given the persistent regional disparity which still affects the EU in terms of overall R&I capacity, successful participation to excellence-based research programmes, such as Horizon 2020, is uneven. European Structural and Investment Funds (ESIFs) for the period 2014–2020 have registered a strong shift in their policy rationale in favour of the higher thematic concentration for R&I investments. Supporting synergies in their use may deliver additional gains in terms of innovation results, may help close the innovation gap in Europe and promote economic growth. To this end, the Commission also produced a guide on “Enabling synergies between European Structural and Investment Funds, Horizon 2020 and other research, innovation and competitiveness related Union programmes”¹.

How to use

Capacity mapping activities have focused on country analysis performed for EU13 new Member States to utilising qualitative and quantitative evidence related to general economic indicators on economic performance and R&I, national/regional FP7 participation patterns and ESIF-related absorption indicators (available on the project website²). The work has been enhanced with a visualisation tool, the R&I Regional Viewer³, which provides an overview of such information.



The R&I Regional Viewer: a combination of quantitative indicators and qualitative information.

The R&I Regional Viewer

S2E has to date provided capacity building activities centred on the organization of S2E national events in each EU13 Member State. These events provided a unique platform for a better understanding of the European and national R&I ecosystem, for exchanging experience, as well as raising awareness of the actions needed to enable cooperation and synergies among R&I actors. These events brought together national/regional authorities in charge of S3 and/or European funding programmes, renowned experts, as well as representatives from universities, research centres and business. As a result of each national event, a Joint Statement was published by S2E and national authorities to summarise the main policy actions needed to overcome existing barriers and create synergies for enhancing the efficiency of national R&I ecosystem. All the Joint Statements can be found at the project webpage⁴. The main issues and recommendations proposed during these events can be summarised under three dimensions:

1. http://ec.europa.eu/regional_policy/sources/docgener/guides/synergy/synergies_en.pdf
2. <http://s3platform.jrc.ec.europa.eu/stairway-to-excellence>
3. <http://s3platform.jrc.ec.europa.eu/synergies-tool>
4. <http://s3platform.jrc.ec.europa.eu/national-events>

- **Quality of R&I governance**

FREQUENCY OF TOPICS RAISED

HIGH

- Sustainability of research infrastructure and cost of maintenance;
- Lack of expertise and qualified staff to support participation in Horizon 2020;
- Brain drain

MEDIUM

- Considering ESIF as an easy/guaranteed source for short-term research projects (substitution effect versus other R&I funds);
- Salary differences between researchers in EU13 and EU15 MSs;
- Need to improve research collaboration with EU15 MSs

LOW

- Business access to public research infrastructure and improvement of public-private partnership;
- Need for an efficient legal framework for public procurement;
- Attraction of EU13 Member States to foreign researchers

- **Capacity building**

FREQUENCY OF TOPICS RAISED

HIGH

- Coordination, communication and trust building between stakeholders;
- Administrative burden and complicated procedures;
- Business involvement in the innovation ecosystem

MEDIUM

- Timely information circulation (silo effect);
- Strategic approach, long-term strategic planning and prioritisation;
- Unstable political and administrative structure, fragmented research system and frequent changes in the policy instruments

LOW

- Heterogeneous EU regulations adoption into national provisions;
- Different responses of Managing Authorities to new economic challenges;
- Heterogeneous interest by Managing Authorities towards other EU innovation initiatives (i.e. macro regional EU programmes, cooperation initiatives, cluster policies)

- **Innovation to commercialisation**

FREQUENCY OF TOPICS RAISED

HIGH

- Lack of continuous support and incentives for commercialisation;
- SMEs-based business environment with limited capacity and resources;
- Lack of international collaboration and close-to-market research

MEDIUM

- Need for enlarging the scope of Seal of Excellence initiative;
- Complicated state-aid rules;
- Low business and entrepreneurial culture

LOW

- Limited roles of Technology Transfer Offices and support services for business;
- Rigid public procurement regulations;
- Lack of entrepreneurship in university curricula

Impact

Overall the combination of capacity mapping and capacity building initiatives led to significant outcomes:

- Providing a better understanding of the national and regional innovation ecosystems with a special emphasis on the identification of obstacles, barriers and potentials to innovation
- Raising awareness of the actions needed to enable synergies between ESIF, H2020 and other European and national programmes for research and innovation
- Facilitating the dissemination of case studies and experiences in combining Structural Funds and Framework Programmes (FPs and Horizon 2020) to improve excellence in R&I systems
- Drawing lessons for the future and identified follow-up actions to enhance the potential synergies between different EU funds in the Member State.

Specifically, the S2E National Events provided an opportunity for establishing informed communication between stakeholders in participating Member States. This was recognised as a novelty in itself.

07 Smart Specialisation Platform on Industrial Modernisation (S3P - Industry)

Type of support / service available

The European Commission supports the modernisation of Europe's Industry in order to ensure the EU's global competitiveness. This objective is supported by a number of EC's Directorates-General (DGs), including JRC, through a focused alignment of their multi-level policies.



S3P-Industry fosters synergies between various funding sources.

One of the driving forces behind the joint initiative of the S3P-Industry is to foster synergies and complementarities between diverse funding sources with the objective to accelerate the development of joint investment projects supported by possible synergies between European Regional Development Fund (ERDF), the EU program for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME), Horizon 2020 and other funding sources. Despite the differences among the main objectives of these funding sources, through facilitating the synergies among them, these sources may complement greatly the principle objectives of the S3P-IM to support the optimal and effective implementation of cohesion policy funds for high quality industrial modernisation and investment projects and to better align innovation actions at national, regional and local levels.

To facilitate concrete cross-regional innovation, several support mechanisms will be made available for partnerships operating under the platform. These support mechanisms are adjusted to the advancement of a partnership and to the needs of the partnership and of industry, whether they need analytical, expert support or actual funding provided by the DGs involved in the initiative.

The Smart Specialisation Platform of the Joint Research Centre is the main contact point for the initiative that aims to facilitate an open process for interregional collaboration on business-driven investments, for agreed innovation themes. The role of the S3 Platform is to provide direct assistance to EU regions to initiate interregional partnerships, as well as to structure the subsequent process, providing a continuous advisory and analytical support for partnerships. Thus, the key objective of the S3P-IM is to support the efforts of committed EU regions and member states to work together in developing a pipeline of investment projects connected to specific thematic areas of S3 through interregional cooperation. Therefore the platform will be co-developed and co-led by the regions themselves along a pre-defined workflow steps¹.

1. For the description of each workflow steps and sub-steps please see the page: <http://s3platform.jrc.ec.europa.eu/how-does-it-work>.

Relevance for regional authorities

The participating DGs are now increasingly aligning their collective efforts with an aim to support new strategic growth areas including those linked to the development in six strategic, cross-cutting areas, such as key enabling technologies (KETs), clean vehicles and transport, bio-based products, construction and raw materials, plus smart grids. These, and other technologies, are now recognised as the means to address important societal challenges, by facilitating new ways to new products and services and effectively leading to smart, sustainable and inclusive growth. They also play an important role in the research, innovation and cluster strategies of many industries. These technologies are expected to enable applications required for improving resource efficiency, boosting the fight against climate change, or allowing for healthy ageing. In other words, the role of these technologies is 'enabling', 'horizontal' and 'ubiquitous' in both new and traditional products.

Policy context

The European Commission encourages its Member States and regions to consider supporting potential spill-over effects of KETs-based solutions and, as a result, strengthen existing and possibly developing new European industrial value chains. One way this can be done is through the integration of these technologies into national and regional Smart Specialisation strategies. The S3 framework, coupled with an increase in interregional connectivity, can give rise to cooperation in deployment, diffusion or even co-innovation of applications. Such dynamics may be distributed between regions specialised in the basic inventions and regions investing in specific application domains.

How to use

Following the launch of the S3P–Industry platform, on 2nd June 2016, EU regions were invited to propose partnerships, related to specific thematic areas linked to industrial modernisation, in which they wish to collaborate and commit to co-invest in the development of new European value chains with other regions or member states.

A partnership in a new thematic area can be proposed by at least two EU regions or member states, which will act as leading partners in the partnership provided that their proposal satisfies a number of key elements to be considered qualified. Expressions of interest for setting-up and co-leading new partnerships in specific thematic areas for industrial modernisation may be submitted through the S3P – Industry website².

Partnerships operating under S3P–Industry are supported by the participating DGs in their efforts for developing a pipeline of joint investment projects connected to specific thematic areas of smart specialisation priorities through interregional cooperation. The S3P–Industry is therefore co-developed and co-led by the regions and member states themselves, ensuring an active participation and commitment of the so-called quadruple helix actors, i.e. industry and related business organisations and clusters, as well as research institutions, academia and civil society. This combination will play a key role in connecting regional authorities with industrial and market interests and needs.

Qualified S3P–Industry partnerships³ currently operating under the S3P–Industry are covering the following thematic areas:



² The expression of interest form for S3P – Industry is available at: https://ec.europa.eu/eusurvey/runner/S3thematicplatform_expression_of_interest

³ For further information on partnership, please visit the S3P – Industry partnership website: <http://s3platform.jrc.ec.europa.eu/thematic-areas>. Please note that further thematic partnerships are under evaluation as of writing this report on 14th of July 2017 in the field of integrated photonics and tourism (safety).

The S3P-Industry has a functional email⁴ to allow national and regional authorities, and other stakeholders, to have a specific contact point to the initiative, as well as a website⁵.

Impact

The competitiveness and growth of European industry depends very much on the capacity of Europe's regions to provide a vibrant ecosystem for innovation that facilitates cooperation between industry, academia and other innovation actors. To achieve this, an integrated approach is necessary to ensure strong involvement of industry in the implementation of RIS3 strategies and intensify cross-regional cooperation with a specific focus on making better use of clusters and fostering industrial modernisation for which the S3P - Industry provides a framework.

Since the launch of the S3P - Industry, the qualified partnerships have advanced with their thematic areas along the workflow steps. Their advancement is depicted in the following graph, allowing the S3P - Industry to monitor and evaluate progress in line with the objectives of the initiative.

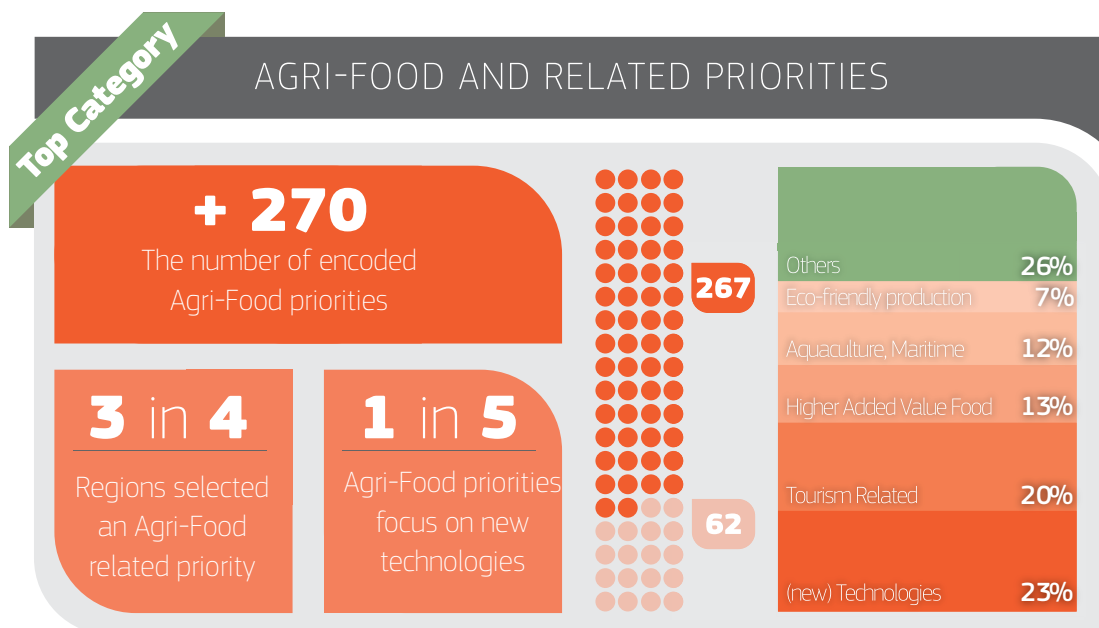
⁴. JRC-S3P-INDUSTRY@ec.europa.eu

⁵. <http://s3platform.jrc.ec.europa.eu/industrial-modernisation>

08 Smart Specialisation Platform on Agri-Food

Type of support / service available

The Smart Specialisation Platform for Agri-Food (S3P Agri-Food) aims to accelerate the development of joint investment projects linked to agriculture and food at EU level. S3P Agri-Food encourages and supports interregional cooperation in thematic areas based on smart specialisation priorities defined by regional and national governments. Through this thematic platform, EU regions and member states are able to implement more efficiently their smart specialisation strategies, and regional stakeholders benefit from the new cooperation opportunities with partners from other regions.



S3P Agri-Food aims to accelerate joint projects and supports interregional cooperation in thematic areas.

The Smart Specialisation Platform technical assistance includes:

- Support the development and enhancement of European eco-systems for interregional collaboration based on areas of smart specialisation
- Facilitate the exchange of experience, mutual learning and cooperation to achieve better matching of business entities with research, as well as innovation actors with their business counterparts
- Prepare guidance material on the role of regional authorities in co-creating and developing European value chains in key smart specialisation niches.

The S3P Platform provides methodological support, expertise, advice and networking opportunities through workshops and seminars. In addition, partnerships are provided with support in identifying strong and missing competences among the participating regions, by combining existing EU analytical tools.

Relevance for regional authorities

The objective of the S3P Agri-food platform is to help regions develop trans-regional collaboration in agri-food, specifically by promoting the formation of partnerships for trans-regional cooperation in agri-food value chains, and helping participants exploit already existing sources of funding, such as the European Regional Development Funds (ERDF), national and regional public funds, and private resources, thus enabling them to spread out their investment risks and increase their profits.

One important benefit offered by the Thematic Smart Specialisation Platform on Agri-food is the inter-regional and intra-regional cooperation in which regions collaborate on common objectives. In addition, regions can share resources to achieve a joint goal with greater efficiency. The Agri-Food platform has the potential to improve the competitiveness, resiliency and sustainability of the agri-food sector by promoting a shared value economy.

Policy context

European Territorial Cooperation (ETC), better known as Interreg, is one of the two goals of cohesion policy and provides a framework for the implementation of joint actions and policy exchanges between national, regional and local actors from different Member States. The overarching ECT objective is to promote a harmonious economic, social and territorial development of the Union as a whole. Through its policies, the EU also supports various other networking initiatives including those in the area related to agri-food value chain. This helps bring scientists, industry and farmers from different countries together. These platforms and networks design strategic research agendas and can inspire innovation on the ground.

How to use

The Agri-food platform is based on a bottom-up approach and is driven by the regions that wish to foster inter-regional cooperation based on matching their smart specialisation priorities related to agri-food. It is thus co-developed and co-led by proactive regions, with the active participation of business organisations, research institutions, academia and civil society. The S3P Agri-food platform is comprised of thematic partnerships that are proposed and coordinated by self-organised regions.

Generally, a partnership in a new thematic area can be proposed by two lead regions (EU regions or Member States). Expressions of interest for setting-up and co-leading new partnerships in specific thematic areas for Agri-Food may be submitted through a dedicated webpage¹. At the launch of the Agri-Food platform in June 2016, the European Commission invited all EU regions to submit Expressions of Interest to setup new interregional partnerships related to specific thematic areas linked to Agri-Food, in which they wish to collaborate and commit to co-invest in the development of new European value chains with other regions or Member States. For a list of submitted proposals for the development of S3P Agri-Food thematic partnerships see the Expression of Interest section² of the S3P Agri-Food web page.

The European Commission is committed to providing expert assistance to qualified partnerships, organising workshops to identify shared areas of interests, and discussing implementation actions. This can lead to organisation of partnering and matchmaking events for interested partners including industry, academia, and business, aimed at discussing, facilitating and accelerating the development of joint investment projects.

The S3P Agri-Food web page also hosts a number of papers addressing the knowledge gap on identifying potential partner regions with interests and commitments to specific thematic areas, existing/confirmed regional capabilities in order to contribute to joint initiatives and future partnerships in areas of strategic interest.

S3P Agri-Food contact point: JRC-S3P-AGRIFOOD@ec.europa.eu

Impact

The investment opportunities generated by the S3P Agri-Food will contribute to a more competitive and sustainable EU food supply chain, more resilient food systems, and to a more effective targeting of the EU regional funds on growth and jobs, especially through the numerous SMEs and micro-companies that make up this chain. The Platform will also promote the complementarity of funding instruments in the support of an investment project pipeline.

1. <http://s3platform.jrc.ec.europa.eu/agri-food>

2. <http://s3platform.jrc.ec.europa.eu/agrifood-expression-interest>



Research and Innovation

09 European ICT Poles of Excellence (EIPE)

Type of support / service available

An interactive online tool mapping ICT R&D, innovation and business activity in Europe, offering 42 individual indicators on business and research activity agglomeration, internalisation and networking at global level for each of 1303 NUTS3¹ regions in Europe.

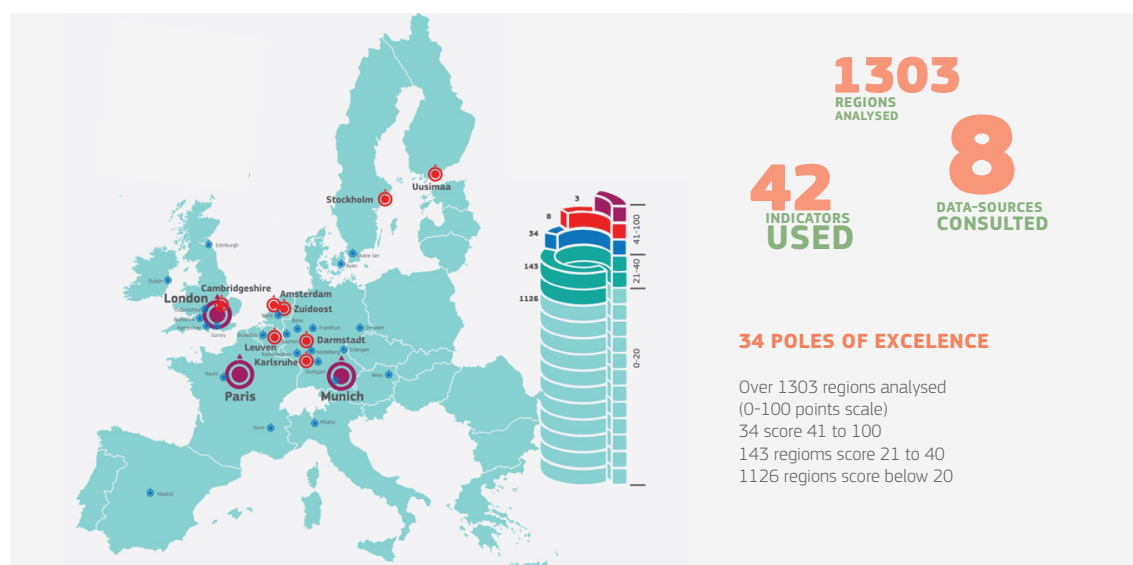
Relevance for regional authorities

In the European ICT Poles of Excellence (EIPE) tool, regions can find data (not available elsewhere) offering a very detail analytical information addressing ICT R&D, innovation, and business activities. Each of the 42 indicators targets a different aspect of the region's performance in terms of ICT business or research activity agglomeration. Such indicators, together with the four composite indicators provided, offer a very detail and precise observation of the role of European regions in the global ICT networks. Moreover, as this project aims to define, identify, analyse and monitor the existence and progress of current and emerging European poles of worldwide excellence in ICT, rankings are offered to check against the champions in each of the different targeted aspects. The project contributes to monitoring and measuring the digital transformation by accounting for agglomeration, internationalisation and networking activity in ICT.

Policy context

In line with the Digital Agenda², the Commission's published a Communication entitled "A Strategy for ICT R&D and Innovation in Europe: Raising the Game"³. This proposed a strategy to establish Europe's industrial and technological leadership in ICT, to make Europe more attractive for ICT investments and skills and to ensure that its economy and society benefit fully from ICT developments. Building on Europe's assets, in particular the many ICT industrial clusters of Europe, the strategy seeks to step up efforts in ICT research and innovation and to maximise their impact in today's economic context. It forms part of the preparations for a European plan for innovation and research, and encompasses the main technologies of the future including ICT.

Leveraging on ICT-related research, innovation, and business is of key importance in the efforts to deal with ongoing digital transformation.



The EIPE Atlas offers a snapshot of how ICT activity is distributed across Europe and where its main locations are.

1. Since January 2015, NUTS3 lists 1342 regions. For details on the NUTS classification visit: <http://ec.europa.eu/eurostat/web/nuts>
 2. http://ec.europa.eu/information_society/digital-agenda/index_en.htm
 3. http://ec.europa.eu/information_society/newsroom/cf/itemdetail.cfm?item_id=4698

How to use

Regions can make use of the available maps, to check their results and their positioning against the excellence in each domain through the EIPE Atlas interactive web visualisation⁴. They can access all the 42 indicators and the 4 composite ones in order to analyse their performance in ICT R&D innovation and business activity, consider their internationalisation and global networking capacities, in order to derive suitable policy recommendations.

The European ICT Poles of Excellence (EIPE) Project⁵ set the general conceptual and methodological conditions for defining, identifying, analysing and monitoring the existence and progress of current and future EIPE. The objective is to improve our capacity to distinguish these poles of excellence among the many European ICT clusters and benchmark them with non-European poles. The project observes their dynamics and offers a thorough analysis of their characteristics.

JRC is currently developing an updated version of the EIPE Atlas. This will present the results of the empirical mapping of ICT R&D, innovation and business activity in Europe. It will rank the top European NUTS 3 regions based on their performance in EIPE Composite Indicator (EIPE CI). It will also provide their rankings in the 42 individual indicators that contributed to the building of the EIPE composite indicator.

The Atlas provides a geographical representation and a map-based tool with which to explore different dimensions of excellence. It considers agglomeration, internationalisation and networking of ICT research, innovation and business activities. The EIPE Atlas also offers a snapshot of the performance of regions that are identified as the main locations of ICT activity in Europe. It aims to provide a comprehensive picture of how ICT activity is distributed across Europe and where its main locations are. This information is expected to give a better overview of the European ICT landscape, activity and actors in each location and to reveal their strengths and weaknesses.

Case studies reports have also been developed to present examples of how the EIPE projects and its indicators can be used to guide effective analytical work and ground policy initiatives.

The Atlas will also make possible analysis and graphic representation at different level of aggregation, from NUTS3 to country level.

Impact

The project provides, for the first time, quantitative measures of geographical agglomeration of ICT research, innovation and business activities. It also gives us a deeper understanding of the internationalisation achievements and of the actual role of poles of excellence in worldwide networks.

4. <http://is.jrc.ec.europa.eu/pages/ISG/eipe/atlas.html>

5. <https://ec.europa.eu/jrc/en/eipe>

10

Increasing higher education impact on innovation: Entrepreneurial Universities

Type of support / service available

JRC is researching the conditions that affect the success of European universities to become more entrepreneurial: budget size, autonomy, research performance, specialization, entrepreneurship education, teaching/ research ratio, among others. A first case study of Aalto University and its innovation ecosystem has been published already¹. A combined qualitative and quantitative analysis will result in the publication of a report planned for 2018².

Relevance for regional authorities

National and regional governments are increasingly looking to universities to play a role in supporting regional development and growth. A central way to do this is by promoting Entrepreneurial Universities. Such universities take a strategic approach to attain a high degree of interaction with their innovation ecosystem. Developing a more entrepreneurial role can strengthen universities' capacity to orchestrate their domestic innovation ecosystem and their contribution in the entrepreneurial discovery process informing Smart Specialisation strategies. A greater insight in the internal and external factors that make universities succeed in becoming more entrepreneurial can help regional and national policy makers to promote this development.

Policy context

Several Communications from the European Commission underpin the increasing importance of an Entrepreneurial focus within Universities. The Communication on a "Renewed EU agenda for Higher Education" (COM (2017) 247) gives central place to the promotion of Entrepreneurial universities.

Likewise, the Communication on the "Entrepreneurship 2020 action plan" (COM (2012) 0795) states: *"Universities should become more entrepreneurial....the European Commission in collaboration with OECD has developed a framework for entrepreneurial universities to assess themselves"*. The Communication "Supporting growth and jobs – an agenda for the modernisation of Europe's higher education systems" (COM (2011) 567) reads: *"Encourage partnership and cooperation with business as a core activity of higher education institutions, through reward structures, incentives for multidisciplinary and cross-organisational cooperation, and the reduction of regulatory and administrative barriers to partnerships between institutions and other public and private actors"*.

Research on success factors of Entrepreneurial Universities will support efforts such as HEInnovate, an initiative of the European Commission and the OECD to assess and develop entrepreneurial activities in higher education institutions.

How to use

The first published outcome of the project is a case study identifying key factors in the Espoo (Finland) innovation ecosystem, focusing on the role of Aalto University as an example of an entrepreneurial university.

The results of the project will feed into the Knowledge Hub for Higher Education developed by JRC and EAC and build on the experience of DG EAC's HEInnovate³.

1. Available at: <https://rio.jrc.ec.europa.eu/en/library/place-based-innovation-ecosystems-espoo-innovation-garden-and-aalto-university-finland>

2. The JRC Publications Repository is the online service giving access to all research publications produced by the European Commission's Joint Research Centre.

3. <https://heinnovate.eu/en>

Impact

The impact of the policy is threefold: firstly universities contribute to the development of human resources for their regional and national innovation ecosystems. A greater involvement in entrepreneurship education and greater interaction of universities with private sector actors can result in graduates that better match national and regional economic development needs. Secondly, while the greatest contribution to knowledge transfer is the training of graduates, universities also play a direct role in diffusing scientific and technological knowledge to domestic private sector actors. Such knowledge transfer can take many forms. It occurs, among others, through contract research, joint research and the mobility of university staff to private sector firms. Thirdly, a greater entrepreneurial role of universities places them in a better position to actively contribute to regional developments processes. As orchestrating actors of their domestic innovation ecosystem, they can also have a greater role in smart specialisation processes.

11 Innovation Camps

Type of support / service available

Innovation Camps are essentially a tool to develop a culture of innovativeness at a local level. They seek to address societal and economic challenges facing local societies in a European context. They bring together a geographically and disciplinary diverse group of participants to work closely together during two to five days. Immersion in an entrepreneurial way of thinking and working processes aims to foster the discovery of opportunities and the development of ideas with real-world impact. This methodology has been refined through the ongoing organisation of such camps across Europe since 2010.

Sharing similar goals, the Smart Specialisation Platform (S3P) encourages and supports regions and cities willing to host Innovation Camps. The platform can provide methodological guidance and access to a pool of professional facilitators and support the preparation of a team of local facilitators for an autonomous use of the methodology.

Relevance for regional authorities

The Innovation Camp methodology supports regions and cities in the identification of local societal challenges and the conception of innovative solutions for related issues. Multidisciplinary groups develop new ideas and perspectives on real-world challenges brought to the Innovation Camps by cities, regions, business organisations, universities and NGOs.

Innovation Camps are also a complementary tool for EDP (Entrepreneurial Discovery Process), a core methodology of the JRC Smart Specialisation process to stimulate inclusive and interactive bottom-up processes of collaboration between multiple and diverse stakeholders.



Gabrovo Innovation Camp (Bulgaria, 2016).

Policy context

In the overall framework of the Europe 2020 Strategy, and particularly in the context of the Digital Single Market, Open Innovation is seen as a positive approach for innovation, helping to solve key European challenges by embracing change, and engaging all relevant stakeholders.

More positive attitudes towards entrepreneurship and risk taking are needed to turn Europe into a more innovative, dynamic and competitive economy in a globalised world. Such a culture cannot be imposed but needs to be nurtured in society, as it exceeds the narrow domain of R&D and innovation policy. Policy makers have a clear responsibility to enable and favour innovation (e.g. rewarding it, supporting it, creating ecosystems to make it pervasive), but a culture of innovation is a societal feature under the collective responsibility of all driving societal stakeholders. A well-intended innovation culture can benefit society, so it is inclusive by nature. Methodologies like this are needed to guarantee that all relevant actors (including civil society) meet and cooperate to find solutions to common territorial development challenges.

How to use

S3P encourages and supports regions and cities from all EU Member States willing to experiment with Innovation Camps. Expressions of interest can be made to the JRC via the S3P team¹. Different stakeholders may have differing interests:

- Policy makers: to mobilise self-organising capacities of cities and regions to address local societal challenges
- Business/entrepreneurs: to match/join interests, capacities and forces locally to compete innovatively in a globalised market
- Academia: to identify locally-meaningful research and innovation capacities to be developed in the long run in cooperation with business and government, while working with and for the local society
- Civil society: to empower citizens to gain ownership and conceive innovative solutions to societal issues of their concern.

Any of these stakeholders could propose the real-world challenge to be addressed at an Innovation camp. Participants from diverse backgrounds, countries and ages work together at the Camps in largely self-organising groups. The lightly facilitated work process is designed to continuously frame and reframe the issues, problems, and assumptions relevant to a challenge. This leads to the creation of a range of new perspectives – new lenses through which the issues can be better understood – and entrepreneurial ways of dealing with them.

The prototyping period after the Camp is an integral part of the process. Follow-through takes place at diverse and relevant locations, with direct stakeholder engagement. Living labs and (urban) test-beds may be part of this co-creation process. This leads to more robust prototypes, to practical experiments, pilots and – with sufficient commitment – plans for fast-track realization.

The Innovation camp methodology is refined from camp to camp, and is adapted to best address the specific challenges of each event. A good example is the 2016 Gabrovo Innovation Camp², in Bulgaria. There, the overall objective was to transform regional potential into innovation-led economic growth and societal wellbeing. It did this by addressing the theme of “Overcoming the Innovation Divide in Europe”, examining three core challenges and to identify possible solutions:

- Innovation Divide in Europe
- Smart Specialisation in Higher Education and Urban Development
- 21st Century Democracy.

Other regions can learn directly from the experience of the innovation camps by participating in them and/or studying the publicly available outcomes of the innovation camps.

Impact

In the past, Innovation Camps have addressed issues such as low carbon urban planning, realizing regional test-beds and demonstrators, renewing citizen-government engagement, and enhancing the innovativeness

1. Available at: <https://rio.jrc.ec.europa.eu/en/library/place-based-innovation-ecosystems-espoo-innovation-garden-and-aalto-university-finland>

2. <http://gabrovoinnovationcamp.eu/> This includes the basic methodology: http://gabrovoinnovationcamp.eu/wp-content/uploads/2016/08/Innovation-Camps-methodology-guide_Bratislava.pdf

and inclusiveness of society. Since 2016 the JRC has co-organised Innovation Camps in cooperation with the Committee of the Regions – namely in Amsterdam (NL), Bratislava (SK) and Gabrovo (BG) – or with regions in phase of implementing their RIS3 – namely in Lapland (FI) and Catalonia (ES). Particularly in the latter, it has been instrumental to cluster collaborations (Lapland) or to the aggregation of digital-social innovation spaces and organisations (living labs, fablabs, maker or co-working spaces, telecentres) to the Catalan innovation ecosystem. This engaged citizens as co-creators in the implementation of RIS3CAT. Going back to the Gabrovo example, it provided an innovative way to approach the largely unexplored and unrevealed potential of existing urban innovation opportunities in Severen tsentralen region of Bulgaria, coming from the bridging and the interaction of main local shareholders – local authorities, businesses and industries, academic structures (schools, Technical University, community centres), civil society, cultural operators, freelancers, etc. Within the Severen Tsentralen region, Gabrovo is a dynamic city and the co-organisation of the innovation camp was a strong catalyst for innovative ideas, and a possible boost for the Entrepreneurial Discovery Process. The Mayor of Gabrovo announced the intention to follow up the proposals and to finance what is possible. In particular, the “digital achievement” project, a mobile (truck based) unit bringing basic digital knowledge to elderly people in rural areas exhibited strong potential to be realised in practice.

12

Providing analysis on Research and Innovation Systems

RIO Country Reports

Type of support / service available

The Research and Innovation Observatory (RIO) Country Reports analyses and assesses the development and performance of the national research and innovation system of the EU-28 Member States and related policies. The analysis of research & innovation in the RIO reports, including the challenges, policy responses and their impact, provides Member States and regional stakeholders with a timely source of analysis and evidence. In the 2017 series of reports, a stronger focus on smart specialisation is envisaged.

These short reports are co-authored by JRC and a network of independent experts on R&I. The draft reports also feed into the European Semester process. Member State contact points are able to check the reports before publication. In order to be more accessible, the reports are available in 20 EU languages.

Relevance for regional authorities

Public authorities across Europe on both regional and national level have an important role to play in research and innovation, from involvement in supporting the activities of universities in education, research and local growth, to facilitation of collaboration between various stakeholders, as well as providing locally administered funding or incentives.

Policy context

The R&I Observatory contributes to the Commission's top-level priorities "better spending", "better regulation" and "strengthening the industrial base". Its RIO country reports provide the Commission with consolidated input on national innovation policies on the 28 Member States, feeding directly into the European Semester process. The reports also inform national policy making, including as an input to the H2020 Policy Support Facility activities. RIO responds to the increased attention of Member States to innovation as a source of sustainable economic growth. It provides evidence on national and EU R&I policies, funding and system performance in support of economic growth, sustainability and societal well-being, to inform better policies at EU and national level.

How to use

The RIO-PSF website is a reference and key source of information for European and national policy makers as well as other stakeholders in the field of R&I policy. It delivers analysis, insights, statistical data and best practices on designing, implementing and evaluating research and innovation policy at EU and national levels [More](#)



The RIO Country Report 2016 is now available

The annual RIO Country Report analyses and assesses the development and performance of the national research and innovation system and related policies. The report also assesses the match between national policy priorities and the structural challenges of the research and innovation system.

COUNTRY ANALYSIS **POLICY SUPPORT FACILITY** **STATISTICAL DATA** **LIBRARY**

The RIO-PSF website provides up-to-date qualitative information and indicators

The EU 28 RIO reports are available on the RIO website both in English and in national languages. In their 2017 version, they offer insights on the following specific issues:

- Main R&I policy developments in 2016
- Economic Context
- Main R&I actors
- R&I trends
- National Innovation challenges
- Focus on creating and stimulating markets.

You may contact the RIO team via <https://rio.jrc.ec.europa.eu/en/contact>

Impact

This work has extended the European Commission's ongoing efforts to help define and implement efficient Research and Innovation policies. Through its aim to monitor and inform EU strategy and goals, as well as facilitate policy learning, it provides Member States and regions with information and analysis that could feed into the definition of future R&I strategies.

13

Mapping industrial actors and technologies

Type of support / service available

JRC monitors business research and innovation activities. It provides data and analyses of the main industrial players. The key strength is that the different databases on company performance, location of subsidiaries, patents and technological profiles and scientific citations are matched from a company perspective. This allows JRC to investigate how these companies and their knowledge creation and innovation activities act as drivers of territorial competitiveness and employment.

Based on several indicators (patent analysis, scientific publications, etc.), JRC builds the technological profiles of the patent portfolios of both regions and companies. In particular, their technological competences in a series of key strategic, high R&D sectors, as well as their capacity to develop Advanced Manufacturing Technologies, Key Enabling Technologies (KETs) and emerging technologies. Depending on the level of disaggregation of the data it is possible to analyse the main patterns and trends at the world, national and regional levels.

Relevance for regional authorities

The mapping of the technological competences of the regions and of their main industrial players can facilitate regional partnering and contribute to the identification of opportunities for cross-regional cooperation. JRC can provide specific analytical support to regions in the context of thematic smart specialisation platforms and more concretely to the S3 thematic platform on Industrial Modernisation, as well to the one on Energy with respect to renewable technologies for example. In addition, such mapping of technological and industrial regional competences can be used to assess region's RIS3 thematic priorities, identifying concrete strengths and weaknesses at different levels of sectoral and technological disaggregation.

Policy context

New initiatives to boost the competitiveness of the manufacturing sector are underway around the world. The European Commission has placed special emphasis on a set of technologies labelled key enabling technologies (KETs) (**COM/2009/0512 final**). It has also highlighted the importance of stimulating investment in innovation and new technologies to maintain competitiveness and a strong industrial base for Europe's economic recovery (COM (2014) 14/2). To fully benefit from the single market, the European Commission has identified the need to digitise the European industry (COM(2016) 180 **final**).

How to use

JRC publishes annually the EU R&D Scoreboard. This publication identifies main industrial players in key industrial sectors, and provides data and analysis on their R&D investments and economic performance¹.

Additional JRC instruments provide further insights of companies' investments in R&D by establishing direct contact with them and collecting up-to-date information on trends and main factors: the EU R&D Surveys and techno-economic analyses of key industrial sectors².

Impact

Regions can better design, implement and evaluate measures to achieve two flagship initiatives of the Europe 2020 strategy using this evidence and analysis, namely:

1. Available at: <http://iri.jrc.ec.europa.eu/research/scoreboard.htm>

2. Available at: <http://iri.jrc.ec.europa.eu/survey.html>, <http://iri.jrc.ec.europa.eu/other-reports.html>

- The **research and innovation agenda (Innovation Union)** and the 3% investment target: Measures to increase the level of business R&D in Europe
- The **Industrial Modernisation agenda**: increase companies' investments in advanced manufacturing and reinforce the competitiveness of the EU industry in key enabling technologies.

The evidence gathered helps build understanding on how region's technological specialisations impact their economic development. These insights could support the process of setting priorities and selecting projects in the context of their RIS3. It could also help attract knowledge-based investments, from world top R&D investors and from local industries.



Energy and Transport

14

Smart Specialisation Platform on Energy (S3P - Energy)

Type of support / service available

The Smart Specialisation Platform on Energy¹ (S3P-Energy) supports policy-makers, authorities and stakeholders involved in energy and research, innovation policies. Proactive match-making is provided to Member States and regions that have planned investments in energy innovation. Thematic seminars, research and analysis, implementation advice, guidance materials and dissemination actions reinforce the cooperation between Member States/regions, strengthen regional/local capacities, and increase the impact of their activities.

S3P-Energy supports Member States and regions towards an effective implementation of their Smart Specialisation Strategies (S3). In particular, the S3P-Energy aims at supporting the effective uptake of the Cohesion Policy funding opportunities for energy innovation activities at national, regional and local levels. The ultimate objective of the S3P-Energy is to contribute to the shift towards a low carbon economy and to respond to challenges identified in the EU 2020 Strategy².

Relevance for regional authorities

In the period 2014-2020, Cohesion Policy will guide the investment of over EUR 450 billion (including national co-financing) to help achieving the EU-wide goals of growth and jobs and reduce economic and social disparities. It is the biggest investment instrument at EU level for pursuing the objectives of the Europe 2020 Strategy. Investments will be concentrated on four key priorities: innovation and research, the digital agenda, support for small and medium-sized businesses (SMEs) and the **low-carbon economy with EUR 125 billion allocated to these areas**.

For the programming period 2014-2020, Cohesion Policy is closely interlinked with the Europe 2020 Strategy, its objectives and targets (including the ones for energy). The implementation of the policies is also closely linked with preconditions (ex-ante conditionalities) that are to ensure that the funds will be spent in the most optimal and targeted way.

Policy context

Energy is a topic of high interest amongst EU Member States and regions. Currently, 179 regions and 20 countries have identified energy-related priorities as part of their Smart Specialisation Strategies. The S3P-Energy addresses energy issues as part of the European efforts to achieve a shared vision on knowledge-based energy policy in regions and to encourage the financing of viable investments in Europe in line with the EU's Energy Union strategy³ and the EU Plan in strategic investments in jobs and growth⁴, the latter to be realised through the European Fund for Strategic Investments (EFSI)⁵. Regional action through the smart specialisation on energy plays a driver role in the decarbonisation of the economy and contributes to the achievement of these strategies.

How to use

- **Inter-regional cooperation:** The S3P-Energy promotes cooperation not only within regions, but also between regions. Proactive 'match-making' is provided to Member States and regions that have planned investments in energy innovation. In this context,

1. The Smart Specialisation Platform on Energy webpage <http://s3platform.jrc.ec.europa.eu/s3p-energy>

2. https://ec.europa.eu/info/strategy/european-semester/framework/europe-2020-strategy_en

The Europe 2020 strategy is the EU's agenda for growth and jobs for the current decade. It emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy.

3. http://ec.europa.eu/priorities/energy-union/index_en.htm

4. http://ec.europa.eu/priorities/jobs-growth-investment/plan/index_en.htm

5. http://ec.europa.eu/priorities/jobs-growth-investment/plan/efsi/index_en.htm

the S3P-Energy is currently supporting the regions that share similar/complementary energy priorities in their S3 strategies to mobilize concrete investment projects by facilitating the creation of “**S3 Energy Partnerships**” that offer interactive and participatory arenas for interregional cooperation⁶. The S3P-Energy collaboration helps regions to combine complementary strengths, exploit their competences in R&I, build-up necessary research capacities, overcome the lack of critical mass and fragmentation, gain better access to the global value chains, and foster co-investment in energy⁷. The S3P-Energy has created an online registration form for policy makers/ stakeholders with competences/interests in innovation and energy policies as the best way to identify regional interests and allow participants to follow the progress of S3P-Energy platform. With this tool, the aim is to update and receive feedback from interested stakeholders about the implementation of S3 related to energy.



S3P-Energy has facilitated the engagement of more than 60 EU regions as members of the interregional partnerships in five specific energy areas.

- An **interactive capacity mapping**⁸ containing relevant socio-economic and energy indicators, as well as the existing industrial and research capacities in the region. The capacity mapping exercise allowed an overview of the energy sector core stakeholders, providing a number of key areas of common challenges and interests as a basis to further define cooperation areas and opportunities for value chain integration.
- **ESIF Energy Monitoring tool**. This tool will allow searching in the European Structural and Investment Funds (ESIF) Operational Programmes the planned investments in energy. The aim is to identify regions/Member States with similar interests in different fields related to energy and analyse patterns and areas of investment.
- **Communication and dissemination activities**. The S3P-Energy operates on the basis of a structured communication strategy which is conducted by using several communication channels: S3P-Energy webpage⁹, social media¹⁰, mailing list to key stakeholders and database of strategic partners at European, national and regional level, and email¹¹. Targeting regions and stakeholders related to smart specialisation process on energy, the main contributions of this communication strategy rely on the common sharing of results achieved on energy and smart specialisation, progress of interregional cooperation and effective use of European cohesion funds for energy.
- Identification and dissemination of **good practices** related to the implementation of innovation and energy-related investments, to interregional collaboration and joint investments on energy and examples of synergies between ESIF and other funding sources.

These activities are carried out by the JRC in close collaboration with other Directorates General of the

6. For more information on the S3 Energy Partnerships, <http://s3platform.jrc.ec.europa.eu/s3-energy-partnerships>

7. There is an Open Call for S3 partnerships on energy at https://ec.europa.eu/eusurvey/runner/S3_Energy_Partnerships_Eol

8. <http://s3platform.jrc.ec.europa.eu/mapping-regional-s3-priorities-in-energy>

9. <http://s3platform.jrc.ec.europa.eu/s3p-energy>

10. Twitter account @S3Platform and specific hashtag #S3PEnergyr

11. The S3P-Energy has a functional email as common contact point with its staff: JRC-B3-S3PLATFORM-ENERGY@ec.europa.eu

European Commission, such as DG REGIO and DG ENER.



The online registration of the S3P-Energy is publicly accessible

The S3P-Energy has also developed a **virtual community**¹² with the objectives of:

- **Sharing information:** every member (participating countries and regions or experts) can download documents or upload new ones.
- Encouraging the debate: through a “Discussion space” structured by topics (every member can contribute to existing debates or open new ones).



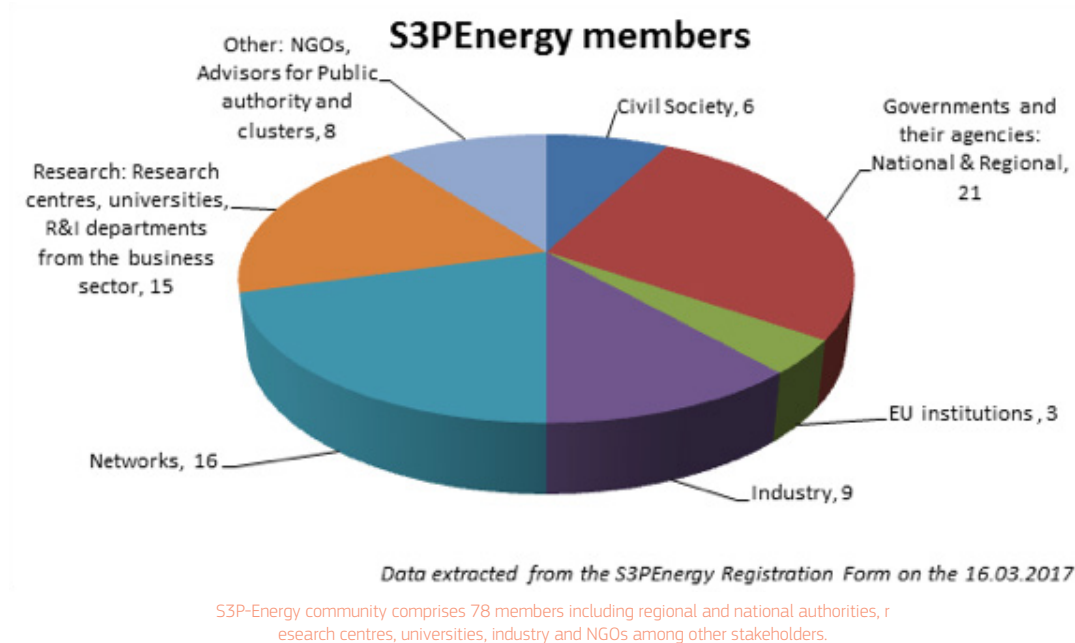
S3P-Energy virtual community

12. <http://rcp.jrc.es/group/s3p-energy/dashboard>;

Impact

The S3P-Energy is engaging stakeholders in charge of energy policies at national and/or regional level. Currently, the S3P-Energy community includes 78 energy innovation-profiled members representing 41 different regions.

The portfolio of services, tools and assistance provided by the S3P-Energy to member states and regions has created a significant impact in terms of interregional cooperation and mutual learning. The platform has facilitated the engagement of more than 60 EU regions as members of the interregional partnerships on Sustainable Buildings, Bioenergy, Marine Renewable Energy, Smart-grids and Solar. The S3P-Energy will also support the creation of new partnerships on other key areas of specialisation in energy upon joint request from EU Member States and regions. Since 2015, the S3P-Energy has also organised and participated in more than 50 thematic workshops engaging stakeholders across Europe in charge of elaboration and implementation of the S3 and energy policies.



15

Helping unleash energy efficiency potential in heating and cooling

Type of support / service available

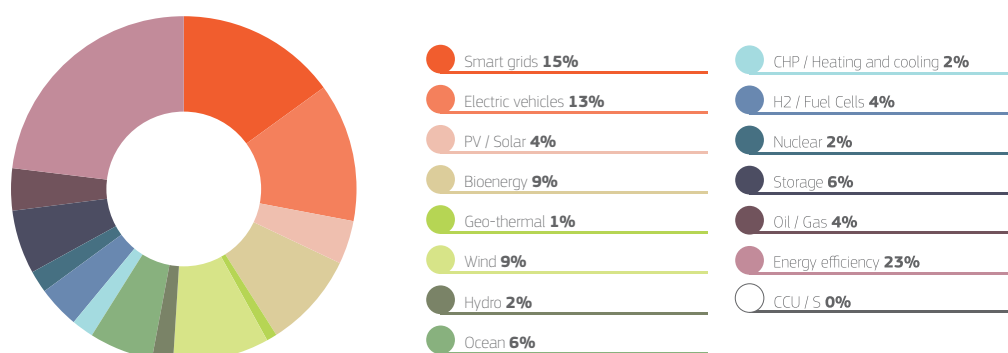
The JRC supports regions with interests in sustainable heating and cooling (H&C) to make the best use of Cohesion and research and innovation funds. The initiative is integrated in the activities carried out by the Smart Specialisation Platform on Energy (S3P), jointly developed by the JRC, DG REGIO and DG ENER¹. The JRC provides guidance materials, promotes knowledge sharing and information tailored to facilitate decision-making on heating and cooling technology solutions, and informs about financing options.

In particular, JRC provides:

- **Regional mapping** on interests and issues related to heating and cooling to foster cooperation amongst regions
- **Technical assistance** in the definition of regional heating and cooling strategies focused on the most promising technologies including amongst others; district heating and cooling, cogeneration, waste heat from industry, solar heat or geothermal
- **Financial support** on existing mechanism to fund heating and cooling projects and best utilising of the European Structural and Investment Funds (ESIF funds), also in combination with other financing sources, like the European Fund for Strategic Investments (EFSI funds)
- **Policy recommendations** on how to draft regional heating and cooling strategies and on how to align national and regional energy strategies.

Relevance for regional authorities

The heating and cooling (H&C) sector represents about half of the energy consumption at national level, and 75% is still provided by fossil fuels. As it is commonly recognized, the potential to improve energy efficiency and to decarbonise the H&C sector is significant.



Energy efficiency is the key priority for regions and countries in the smart specialisation strategies in the area of energy.

S3P Energy platform and related activities provides regional authorities with information about available H&C technology solutions, most cost-efficient solutions, identifies energy service companies (ESCOs) and financing schemes, explores how to access European Structural and Investment Funds, etc. JRC supports the regions in defining and planning the financing of envisaged projects.

1. <http://s3platform.jrc.ec.europa.eu/>

Policy context

European Cohesion and research and innovation funds support implementation of regional policy in the EU following the objectives of the Europe 2020 strategy². For example, the European Regional Development Fund (ERDF) has innovation and research and the low-carbon economy among its key priorities. Funds support the implementation of efficiency improvements as well as job creation and enhanced competitiveness of a region.

The Energy Union strategy³ and several Directives state that energy efficiency is a priority in order to transform the energy system. EU has committed to reach the 20% energy efficiency target by 2020. In 2016 the Commission proposed a new 30% energy efficiency target for 2030. In addition, the EU Heating and cooling strategy (2016)⁴ aims at improving energy efficiency and sustainability in the heating and cooling sector. It aims at reducing energy imports and dependency, intends to cut costs for households and businesses, and to deliver greenhouse gas emission reductions.

How to use

The dedicated heating and cooling section set in the S3P-E platform offers regional stakeholders the following services:

- **Inter-regional cooperation.** The heating and cooling dedicated section in the S3P-E platform allows regions to identify potential partners with common interests, share project ideas ask for support or understand how other regions overcame barriers to developed projects in the area
- **Success stories repository.** This section will inspire regions on how to set up new initiatives. Success stories include information on technical solutions, utilisation of financial instruments or involvement of stakeholders
- **Case studies on financial instruments.** Three case studies on how to make ideas proposed by regions into real projects via the utilisation of available funding mechanisms are accessible via the platform. Opportunities offered by EIB (European Investment Bank), EBRD (European Bank for Reconstruction and Development), ESIF (European Structural Investment Fund), or ERDF (European Regional Development Fund) are discussed in the case studies
- **Policy recommendations.** Based on the information provided by regions related to current situation of H/C, common challenges and barriers, best practices and successful cases, JRC provides recommendations to accelerate the governance process regarding heating and cooling initiatives in regions
- **S3P-E platform support.** Synergies can be established with other energy-related topics via the utilisation of the platform. Information on technologies factsheets⁵, ongoing regional partnerships⁶ or related EU energy initiatives could be accessed via the general energy platform.

Impact

- Improved use of Cohesion and research and innovation funds for those regions with particular interests in the thematic area of sustainable heating and cooling (H&C)
- Improved knowledge about available cost-effective heating and cooling technology solutions and their financing options from EU Cohesion and innovation and research
- Unleash economic energy efficiency potential at regional level.

2. http://ec.europa.eu/europe2020/index_en.htm

3. https://ec.europa.eu/commission/priorities/energy-union-and-climate_en

4. <https://ec.europa.eu/energy/en/topics/energy-efficiency/heating-and-cooling>

5. <http://s3platform.jrc.ec.europa.eu/technologies-factsheets>

6. <http://s3platform.jrc.ec.europa.eu/s3-energy-partnerships>

16

Optimising investments for the digitalisation of energy solutions

Type of support / service available

Support in mapping and assessing digitalisation of energy transitions including: smart grid projects, retail market regulations, integration of consumers/prosumers, energy vulnerability/poverty. JRC can help identifying actors, funding sources and facilitate lessons learned and best practices compiled in a wealth of projects:

- Smart Grid Project Outlook, with knowledge and insights on almost a thousand projects, for a total investment of ca EUR 5 billion¹
- Distribution System Operators observatory with the most comprehensive data collection exercise on European distribution systems in Europe²
- Cost-benefit methodologies and use cases, applied to smart meters deployment and smart grids in Europe and elsewhere³
- The social dimension of digital energy⁴
- Smart Specialisation Platform on Smart Grids, where all the European regions interested in the digitalisation of energy interact and develop common approaches⁵.

Relevance for regional authorities

Within the energy field, the digitalisation of energy (and in particular smart grids) is identified by many regions as a priority in the context of their Smart Specialisation Strategy (S3). Smart grid and retail market research and innovation projects - in particular demonstration and pilot projects - usually require large investments and the level of risk associated to them is generally higher than for normal investments. Indeed several uncertainties, for instance, about the performance, reliability and life span of the adopted technology, consumer response and project replicability, can affect the investment decision and the smart grid solutions deployment.

Policy context

The digitalisation of energy is transforming regions, cities and local communities. Smart grids are energy networks that can automatically monitor energy flows and adjust to changes in energy supply and demand accordingly, facilitating the introduction of renewable sources. When coupled with smart metering systems, smart grids reach consumers and suppliers by providing information on real-time consumption. This enables new services, empowers the end consumer and opens new opportunities for the creation of jobs and growth. This smart metering and smart grids rollout can reduce emissions in the EU by up to 9% and annual household energy consumption by similar amounts. The European Commission's Proposal for a DIRECTIVE on common rules for the internal market in electricity (recast) states that all consumers should be entitled to request a smart meter from their supplier.

How to use

1. Mapping and assessing Digital Energy projects

The Smart Grid Outlook and the S3P platform on Smart Grids can help in answering questions like: what applications are closer to commercialization? What are the drivers and barriers on their path to deployment? What opportunities are shaping up for the European industry? What are the main actors and the synergies among them? Which is the potential for community efforts regarding renewable sources and storage? Etc.

1. <http://ses.jrc.ec.europa.eu/smart-grids-observatory>

2. <http://ses.jrc.ec.europa.eu/distribution-system-operators-observatory>

3. <https://ses.jrc.ec.europa.eu/smart-grid-cost-benefit-analysis>

4. <https://ses.jrc.ec.europa.eu/consumer-engagement-future-electricity-system>

5. <http://s3platform.jrc.ec.europa.eu/s3p-energy>

17

PVGIS: estimating photovoltaic electricity production at local level

Type of support / service available

The PVGIS online tool (PhotoVoltaic Geographical Information System) allows users to make estimates of photovoltaic (PV) energy output at any location over large geographical regions. It has been running successfully for over 15 years and at the time of writing covers Europe, Africa, most of Asia and most of the Americas. PVGIS also makes geospatial data sets available for download, which can be used in GIS software, and produces summary statistics for solar radiation and PV energy output for countries and regions in Europe. More detailed geospatial studies can also be made using the PVMAPS software, which runs as part of the open-source GRASS GIS software. Finally, a 30-year high-resolution time series of solar power generation at EU country, bidding zone, NUTS-1 and NUTS-2 level is available as part of the JRC's EMHIRE dataset¹, generated using PVGIS's algorithms.

Relevance for regional authorities

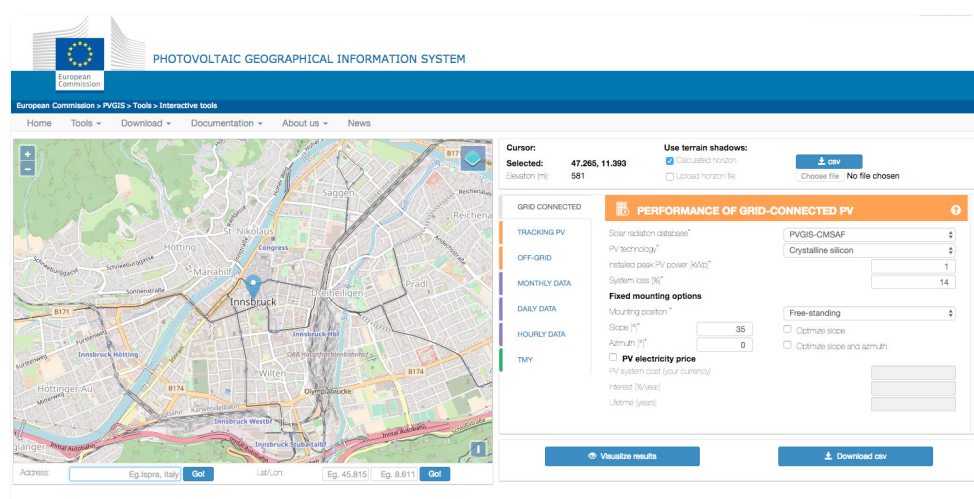
PVGIS is useful for local authorities who are planning installation of PV on public buildings or are preparing sustainability plans, for instance for the Covenant of Mayors. Local regulation of PV and other solar energy installations can also benefit from having access to assessments independent of commercial interests.

Policy context

Photovoltaics and other forms of solar energy are critical to meeting EU targets for renewable energy in 2020 and for the transition to a clean and sustainable energy system by 2050.

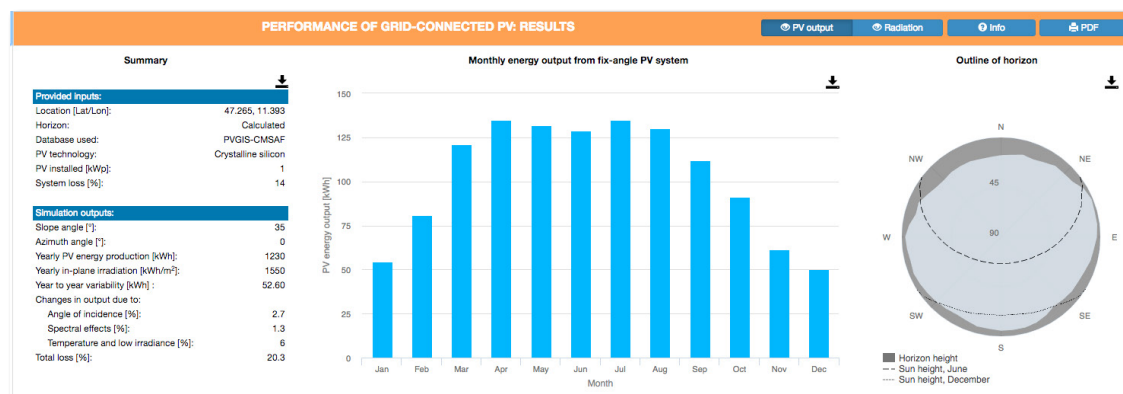
How to use

PVGIS is freely accessible online². The figure below shows the latest version of the user interface. The user can easily produce estimates of PV electricity production simply by entering a few pieces of information about the PV system. It includes options for different PV technologies and different system configurations, including building integrated systems, sun-tracking systems and stand-alone systems with energy storage by batteries. PVGIS has a 'getting started' page³, available in English, French, Italian, Spanish and German and a user manual⁴.



PVGIS user interface.

1. <https://ec.europa.eu/jrc/en/scientific-tool/emhires>
2. <http://re.jrc.ec.europa.eu/pvgis.html>
3. http://re.jrc.ec.europa.eu/pvg_static/en/intro.html
4. http://re.jrc.ec.europa.eu/pvg_static/en/manual.html



Example of output from PVGIS.

The figure above shows an example of the output produced directly in the web browser. The results can also be downloaded for import into spreadsheet software, or as a PDF file for easy viewing and printing. If a larger number of sites are needed, all the PVGIS functionality is available also as a web service⁵ with automated calculations. The EMHIRES 30-year solar power time series can also be accessed online⁶.

Contact:

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- Ewan Dunlop (ewan.DUNLOP@ec.europa.eu)
- Iratxe GONZALEZ APARICIO (Iraxte.GONZALEZ-APARICIO@ec.europa.eu) for EMHIRES

Impact

- PVGIS helps regional and local policy-makers to assess the potential for PV and other solar energy installations for single locations or discrete sets of locations
- PVMAPS can be used to perform geospatial estimates of PV performance, suitable for estimating the solar energy potential over the complete area of a region
- PVGIS is free for everybody to use and can help develop a more informed debate about local and regional sustainability goals.

5. http://re.jrc.ec.europa.eu/pvg_static/web_service.html

6. <https://setis.ec.europa.eu/EMHIRES-datasets>

18

Transport tEchnology and Mobility Assessment Platform (TEMA)

Type of support / service available

Big data in support of regional mobility and vehicle emissions analysis. TEMA (Transport tEchnology and Mobility Assessment platform) is a flexible and modular big data platform, based on GPS mobility data and interfaced with GIS-based digital geographic mapping systems. It aims at harnessing the potential of big data in support to transport policy, performing a wide-range of mobility analyses. It characterises the driving behaviour of the vehicles at a regional level and investigates the potential of innovative vehicle technologies nested in complex transportation systems. The platform is designed also to serve real-world vehicle emission applications. It evaluates driving and evaporative gaseous emissions from conventional fuel vehicles and eco-innovation technologies assessments.

Relevance for regional authorities

The tool can support smart city and smart region policies in the frame of low carbon mobility and sustainable transport systems development. TEMA contributes to enhance the understanding of the potential of innovative vehicle technologies to cover real-world mobility demand and quantifying their impact in terms of energy, efficiency, environmental impact and sustainability. It is conceived and designed as a flexible and modular platform, capable to be adapted for supporting several aspects of EU transport and energy policies.

Policy context

The Energy Union Strategy and related Action Plan, as well as the European Strategy for Low-emission Mobility, highlight the need to increase the efficiency of transport system, foster the deployment of low emission alternative energy for transport and move towards low and zero-emission vehicles. Directive 2014/94/EU on the deployment of alternative fuels infrastructure requires Member States to develop national policy frameworks for the market development of alternative fuels and their infrastructure.

How to use

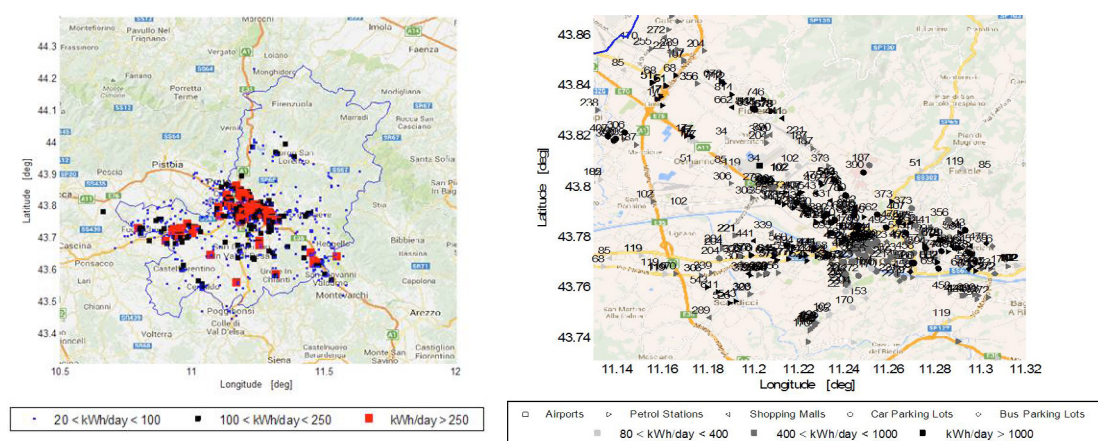
TEMA includes three macro-modules:

- **Travel behaviour:** statistical mobility processing module
- **E-mobility:** Hybrid Electric Vehicles/Electric Vehicles simulation module, Electric Vehicles usability in urban environment and modal shift; Energy spatial and time analysis module, GIS-based spatial distributions of energy demand and offer; Optimised customer-driven recharging infrastructure design based of points of interest (POI); Vehicle to Grid (V2G) applications; Utility factors; In-vehicle battery durability assessment, in support to the UN/ECE electric vehicle and environmental regulatory activities
- **Vehicles' emissions:** Evaporative emissions simulation module; Cold start and driving emissions simulation module; GIS-based spatial distributions of emissions.

Based on our experience, TEMA can be used for supporting the European development of low-carbon road transport policies in the areas of:

- Quantification of the real world potential of deploying electrified vehicles within urban areas accounting for different electric vehicles penetration shares under different technological and infrastructural constraints
- Quantification and geo-referencing the shift from oil to electric energy and the impact on the electricity distribution grid from the deployment of EVs

- Evaluation of the driving and evaporative real world emissions from the current fleet of conventional vehicles and the gaseous emissions reduction potential from the introduction of new vehicle technologies
- Evaluation of the Utility Factor (UF), based on collected vehicle activity data to evaluate the real world conditions of use of plug-in hybrid electric vehicles
- Evaluation of the future market competition and new business opportunities offered by the diverse scenarios considered
- Assessment of the in-vehicle battery durability, in support to the United Nations Economic Commission for Europe (UNECE) electric vehicle and environmental regulatory activities.



Extract from the geo-referenced energy demand results, province of Firenze, (left). Recharge infrastructure needed to sustain the demand (right).

Further information is available at JRC's website Science Hub¹.

Impact

TEMA contributes, among others, to supporting the development of real-world scenario and road transport policies, thus allowing the design of regional-tailored policies for the electrification of transport. It also supports recharge infrastructure deployment, with impact on recharging columns manufacturers and the development of regulation for enhanced automotive battery durability and second usage, thus reducing the life-cycle environmental footprint of automotive batteries. Additionally, it contributes to the deployment of vehicles with zero tailpipe emissions, thus reducing pollutants in urbanised areas.

1. <https://ec.europa.eu/jrc/en/publication/big-data-visions-towards-development-low-carbon-road-transport-policies>

19

Optimal allocation of electric-vehicle charging infrastructure in cities and regions

Type of support / service available

JRC has developed a methodology to identify optimal locations of electric vehicle (EV) recharging stations within a large region. This is the GIS (Geographic Information System) methodology, based on open source tools.

Relevance for regional authorities

The methodology can assist regional authorities to allocate recharging points for EVs in urban environments, national and regional road networks, as well as motorways. This is important to avoid stranded vehicles, on the one hand, while, on the other hand, facilitating a broader use of electricity in road transport. The methodology developed is based on the hypothesis that EV drivers in urban areas will be an integral part of a smart city and their recharging needs can be accommodated within a smart urban planning approach. Hence, the methodology tries to solve the problem of optimal allocation of the recharging infrastructure within an urban planning approach. As such, it is based on geospatial data that is typically available at local, regional, or national authorities.

Policy context

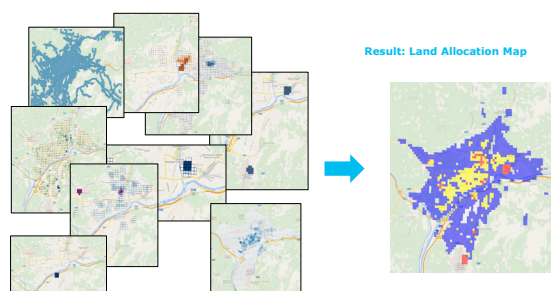
The European Commission regards alternative fuels as an important option to sustainable mobility in Europe. The Clean Power for Transport package, adopted in 2013, aims to foster the development of a single market for alternative fuels for transport in Europe. It contains a Communication laying out a comprehensive European alternative fuels strategy [COM(2013)17] for the long-term substitution of oil as an energy source in all modes of transport. The Directive on the deployment of alternative fuels infrastructure (2014/94/EU) requires Member States to develop national policy frameworks for the market development of alternative fuels and their infrastructure, including electricity and recharging points for EVs. The JRC method can help authorities to implement the national policy frameworks for electro-mobility in an efficient and optimal way.

How to use

Particular characteristics of the approach are its versatility and ease of use. The methodology can be easily implemented by local or regional authorities as it relies mainly on data readily available to them¹. Local authorities and network operators have to assist in the collection of required data that are difficult to find from other sources. Typical information required is population and housing census data, parking places, electricity network, points of interest, road network and already installed recharging points.

The methodology was already applied to two different cases:

- At city level (urban road network), where high-potential areas for the installation of recharging points are identified (pilot study was made for the city of Bolzano/Bozen, see accompanying image)



Urban road network: Land allocation map obtained via map algebra and weighting factors on raster layers.

1. The methodology is described in the report "Optimal allocation of electric vehicle charging infrastructure in cities and regions" <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/optimal-allocation-electric-vehicle-charging-infrastructure-cities-and-regions>

- At regional or national level (national and regional road networks and motorways), where the methodology provides explicitly the suggested locations, namely, the charging stations should preferably be placed in already built areas, gas stations or rest areas, to minimize additional investment costs (pilot study was performed for the province of Alto Adige/Südtirol).

Impact

The methodology can be used to support the implementation of the Directive on the Deployment of Alternative Fuels Infrastructure (2014/94/EU), thereby assisting Member States to enhance deployment of EVs and their recharging infrastructure. Regarding the analysis of the motorway network, the methodology could provide additional input in studies that analyse the inter-connection of motorway corridors across member states throughout Europe (e.g., on the Trans-European Transport Network (TEN-T) Corridors and Core Network).

The image features a minimalist design with a solid orange background. A thick white vertical line runs down the left side, and a thick white horizontal line runs across the middle. A diagonal white line starts from the intersection of these two lines and extends towards the bottom right corner. The text 'IV Environment' is positioned in the upper left area, with 'IV' in a large, bold, sans-serif font and 'Environment' in a smaller, bold, sans-serif font below it.

IV

Environment

20

Development of Green Public Procurement (GPP) criteria

Type of support / service available

Guidance on how to complete public procurement tenders can encourage the provision of environmental beneficial goods and services.

This guidance consists in providing product- and service-specific green public procurement criteria. These ready-to-use criteria are developed in close co-operation with all interested stakeholders, namely industry, NGOs and Member States, and represent the state-of-the-art description of how specific goods and services can be purchased in a more environmental friendly way.

In order to be of use in all EU regions, GPP criteria are downloadable for free in all official EU languages¹.

Relevance for regional authorities

Public authorities across Europe purchase works, goods and services equivalent to around 14% of European GDP/year, respectively EUR 1,8 trillion in 2015.

This important volume of consumption can be a powerful driver for moving products, sectors and markets towards a better environmental performance. In other words, the objectives of this support are reducing the environmental burden of publicly purchased goods and services, plus encouraging companies to develop environmentally better performing products and services in order to comply with green public call for tenders.

Guidance on how public procurement tenders can be formulated in a way to incentivize the provision of environmental beneficial goods and services is provided by the European Commission for a broad range of sectors, spanning from IT equipment to office buildings and road construction.

Where needed and possible, GPP criteria are developed with a view to local or regional conditions, i.e. in the GPP for road construction where the use of locally available material is favoured.

Policy context

In its Communication “Public procurement for a better environment” (COM(2008)400), the European Commission defines Green Public Procurement as “a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life-cycle when compared to goods, services and works with the same primary function that would otherwise be procured.” The Communication serves as framework legislation, as no specific sectors, goods or services are mentioned.

On behalf of DG Environment, JRC develops Green Public Procurement criteria for a broad range of goods and services, including, for example, Office Buildings, Road Construction, or Computers. These criteria are based on a scientific analysis of the technical, economic and environmental characteristics of the specific good/service in question. From this analysis a set of criteria is derived that is best suited to address the environmental best performing products on the market.

The criteria development process is carried out in a permanent exchange with stakeholders from industry, NGO and Member States in order to ensure a high degree of real world applicability of the criteria. Close contact with the final target group – procurers at regional and municipal level – helps to maximize the added value of the criteria.

1. European Commission GPP site: http://ec.europa.eu/environment/gpp/index_en.htm

How to use

Criteria are available for a broad range of product groups, which have been identified with the help of procurement practitioners across EU28. An overview can be found at:

- European Commission GPP site²
- Joint Research Centre Product Policy Support³.

The criteria are developed as core criteria, with some environmental ambition, and comprehensive criteria, for those procurers who aim for environmental excellent performing products and services.

The criteria are available in all official languages of the EU so that procurers throughout EU28 can make use of them. The criteria are designed so that procurers can use the set as a whole, or just chose those criteria best fitting the intended objectives and adapting them to local or regional conditions. In the case of Office Buildings it is, for example, stipulated that for setting GPP criteria:

- The specific conditions of the local market for construction material need to be taken into account
- The criterion for low carbon energy sources could be varied based on the local context
- The share of recycled or re-used content needs to be adapted to local availability of those materials.

Impact

The impact of the policy is twofold. Firstly, GPP criteria have a direct impact through reducing the environmental burden of publicly purchased goods and services. Secondly, GPP criteria have an indirect impact through encouraging companies to develop environmentally better performing products and services in order to comply with green public call for tenders. This is particularly relevant for sectors which are, to a large extent, depending on procurement such as, for example, printers, which make up for far more than 50% of sales for the most important companies.

Procurers are supported by GPP criteria to implement the environmental objectives of their respective organization, with the possibility to adapt them to their specific local or regional needs.

1. http://ec.europa.eu/environment/gpp/index_en.htm

2. http://susproc.jrc.ec.europa.eu/product_bureau/index.html

21

Best Environment Management Practice for the Public Administration and Other Priority Sectors

Type of support / service available

JRC develops the EMAS Sectoral Reference Documents (SRDs) on Best Environmental Management Practices (BEMPs) for eleven priority sectors¹. One of the priority sectors is Public Administration where the identified BEMPs focus on how to help public sector organisations, primarily local and regional government, improve their environmental performance, by adopting practical initiatives, measures, techniques and actions implemented by the best performing (frontrunner) organisations within the sector.

The BEMPs also include environmental performance indicators that allow the organisations to monitor the performance of their environmental management, plus benchmarks of excellence, which provide an indication of the levels achieved by the frontrunners and can be taken as inspiration (but are not set as targets to reach).

Public sector organisations that wish to improve their performance can refer to the Best Practice report for this sector, which compiles detailed information on how to implement the BEMPs. The Sectoral Reference Document (SRD) is a shorter legal text which summarises all the BEMPs and presents the environmental performance indicators as well as benchmarks of excellence.

For specific issues, public sector organisations will also usefully refer to the SRDs and best practice reports for other relevant sectors, e.g. waste management or tourism (cf. destination management).

JRC identifies the BEMPs based on a deep analysis of existing publications and through close collaboration with expert stakeholders from the sector, such as waste authorities, waste advisers, NGOs etc.

Relevance for regional authorities

Public Administrations and other organisations throughout the EU can deliver significant environmental benefits by improving their environmental performance, both through their direct environmental impacts and through leveraging improvements in the territory under their administration.

The BEMPs for the Public Administration sector is targeted primarily at local and regional authorities. It provides clear, practical guidance on how to improve their environmental performance, addressing a broad range of issues in the fields of: sustainable offices; sustainable energy and climate change; mobility; local ambient air quality; land use; noise pollution; water supply and waste water management; green urban areas; green public procurement; environmental education; and dissemination of information to citizen and businesses.

Policy context

The work on identifying BEMPs is part of the implementation of the EMAS (Eco Management and Audit Scheme) Regulation, a voluntary framework for organisations to evaluate, report and improve their environmental performance. As such, the EMAS Sectoral Reference Document for the public administration sector is published as a Commission decision and needs to be taken into account by EMAS-registered organisations from the sector.

However, the Document (and the Best Practice report with a more in-depth description of BEMPs) is not only relevant for EMAS verified organisations, but is also intended to be a useful and inspirational reference document for any relevant organisation of the sector. It presents comprehensive best practices that can be broadly applied by companies and local / regional authorities dealing with waste management that wish to improve their environmental performance.

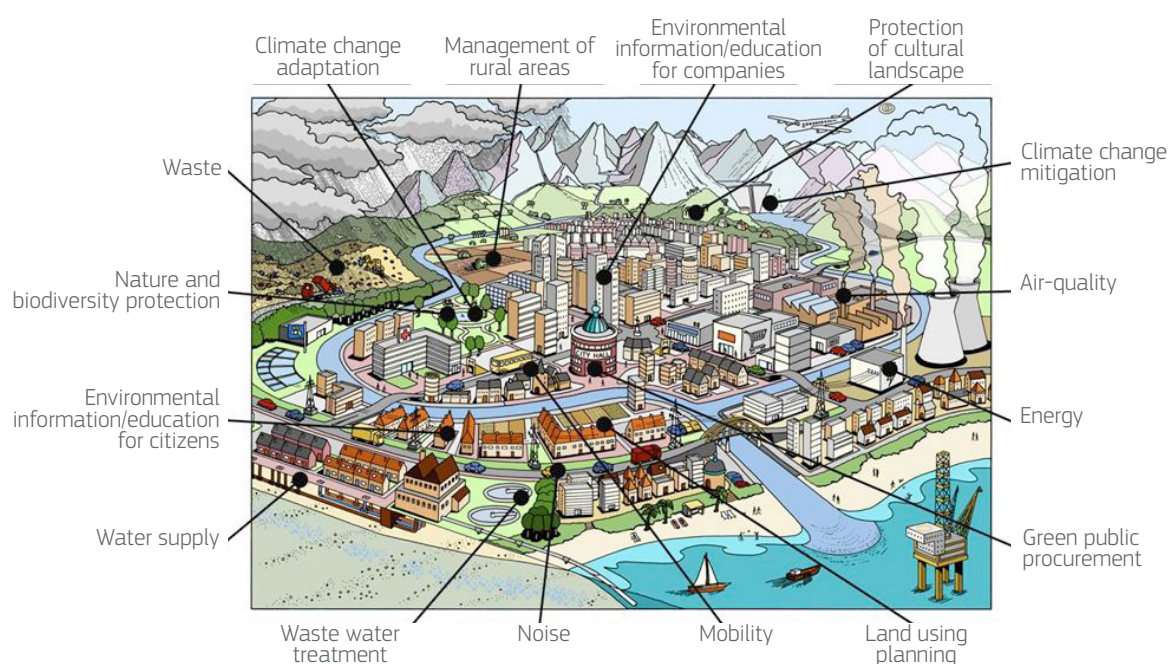
¹ The 11 priority sectors are: Retail, Tourism, Construction, Public Administration, Agriculture, Food and Beverage manufacturing, Electrical and Electronic Equipment manufacturing, Car manufacturing, Waste management, Telecommunication and ICT services and Fabricated Metal Products.

How to use

Public Administrations and other organisations that wish to improve their environmental performance or their environmental management system will find in the BEMPs a relevant updated source of information to achieve these goals. They can use the reference documents to identify the most relevant areas for action.

BEMPs for the sector include three key elements: detailed information on how to implement best practices and address key environmental aspects; environmental performance indicators to monitor their environmental performance through time, or even to compare performance between different sites or organisations; and benchmarks of excellence to provide aspirational references.

The diagram below illustrates the different areas where Public Administrations will find detailed Best Practices to help them reduce their environmental impact.



Areas covered in the Sectoral reference document for the Public Administration on Best Environmental Management Practices.

For instance, a broadly applicable chapter which will be applicable to many sites managed by Public administrations is the one on sustainable offices, addressing issues such as energy and water use, waste production, paper and consumables, commuting and business travel, canteens and coffee bars or the organisation of meetings and events. This chapter is in fact of broader relevance to all office buildings managed by any organisation.

The following website gives access to the best environmental management practices for the Public Administration sector, including the Best Practice report. It also provides contact details and how to get involved: http://susproc.jrc.ec.europa.eu/activities/emas/public_admin.html

Organisations interested in waste management can follow the development of the work for that sector at the following link: http://susproc.jrc.ec.europa.eu/activities/emas/waste_mgmt.html

Further information can be also asked via contacting JRC-EMAS-SRD@ec.europa.eu

Impact

The public administration sector is made up of over 90,000 organisations throughout Europe. The vast majority of these organisations are concentrated at local level and fall under the competence of municipalities. The average EU subnational public sector expenditure in 2010 was about 17% of the total GDP. Their engagement in driving society towards sustainability is of great importance. Municipalities and local authorities are responsible for activities ranging from land use planning to waste water treatment or local transport and mobility. They have direct or indirect influence over activities with significant environmental impact. Public administrations taking a leading role can demonstrate what is possible and stimulate others to follow, and implementing best practices can result in a substantial reduction of environmental impact.

22 Addressing thirsty regions and cities

Type of support / service available

JRC is providing scientific support to the implementation of a range of EU policies, some directly related to water and others affecting status and availability of water through regulations of sectoral activities (e.g. the Common Agricultural Policy). JRC is also engaged in the development of the European Innovation Partnership, which identifies water as an area where innovation is necessary to set Europe on a path to sustainable growth. Working together with regions, JRC facilitates joint building of assessment capacity of future water resources under present and a changing environment (e.g. climate change, land use) and contributes to the harmonization across countries of the implementation of EU-water policies in a transboundary context.

Relevance for regional authorities

JRC knowledge could be used to support the implementation of cross-border strategies exploring opportunities for economic growth and water-energy-food security in European regions. By providing scenario and trade-off analyses of socio-economic and environmental consequences of changing pressures on water it could help prioritize and assess the effectiveness of investment mechanisms across different sectors (energy, food, industry, urban, environment, tourism).

Policy context

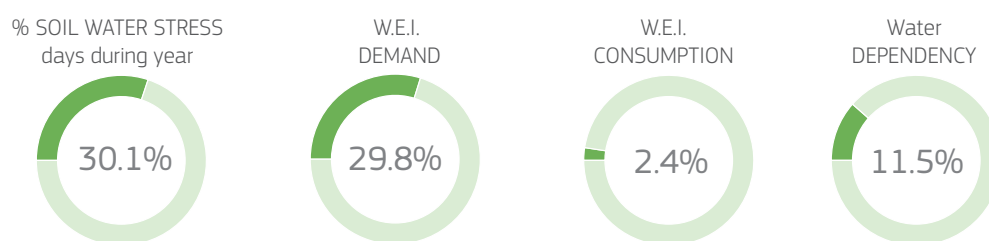
The 2015 Sustainable Development Goal (SDG) 6 on Clean Water and Sanitation aims to ensure access to water and sanitation for all, as part of an international effort to fight inequalities and tackle climate change. In order to quench the growing thirst of regions and cities, we need to manage water intelligently. Water is an irreplaceable resource for society, but it is only renewable if well managed. The JRC initiatives cut across several pieces of water-related legislation, including the Water Framework Directive (WFD), the Urban Waste Water Treatment Directive, the Drinking Water Directive, the Nitrates Directive.

How to use

JRC has developed a hydro-economic model to assess the impact of policy, nature-based and technological measures on water resources availability at European scale. It allows an analysis of scenarios of socio-economic impacts of alternative water allocation measures across competing water-using sectors (e.g. agricultural irrigation, human consumption, cooling of thermal power plants, hydropower generation, farming and production of biofuels) for the years 2030-2050, including an assessment of the provision/valuation of ecosystem services provided by aquatic ecosystems. The water portal¹ serves as the gateway to JRC's products on freshwater resources, providing access to water data, publications, and maps, as well as to water projects and events. In collaboration with stakeholders and the International Convention for the Protection of the Danube River (ICPDR), JRC has taken the Danube as pilot river basin and compared results for other regions in Europe. This is intended to address the challenges of improving efficiency targets at sectoral level and help regional authorities in the assessment of the cost-effectiveness of the Programmes of Measures included in their WFD-River Basin Management Plans. Water is also a subject based on which bridges between cities regions and states can be built and developed. Thus, illustrating urban water issues in some 40 European cities (see graph for the city of Lodz, Poland), the recently published Urban Water Atlas for Europe² promotes and supports the application of sustainable practices in the use of water at a regional and municipal level, promoting also a dialogue between cities.

1. <http://water.jrc.ec.europa.eu/waterportal>

2. <https://ec.europa.eu/jrc/en/news/urban-water-atlas-europe-360-view-water-management-cities>. This publication has received funding from the EU's Seventh Framework Programme for research, technological development and demonstration under grant agreements no 619040 (DEMOWARE) and 642354 (BlueSCities).



Water demand and availability for the city of Lodz (Poland), based on the JRC's LISFLOOD model
W.E.I. stands for Water Exploitation Index (Urban Water Atlas for Europe, 2017).

Impact

This JRC initiative intends to stimulate ties and cooperation amongst stakeholders and research communities in European regions. For example, JRC work in the Danube Region contributed to evaluate the impact of policy measures and scenarios on water availability, demand and quality for the various sectors. By building on experience deriving from national projects, it also facilitated innovation transfer through, for example, the creation of Synthesis Centres on innovative wastewater treatment in the Lower Danube. Information obtained can be of direct use to stakeholders in a region and the lesson learnt, also in terms of methodological development, exportable to other river basins in Europe and beyond.

23

Best Environmental Management Practices for the Waste Management Sector

Type of support / service available

JRC develops the EMAS Sectoral Reference Documents (SRDs) on Best Environmental Management Practices (BEMPs) for eleven priority sectors¹. One of the priority sectors is Waste Management where the identified BEMPs focus on how to help waste management companies and waste authorities improve their environmental performance, by adopting practical initiatives, measures, techniques and actions implemented by the best performing (frontrunner) organisations within the sector.

The BEMPs also include environmental performance indicators that allow companies and waste authorities to monitor the performance of their environmental management; and benchmarks of excellence, which provide an indication of the levels achieved by the frontrunners and can be taken as inspiration (but are not set as targets to reach).

Organisations responsible for waste management who wish to improve their performance can refer to the Best Practice report for this sector, which compiles detailed information on how to implement the BEMPs. The Sectoral Reference Document is a shorter legal text which summarises all the BEMPs and presents the environmental performance indicators as well as benchmarks of excellence.

JRC identifies the BEMPs based on a deep analysis of existing publications and through close collaboration with expert stakeholders from the sector, such as waste authorities, waste advisers, NGOs etc.

Relevance for regional authorities

Household waste and similar commercial, industrial and institutional waste, is one of the most problematic categories of waste and among those with the highest potential for environmental improvement through better management. Throughout the EU, the management of this waste is typically a responsibility of regional/local government and needs support from citizens, for whom it is often a very visible aspect of sub-central government action.

The Best environmental management practices on Waste management addresses issues such as integrated waste management plans, prevention, re-use, collection and treatment of waste, with a focus on municipal solid waste, construction and demolition waste, and healthcare waste. It is mainly targeted towards waste authorities and waste managers/ contractors at the level of municipalities, cities, counties or regions.

Policy context

The work on identifying BEMPs is part of the implementation of the EMAS (Eco Management and Audit Scheme) Regulation, a voluntary framework for organisations to evaluate, report and improve their environmental performance. As such, the EMAS Sectoral Reference Document for the waste management sector is published as a Commission Decision and needs to be taken into account by EMAS-registered organisations from the sector.

However, the Document (and the Best Practice report with a more in-depth description of BEMPs) is not only relevant for EMAS-verified organisations, but is rather intended to be a useful and inspirational reference document for any relevant organisation of the sector. It presents comprehensive best practices that can be broadly applied by companies and local / regional authorities dealing with waste management that wish to improve their environmental performance.

1. The 11 priority sectors are: Retail, Tourism, Construction, Public Administration, Agriculture, Food and Beverage manufacturing, Electrical and Electronic Equipment manufacturing, Car manufacturing, Waste management, Telecommunication and ICT services and Fabricated Metal Products.

How to use

Local and regional authorities (as well as waste management companies) are the key target group for the Best Environmental Management Practices for the waste management sector. Organisations that wish to improve their environmental performance or their environmental management system will find in the BEMPs a relevant updated source of information to achieve these goals.

BEMPs for the sector include three key elements: detailed information on how to implement best practices and address key environmental aspects; environmental performance indicators to monitor their environmental performance through time, or even to compare performance between different sites or organisations; and benchmarks of excellence to provide aspirational references.

In particular, environmental performance indicators will enable local authorities to monitor and assess the performance of their municipal solid waste management. The document presents methodological approaches and practical steps that authorities can use to better understand and start improving the waste flows managed on their territories.

In addition, specific BEMPs describe in detail the steps to be put in place to implement best practice.

The JRC webpage on BEMPS for the waste management sector² gathers all the background information regarding the development of the EMAS Sectoral Reference Document on BEMPs for the Waste Management Sector. In particular, users will find available online the background report that supports the implementation of this work, the state-of-play of the work and other related background information. When the legal process is finalised, the final Best Practice report and Sectoral Reference document will also be published. In addition users will find contact details³ and how to get involved.

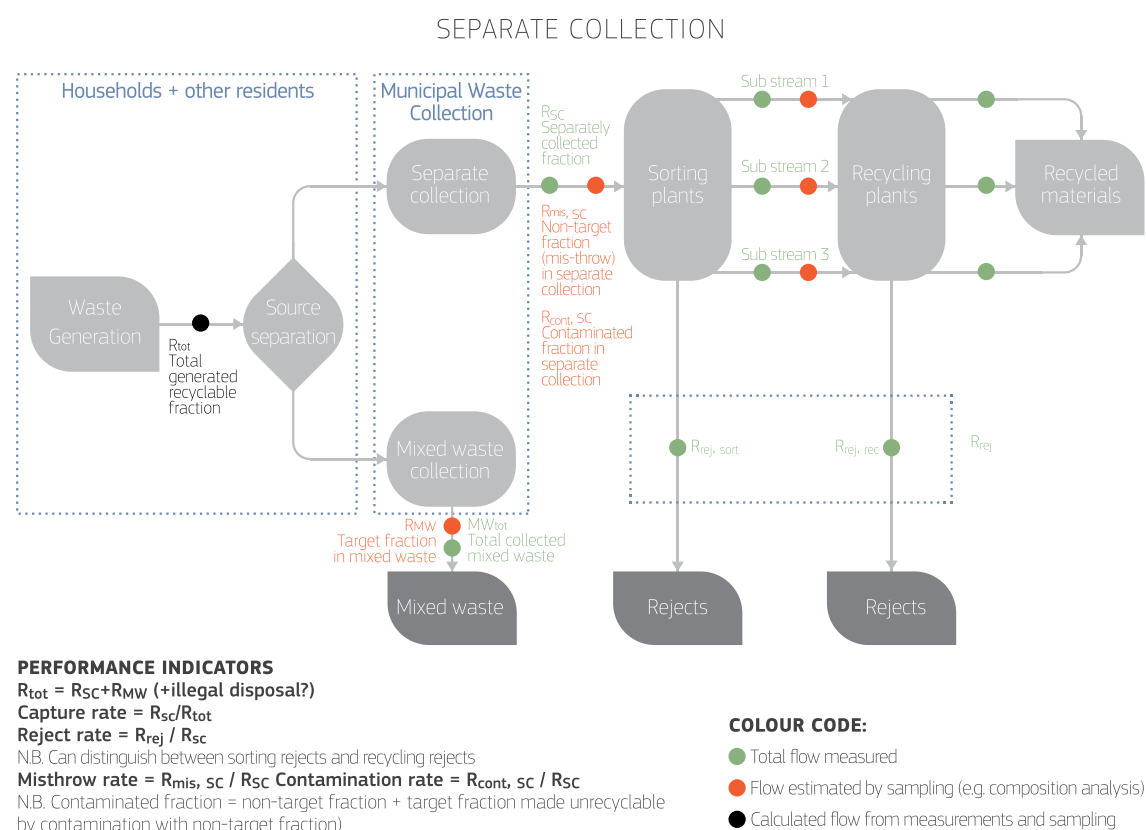


Diagram illustrating how monitoring principles can be used to produce relevant indicators.

² http://susproc.jrc.ec.europa.eu/activities/emas/waste_mgmt.html

³ JRC-EMAS-SRD@ec.europa.eu

Impact

Waste management is a key sector in terms of resource efficiency where broader uptake of best practice, going beyond regulatory requirements, facilitates reaping large environmental and societal benefits.

The reference document on best environmental management practice for the waste management sector⁴ is well aligned with the principles of the circular economy package and aims at helping regional and local authorities to improve their municipal waste management and recycling performance. Exchanging and disseminating these good practices will contribute to the European efforts of bringing all EU regions and municipalities to comparably high waste management and recycling standards.

Regional and local authorities, regardless of their starting point in terms of the environmental performance of their waste management, can benefit from using the BEMPs. These will help them better understand the current hotspots in their environmental impact, monitor more accurately and then improve their performance, by offering concrete solutions tailored to their situation.

⁴ The reference document on best environmental management practice for the waste management sector will be officially adopted by the Commission in the course of the year 2018. Once adopted, it will be available at: http://susproc.jrc.ec.europa.eu/activities/emas/waste_mgmt.html

24

SHERPA: A tool to support regional authorities in designing and assessing the benefits of air quality plans

Type of support / service available

The SHERPA tool (Screening for High Emission Reduction Potentials on Air quality) is a user-friendly interactive tool that can support regional and local authorities in designing air quality plans. By following a three stage process: Source Allocation, Governance and Scenario analysis, a policy maker can investigate how much of an improvement in air quality can be made from acting locally, in which sectors actions should be taken (City, Province, Region, State) and how much additional improvement can be gained from coordinating these abatement measures with neighbouring areas.

Relevance for regional authorities

National, regional and city authorities have a legal obligation to maintain certain levels of air quality in their territories. Whenever these values are not met, authorities are obliged to design plans to improve air quality. Part of the plan includes an assessment of the impact of the pollution abatement measures proposed. However national, regional and city authorities frequently lack the proper tools to perform such analysis (see the results of the APPRAISAL FP7 project¹). SHERPA has been designed to provide practical assistance to regional and local authorities in performing these tasks and designing air quality plans.

Policy context

Although significant progress has been made in Europe regarding air quality in recent decades (EEA, 2015), problems still remain acute for some pollutants. In 2015, 22 out of 28 EU countries did indeed report excesses of the 2008 Air Quality Directive (AQD2008) limit values, for O₃, NO₂ and/or Particulate Matter (PM₁₀) (EEA, 2015). While these air quality excesses were in the past widespread across Europe, they now tend to concentrate in specific regions like the Po Valley, the South of Poland area or the Benelux for PM, and in cities for NO₂². As mentioned above, authorities that exceed the air quality directive limit values are obliged to produce an air quality plan, analysing the impact of the measures that will be taken to avoid future excesses.

How to use

SHERPA is a user-friendly tool³ that allows for a rapid exploration of potential air quality improvements resulting from national/regional/local emission reduction measures. SHERPA takes the policy maker through the three-stage process described below.

1. **Source allocation:** the policymaker defines the area of interest (city, province, region, etc.) and SHERPA evaluates the degree of control that the policymaker has over air pollution within this area. If most of the pollution is due to emission occurring outside the area, this level of control will be low (and vice-versa). During this step, SHERPA provides information on: (1) the amount of pollution originating from outside the area under consideration; and (2) the breakdown in terms of activity sectors and precursors for the pollution originating from emissions from within the area.
2. **Governance:** The next step identifies the sources (regions, countries, etc.) and activity sectors of the air pollution originating from outside the area of interest. For example, primary emissions from agriculture take time to form secondary particulate matter and thus have an effect on air pollution

1. <http://www.appraisal-fp7.eu/site/index.php>

2. Kiesewetter et al., 2015

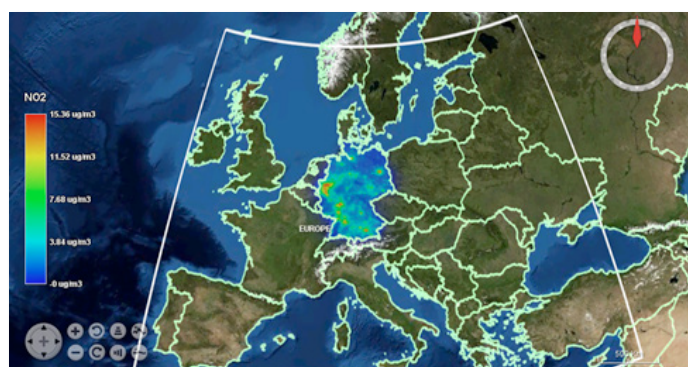
3. It is available for download from <http://aqm.jrc.ec.europa.eu/sherpa.aspx>

over longer distances than traffic emissions that directly impact concentrations at the local scale. This allows policy makers to assess the benefits of regional or even wider scale collaboration in order to increase the efficiency of their abatement strategies on a sectorial basis.



Example of scenario analysis result.

3. **Scenario analysis:** In the scenario analysis step, the policymaker can experiment with different sector-specific emission abatement strategies in terms of both intensity and spatial coverage (city, province, region, country, etc.) in order to identify realistic emission reductions that achieve the desired improvement in air quality for the chosen area.



Example of scenario analysis result.

Impact

SHERPA helps policy-makers do the following:

- Identify the maximum air quality improvement that can be achieved by acting only in their area of interest (city, province, region)
- Identify the key sectors and pollutants that can be the subject of abatement actions for this given area
- Identify the contribution to air quality in their area of interest that comes from emissions in neighbouring areas and the key sectors and pollutants
- Identify the potential additional gains in air quality in their area of interest from coordinated abatement strategies addressing not just their area of interest and key sectors, but also surrounding areas and their key sectors.

25

Supporting regions in the sustainable management of soil resources

Type of support / service available

JRC has developed a series of technical approaches to help regions assess the state of soil and key pressures acting on it. JRC can assist regions through technical assistance, training, analysis, modelling and study visits to support the development of competences.

Relevance for regional authorities

There is increasing recognition that soil condition underpins key societal challenges, such as food security, green growth and bioeconomy. Soil also regulates climate, hydrological and nutrient cycles while mitigating the effects of climate change through increased soil carbon sequestration. Furthermore, soils provide resilience against floods and droughts, buffer the effects of pollutants and preserve cultural heritage. Pressures on soil, due to competition for land or inappropriate land management choices, severely impact soil functions. Amplified by climate change, these pressures lead to degradation processes and, in extreme cases, the complete loss of the resource. Exacerbating factors include the poor awareness and undervaluing of the societal services and resilience provided by soil. It is therefore beneficial for a region to better understand the pressures on the land in order to limit a loss of critical soil-based functions and services.

Policy context

There is a new political momentum at both global and EU level for soil and land degradation related issues. The protection of soil functions are reflected in around 35 policy areas, most specifically through the EU's Soil Thematic Strategy ((COM(2006) 231, (COM(2012) 46)), the 7th Environment Action Programme and several Sustainable Development Goal (SDG) targets. Knowledge of the condition of, and changes to, soil functions and associated ecosystem services is also critical to EU policies on agriculture, climate, industrial emission and pollution control, sewage sludge and other waste disposal, plus biodiversity. Many regions are now considering soil functions within spatial planning with the goal to reduce land take and soil sealing (the concept of land degradation neutrality).

How to use

The **European Soil Data Centre**¹ provides access to several tools and procedures to assist EU regions assess the state of soil conditions and trends of pressures acting on them. In particular:

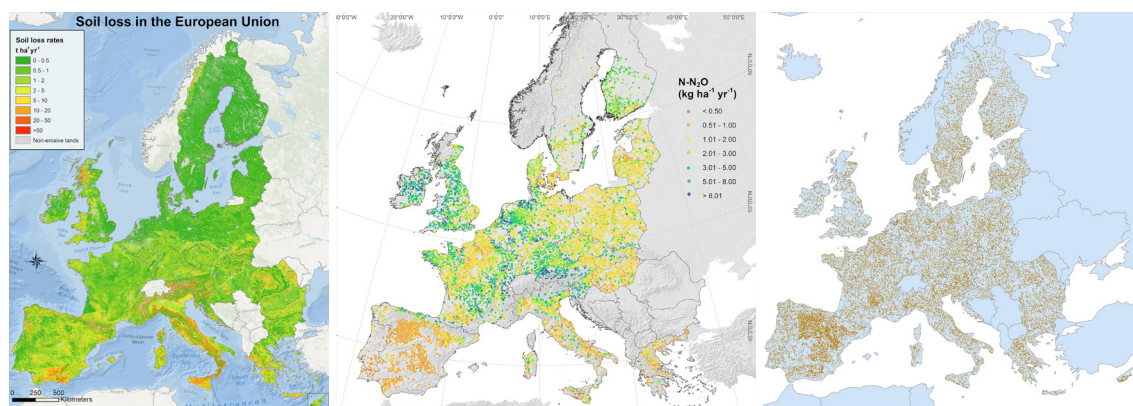
- **Monitoring of soil condition** and trends is lacking or outdated in many regions. The JRC has developed the soil component of the LUCAS Survey² that provides an insight in to how soil condition is affected by land use and land management policies. Regional authorities could either adopt the LUCAS methodology as a protocol for primary data collection, sampling and laboratory analysis or directly integrate the results of LUCAS data in to their policy making
- **To assess the scale and impact of soil erosion** at regional level the JRC has developed a high resolution soil erosion modelling platform to assess the vulnerability of loss of soil by water³ and wind⁴. Policy makers use the approach to set up regional scale assessments or utilise JRC data to assess the vulnerability to soil erosion in their regions

1. <http://esdac.jrc.ec.europa.eu>

2. <http://ec.europa.eu/eurostat/web/lucas/overview>

3. <http://esdac.jrc.ec.europa.eu/themes/rusle2015>

4. <http://esdac.jrc.ec.europa.eu/themes/wind-erosion-susceptibility-soils>



From left-right: soil erosion by water, N₂O emissions from soils, LUCAS Soil sampling network.

- **To assess soil organic carbon fluxes in agricultural soils** the JRC has developed a detailed and high resolution modelling platform framework to assess soil carbon fluxes in relation to main management practices⁵. The tool can assess future soil carbon stocks with respect to a range of activities (critically, the approach also takes in to consideration, fertilizer regimes) and climate change scenarios. Support can be provided to develop regional applications.

Impact

Regional soils can be characterised with respect to their key functions and pressures acting on them. A significant output of this work is the ability to compare performance of specific regions to EU-wide norms or other regions which could be neighbours or in similar biogeoclimatic zones. The LUCAS Soil approach is being used as a formal EU SDG indicator, but it also assesses soil pollution, the impact of the CAP and soil carbon reporting in the context of Paris Climate Agreement. Soil erosion has high relevance to intervention measures established under the EU's Common Agricultural Policy (e.g. GAEC Measures). The JRC methodology has been selected to characterise soil erosion in the EU Sustainable Development Goals Indicator set.

5. <http://esdac.jrc.ec.europa.eu/themes/soil-organic-carbon-content>

26

Information, Knowledge and Tools to Support Public Authorities on INSPIRE implementation

Type of support / service available

The INSPIRE Knowledge Base is an interactive online platform providing access for all resources related to INSPIRE. INSPIRE is the European legal framework establishing standards to share spatial data in agreed way. It allows data to be reused across regions and Member States, to be discovered, viewed and accessed easily by public bodies and other interested parties. It started with information needed for environmental policy but, over time, evolved and is today used in many other sectors such as: e-government, agriculture, intelligent transport systems, disaster risk management, smart cities, energy efficiency, etc.

In close cooperation with INSPIRE's policy master, DG Environment, and the European Environment Agency, the JRC acts as the overall technical coordinator for INSPIRE Maintenance and Implementation. It also carries out activities to facilitate the implementation by regional and local public authorities.

JRC developed legal Implementing Rules, Technical Guidelines and other supporting reference material, registers and registry services, now available in the INSPIRE Knowledge Base. Through this interactive platform, JRC supports Member States and regional authorities by providing background information and resources, reusable tools for the implementation of INSPIRE, training resources, information on implementation in each Member State and access to the INSPIRE Geoportal.

Relevance for regional authorities

INSPIRE represents a significant technical and organisational investment linking together the national and sub-national data infrastructures of the 28 EU countries, in 24 languages, and covering 34 data themes from industrial facilities and protected areas to population distribution.

It involves tens of thousands of organisations at all levels of public administrations that require new or additional ICT skills to fulfil their obligations to:

- Create and publish metadata
- Publish data through standardised network services
- Transform data according to INSPIRE interoperable data models
- Develop policies and guidelines to enable data sharing
- Use and combine data from other public authorities in their own country and across borders.

Policy context

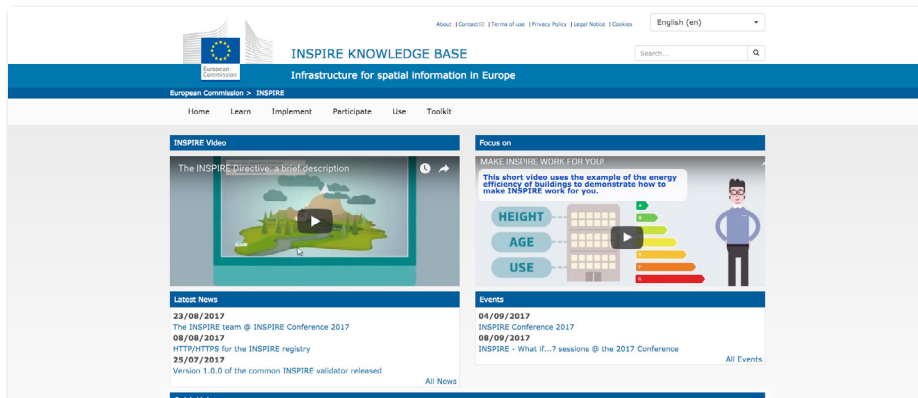
The INSPIRE Directive is the legal framework establishing the Infrastructure for Spatial Information in the EU for the purposes of policies or activities that directly or indirectly impact the environment. It mandates government or public administrations at national, regional or local level, to share public spatial data in agreed standard way. The INSPIRE Directive came into force on 15 May 2007 with full implementation in Member State required by 2021. It is a building block of the Digital Single Market, introducing significant innovation in the public administration down to the local level and a cultural transformation on sharing, opening data and collaborative delivery of public services.

How to use

The INSPIRE Knowledge Base provides access to resources, tools and discussion forums to help implement INSPIRE on national, regional and local level.

The Thematic Clusters online discussion forums and INSPIRE in Practice, a collaborative platform for sharing

resources and experiences, provide support to implement INSPIRE.



JRC INSPIRE Knowledge Base; an interactive platform and a central access point for all resources related to INSPIRE.

Additionally, the application *Find your scope* helps data providers to identify the INSPIRE spatial data themes and spatial object types that are relevant to the dataset(s) they administer.

JRC is also responsible for maintaining INSPIRE geoportal. It provides the means to search for spatial data sets and services and to view and download spatial data sets from Member States within the framework of the INSPIRE Directive.

To help organisations to create metadata on their data sets and services, the geoportal also provides an open source multilingual metadata editor. This editor has been adopted and used by many national, regional and local nodes of the infrastructure to help public bodies in documenting their data.

More information can be found on: INSPIRE Knowledge Base: <http://inspire.ec.europa.eu/> and INSPIRE geoportal: <http://inspire-geoportal.ec.europa.eu/>

Impact

Environmental problems do not stop at borders. Solving them often requires cooperation between countries and regions, which is more successful when it is easy to share data across borders and organizations.

The INSPIRE Directive supports the application of knowledge-based policies and monitoring of activities that have an environmental impact. It sets out actions aimed at removing obstacles to the sharing of spatial data between all levels of government within and across Member States.

INSPIRE started with information needed for environmental policy but, over time, evolved in an open way so that today it is used in many other sectors such as: e-government, agriculture, intelligent transport systems, disaster risk management, smart cities, energy efficiency etc. It also facilitates access by citizens and business to spatial information anywhere across the European Union.

27

Supporting regions to assess farm sustainability (SOSTARE)

Type of support / service available

The SOSTARE model (Analysis of farm technical efficiency and impacts on environmental and economic sustainability) is a diagnostic tool to assess the general performance of a farm, explore in detail any perceived weaknesses in farm management and investigate the impact of changes that might improve efficiency.

It has been developed by JRC for the Administration of Lombardy Region, in partnership with Parco Ticino, the Universities of Milan, Turin, Pavia and Agricola2000.

The model is in the implementation phase on SisCo, the web platform of Regione Lombardia¹.

Relevance for regional authorities

The SOSTARE diagnostic system describes the performance of a farm from the point of view of agronomic efficiency, economic results, ecological performance. When run on a yearly basis, it allows for monitoring the farm performance and assessing it in relation to policy targets (i.e. increase sustainable use of energy, decrease the impact of agrochemicals, increase farm viability, enhancement of biodiversity etc.).

By highlighting areas where farm management should be improved in order to meet sustainability target (which may be individual targets such as reaching a better household income), it also gives information on the impact on public goods supply (biodiversity, impacts on soil and water quality etc.).

The results provided by SOSTARE and organised per farm typology (i.e. cereal, livestock, conventional, organic etc.) can be easily aggregated. This provides the Regional Administration with important information about the overall performance of agriculture in the Region, whether sustainability targets are met, and where it is necessary to focus efforts to reach them.

Policy context

Farmland represents almost half of land use in the European Union, and the Common Agricultural Policy (CAP)² is the policy that receives the highest share of the EU budget. Currently, the CAP has to face the challenges of simplification and modernisation. Moreover, it has to maximise its contribution to the European Commission's ten priorities³ and to the Sustainable Development Goals (SDGs)⁴.

The public consultation launched by the European Commission on "Modernising and Simplifying the Common Agricultural Policy"⁵ has shown that a fair standard of living for farmers and the pressures on the environment are among the most pressing challenges that EU agriculture has to face.

How to use

The model is in the implementation phase on SisCo, the web platform of Regione Lombardia. It is composed by a main database for CAP application, and other integrated operational tools for specific tasks (i.e. plant protection products management, wine sector management etc.). Each farm in Lombardy has access to it and can edit its own data on the regional portal for agriculture and will have access to SOSTARE diagnostic system⁶. Entry pages are personalised for each farm (figure opening next page).

1. <https://agricoltura.servizirl.it/PortaleSisco/>

2. https://ec.europa.eu/agriculture/cap-overview_en

3. https://ec.europa.eu/commission/priorities_en

4. <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

5. <https://ec.europa.eu/agriculture/sites/agriculture/files/consultations/cap-modernising/highlights-public-consul.pdf>

6. Contact point: Claudio De Paola, Regione Lombardia, Direzione Generale Agricoltura, Milano, Italia, claudio_de_paola@regione.lombardia.it



Entry page of SOSTARE system for a sample farm. Parcel data are automatically retrieved from the IACS database.

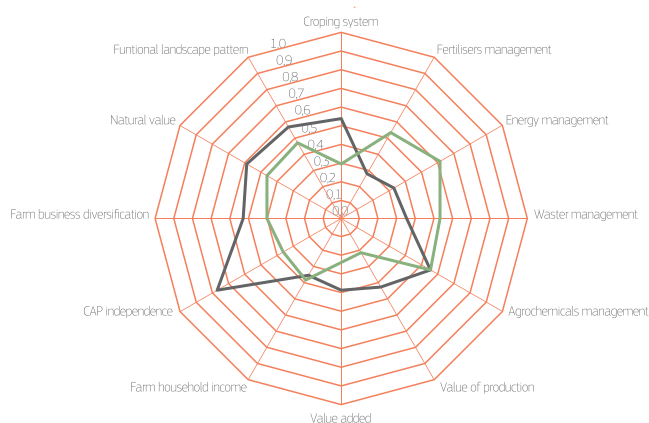
The SOSTARE diagnostic system is based on composite indicators, derived from data describing farm activities, land cover and ecological value. The assessment is made through measurable values, which, consequently, allow the comparison of different management schemes⁷.

Composite indicators allow rating the performance of the farm in terms of cropping system; management of fertilizers, energy, water and agrochemicals; value of production; value added; farm household income; independence from CAP subsidies; farm business diversification; quantity and quality of natural and seminatural vegetation.

Results are displayed as radar (first figure below) or bar diagrams. Radar diagrams provide the overview of the performance of a farm. Results can be easily aggregated (i.e. by farming system, by subregion) (second figure below) and show whether policy measures are needed (i.e. to reduce agrochemicals impact, to improve rotations or water management etc.)



Radar diagram showing the performance of a farm, in terms of agronomic efficiency, economic results, and ecological performance.

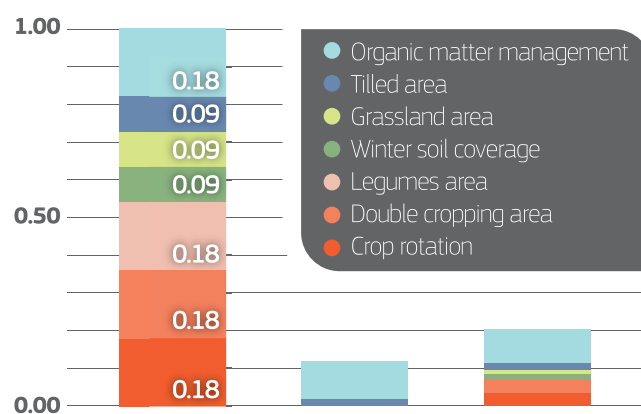


Radar diagram showing the performance of two groups of farms (cereal vs livestock).

7. <https://doi.org/10.1016/j.agry.2014.10.004>

Bar diagrams allow benchmarking farm performances with reference to an ideal situation of high sustainability, and to understand in more detail what are the variables driving the overall performance i.e. of the cropping system (see the graph on benchmarking).

Data needed to run the model are largely available in existing databases (i.e. IACS, Nitrates Directive, agrochemicals use, wine registry, Natura 2000 databases) and can eventually be retrieved to diminish the data accrual load (figure below). Such databases are mostly available in EU Regions, providing the basic information on which the diagnostic system is based.



Farm benchmarking.

Impact

The SOSTARE diagnostic system provides technical assistance in supporting crop choices, highlighting agronomic issues (to improve both quality and quantity). It provides a platform for economic data collection and management (accountancy not compulsory), it highlights agri-environmental and ecological issues. From the point of view of decision-making and farm management support, it shows the benefits of the choice of farming type, crops mix, introducing products processing, direct sale versus join farmers market and starting an agritourism activity.



V

Multi-territorial dimension

(region, urban, macro-regional strategies)

28

Providing re-usable tools to better access data in support to macro-regional strategies

Type of support / service available

The **Danube Reference Data and Services Infrastructure (DRDSI)**¹ is a publicly available online platform and database² that facilitates access to comparable and harmonised data sets on various issues related to the Danube Region.

In particular, it focuses on supporting the collection and management of data resources at a local level, where they are best understood and maintained. Data standards are explored and examples given for how data can be combined. This includes offering open tools to overlay datasets from different sources through the DRDSI platform and promoting Open Data as a means to make data a source for innovation without impediment.

The DRDSI platform shows how the principles of the INSPIRE Directive³ (2007/2/EC) can be put into practice, re-purposing them from their core environmental focus to broader concerns of data sharing for regional policy and collaboration.

Relevance for regional authorities

Data are crucial for macro-regional strategies, as a means to support policy-making and as a shared asset to support economic growth and as a cultural artefact for the region's citizens. Data are needed to understand the status of the region at different stages of the policy cycle and to ensure that investments are targeted where needed.

Data are equally useful for understanding the status quo and substantiating policy decisions at regional and local level. They can also enable referencing and benchmarking versus other regions thus helping to identify the region's/municipality's strengths and opportunities. Such good quality, transparent, comparable and commonly understood data can also be used to readily demonstrate the benefit of regional investments and their impacts on territories.

Policy context

In its communication "Implementation of EU macro-regional strategies" (COM(2016)805), the European Commission recommended "the establishment of a sound monitoring system" quoting, in particular, the example of the Danube Reference Data and Services Infrastructure.

This was confirmed by the General Affairs Council of the 25th April 2017, where the Council noted "the need for more detailed, reliable and comparable data regarding the implementation of macro-regional strategies", and called "on the Commission to gather such data, taking into account the related administrative burden for stakeholders and making the best possible use of existing data sources and technical assistance means, and provide these data to the Council."

How to use

The **Danube Reference Data and Services Infrastructure (DRDSI)** is a publicly available online platform and database⁴. The platform focuses on supporting the collection and management of data resources at a local level. It discusses data standards and provides examples on how data can be combined. This includes offering open tools to work with data from different sources.

1. Data infrastructures in support of macro-regional development available from: <https://bookshop.europa.eu/en/data-infrastructures-in-support-of-macro-regional-development-pbLFNA28297/>

2. <http://drdsi.jrc.ec.europa.eu>

3. The INSPIRE Directive (2007/2/EC of 14 March 2007) aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment. See <http://inspire.ec.europa.eu/>

4. <http://drdsi.jrc.ec.europa.eu>



DRDSI platform accessible at <http://drdsi.jrc.ec.europa.eu>.

Users of the platform can search, visualise and reuse thousands of datasets made available by the European Commission, participating Danube countries and international organisations. For example, it provides access to the data used to evaluate the impact of the Cohesion Policy on local land use, population distribution and environment, or the data needed to assess the water resources. Use of the platform has resulted in cross-border collaborations, new data development and advances in scientific and statistical information.

Danube NET⁵, a network of experts drawn from academia, government and the private sector, provides expertise on existing data sources in the region and potential challenges and opportunities to further develop the project.

The platform offer several means⁶ to collaborate by uploading data, registering as a user and becoming active in the Danube RDSI Community.

Impact

This work has extended the European Commission's ongoing efforts to help define and implement the INSPIRE Directive to help create a European Spatial Data Infrastructure. This has included new technologies in sharing and visualising Open Data, exploring themes beyond the environment, such as cultural heritage and the role of new data sources, especially those created by citizens to support decision-making.

Importantly, the DRDSI has demonstrated the benefits INSPIRE brings to public administrations when new data sharing activities need to be implemented and how capacity can be built across borders to also actively contribute to macro-regional decision-making and research.

5. <http://drdsi.jrc.ec.europa.eu/danube-net>

6. <http://drdsi.jrc.ec.europa.eu/collaborate-with-us>

29 Smart Specialisation support to the EU strategy for the Danube region

Type of support / service available / objective

JRC's *Smart Specialisation Platform (S3P)* supports the design, alignment and implementation of the smart specialisation strategies (S3) in the Danube Region to foster an integrated and coordinated approach at the macro-regional level.



The S3P support to the EU strategy for the Danube region covers 14 countries and a population of more than 120 million citizens.

The S3 Platform (S3P) offers numerous activities to support the Danube macro-regional collaboration such as surveys and analytical support, peer reviews, mutual learning workshops, mapping, stakeholder discussions at the innovation camp, S3 policy briefs and other reports, online tools and enhanced collaboration with territorial cooperation programmes. Furthermore, S3P has contributed to the JRC Scientific Support to EUSDR events held back to back or within the EUSDR Annual Forums and **participated actively as a partner in the FP7 Danube INCO.NET project**¹. More information is available at the S3P Danube macro-region webpage².

Relevance for regional authorities

The EUSDR is the biggest and the most diversified EU Macro-Regional Strategy comprising some EU innovation leader regions but also the most lagging territories of the EU and its immediate vicinity. The implementation of the smart specialisation process is challenging as it integrates different policy areas and responsibilities, in a horizontal sense between ministries, and vertically from the local and regional to the national and European levels. Moreover, it requires different innovation actors to work closely together, including firms, research institutions, government and civil society itself (the end users of innovations and on occasion co-producers of knowledge) in a so called 'quadruple helix'. The key factor to meeting this challenge is the existence of a solid but dynamic institutional eco-system that fosters innovation. In this process of developing and implementing evidence-based policies for territorial development and innovation, public sector institutions have to be equipped for effective strategic management and organisational development. Therefore, due to the complexity of integration of such activities at the macro-regional level, the European Commission provide dedicated support in order to assure the consistency and participation of wide range of stakeholders from the extensive territory covering a population of more than 120 million citizens. Direct beneficiaries of the S3 related activities are Austria, Bulgaria, Croatia, Czech Republic, the German regions of Baden-Wuerttemberg and Bavaria, Hungary, Romania, Slovakia and Slovenia; three enlargement countries - Bosnia and Herzegovina, Montenegro, and Serbia; and two neighbourhood countries - Moldova and the 4 South-Western regions of Ukraine.

1. Danube INCO.NET project

2. <http://s3platform.jrc.ec.europa.eu/danube-macroregion-activities>

Policy context

S3 is a connecting block for innovation collaboration in the Danube. Aligning the research and innovation agendas of the Danube countries and regions, it seeks to stimulate regional diversity to build globally-competitive innovation hubs. The macro-regional dimension provides a wider choice of combinations of actors, areas and expertise for strategic transnational research and innovation (R&I) partnerships in the relevant S3 priority domains. The S3 support to the EUSDR provides integrated package of activities and tools to facilitate the S3 related collaboration in the Danube. The S3 tools enable to exploit co-specialisation opportunities, to benefit of macro-regional diversity and competences. By participating in S3 activities at macro-regional level, regional and national policymakers have an opportunity to:

- Discuss the transnational dimension of S3 and identify complementary S3 priorities
- Examine various cooperation opportunities to stimulate transnational cooperation in S3
- Learn about available implementation and co-financing instruments
- Explore common interests and set up collaborative S3 projects
- Jointly consider how to mobilise relevant funding sources that will support their projects.

How to use

Since 2013 the S3 Platform has developed various **online tools**³ and collaborative activities to foster and facilitate the S3 collaboration in the Danube. These tools are available at the S3 Platform's **website**⁴. The **Eye@RIS3 tool**⁵ maps the main S3 research and innovation (R&I) related priority areas of the Danube regions/countries which allows comparison with the EUSDR Priority Areas built on the common interest for collaboration in the macro-region. This mapping facilitated grouping of stakeholders around similar and/or complementary priorities, thus achieving synergies and aligning efforts in joint collaborative initiatives.



Geographical distribution of the four main S3 (R&I for the non-EU) priority themes in the Danube:

Source: Eye@RIS3 database

Note: Despite only 4 Southern UA regions are part of the EUSDR, maps show the national level R&I priorities as these are the only data available

Following the identification of the complementary S3 priorities a series of thematic workshops have been organised in order to facilitate a dialogue among stakeholders and foster trans-regional S3 partnerships. The topics of sustainable innovation and energy, public health and ICT/Digital growth have received a particular attention at these events and gathered the Danube stakeholders to discuss joint initiatives during the past years.

Another S3 tool, the **ESIF-Viewer**⁶, visualises the R&I and business related investments of the European Structural Investment Funds (ESIF) across EU Member States and regions. It assists finding the specific fields in which the R&I and business activities will be invested. Its application at the Danube territory facilitates identifying the investment synergies and hence the macro-regional collaboration activities around commonly financed activities.

3. <http://s3platform.jrc.ec.europa.eu/s3-tools>

4. <http://s3platform.jrc.ec.europa.eu/home>

5. <http://s3platform.jrc.ec.europa.eu/map>

Impact

The cooperation in S3 has been recognised as a tool for expanding opportunities for collaboration, improving governance and dialogue between various thematic priority areas and streamlining the regional/national ESIF funding towards solving common challenges through research and innovation in the Danube region. The S3 Platform's activities in the Danube macro-region facilitated the process of streamlining of national and regional S3 priorities in the Danube. The S3P support to the EUSDR also fostered R&I collaboration among the partner regions/countries, facilitated creation of strategic linkages to tackle common challenges, leveraged opportunities at the macro-regional level and contributed to the alignment of the S3 related European, national and regional funding among the partner countries/regions. Due to the S3P work with the R&I and competitiveness related EUSDR thematic priority areas and with the Danube countries and regions, the governance and dialogue between various levels of stakeholders across the macro-region have also improved considerably. The impacts of these activities have been recognised by the Danube wide stakeholders at the regular high level Annual EUSDR Forums, which have recognised the S3 as a fundamental tool for expanding the collaboration opportunities across the macro-region and for improving the Danube region competitiveness. The creation of solid R&I cooperation networks has substantially contributed also to stability and cohesion in the macro-region. The S3P work with the non-EU Danube countries has helped launching the S3 pilot supporting activity under JRC Enlargement and Integration Action which aims at developing capacity building support for the S3 process and at applying the S3 model in order to improve the research and innovation policies also in the Danube bound Western Balkan enlargement countries and the Danube EU neighbourhood countries.

6. <http://s3platform.jrc.ec.europa.eu/esif-viewer>

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Smart Specialisation Strategy support to the EU strategy for the Baltic Sea Region

Type of support / service available

The Smart Specialisation Strategy (S3) Platform facilitates work on synergies in S3 within the Baltic Sea Region (BSR). The S3P works closely with the Policy Area Innovation (PA INNO) of the EU Strategy for the Baltic Sea Region, the Baltic Sea Region Programme, DG REGIO and BSR countries and regions towards increased innovation and growth through S3 in the macro region. The S3P Platform coordinates activities with these and other platforms for interregional collaboration to provide BSR stakeholders arenas for a dialogue to develop and to enhance collaboration opportunities within S3 priorities. Direct beneficiaries are Sweden, Denmark, Estonia, Finland, Germany, Latvia, Lithuania and Poland.

To facilitate a cooperation, S3P offers various tools such as analytical support, surveys, mapping and online tools enabling to find potential partners for S3 collaboration (e.g. **Eye@RIS3 Database**¹) or to visualize planned investments (e.g. **ESIF-viewer**²).

Relevance for regional authorities

S3 support to the EUSBSR provides an integrated package of activities and tools to accelerate collaboration in S3 in the BSR. The S3 tools enable to exploit co-specialisation opportunities, in order to benefit of macro-regional diversity and competences. By participating in S3 activities at macro-regional level, regional and national policymakers have an opportunity to:

- Discuss the transnational dimension of S3 and identify similar or complementary S3 priorities
- Examine various cooperation opportunities to stimulate transnational cooperation in S3
- Learn about available implementation instruments
- Explore common interests and set up collaborative S3 projects
- Jointly consider how to mobilise relevant funding sources that will support their projects.

Policy context

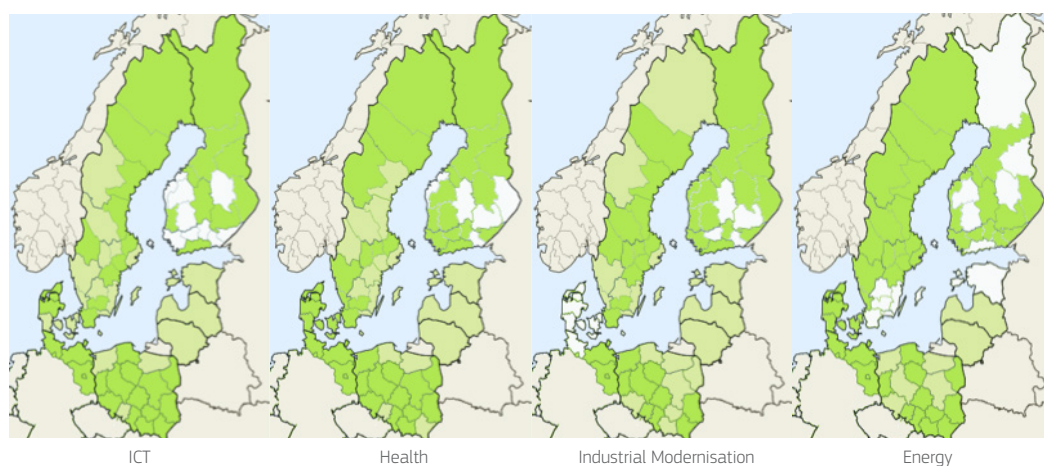
S3 is a connecting block for collaboration in innovation in the Baltic Sea Region, which can stimulate the constructive use of regional diversity to build globally-leading innovation hubs in common or complementary S3 areas. The macro-regional dimension in S3 provides a wider choice of combinations of actors, areas and expertise for strategic transnational R&I partnerships in the relevant S3 priority domains. S3 support to the EU Strategy for the Baltic Sea Region foster collaborations in smart specialisation, facilitate creation of strategic linkages to tackle common challenges, leverage opportunities at BSR level and look for alignment for S3 funding among BSR partner countries.

How to use

Since 2013, various tools and collaborative activities have been used to foster collaboration in S3 in the BSR. Mapping main S3 priority areas (see) in which BSR countries and regions have common interests facilitates grouping stakeholders around similar or complementary priorities (see next figure), achieving synergies and aligning efforts in joint initiatives.

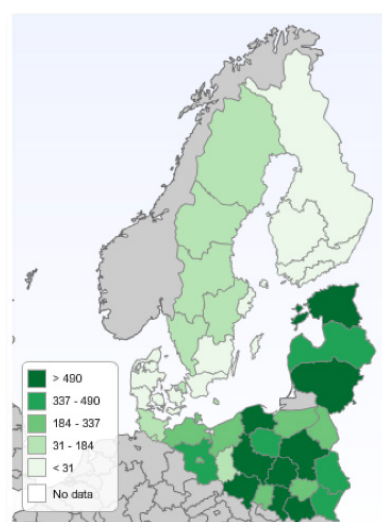
1. <http://s3platform.jrc.ec.europa.eu/eye-ris3>

2. <http://s3platform.jrc.ec.europa.eu/esif-viewer>



Geographical distribution of the main priority themes in the Baltic Sea Region.

Source: Eye@RIS3 database



ESIF in research & innovation in BSR.

(Source: ESIF-viewer database)

S3 workshops and participatory meetings organised in the frame of EUSBSR forum or other BSR events support the dialogue among stakeholders and foster regional partnerships in S3. The topics of e-health and bio-economy have received a particular attention and gathered BSR stakeholders to discuss joint initiatives in the last years.

S3 tools visualize the categories where the investments of European Structural Investment Funds are concentrated and the possibilities for synergies in funding macro-regional collaborations.

The S3P, together with PA INNO, takes part in the network of ERDF Managing Authorities in the BSR, which has been established to develop more efficient financial support to the EUSBSR implementation. They have initiated a pilot project exploring how to jointly fund a collaborative activity in S3 in clean technologies.

Collaboration with Interreg Baltic Sea Region Programme³ has opened a line of calls for collaboration on S3 which has resulted into new S3 projects in the BSR such as: Smart blue regions⁴; EmplInno⁵; BSR Stars S3⁶ and others.

³. <https://www.interreg-baltic.eu/home.html>

⁴. <http://www.smartblueregions.eu/>

⁵. <http://www.empinno.eu/>

⁶. <http://www.baltic.org/project/bsr-stars-s3>

More information about S3 support for the BSR is available at S3P on the Baltic Sea Region webpage⁷.

Impact

With the S3 approach, regions can explore competitive advantages at the macro-regional level. They can making the best use of available assets, competences and funds with an ambition to become internationally competitive, to strengthen their visibility and to connect to global value chains. Furthermore, collaborating in S3 at macro-regional level, regional actors can provide more appropriate common and coordinated replies to common challenges in specific S3 priority domains.

In this context, fostering collaboration in the Baltic Sea Region across smart specialisation priorities on health issues has led to the resolution of the 24th Baltic Sea Parliamentary Conference, Rostock 2015, to state the importance to “further strengthen measures for collaborative implementation of a joint eHealth Innovation ecosystem based on a Baltic Sea Region cooperation platform for eHealth initiatives built on smart specialisation”⁸.

7. <http://s3platform.jrc.ec.europa.eu/s3-in-baltic-sea-region>

8. <http://www.bspc.net/annual-conferences/the-24th-baltic-sea-parliamentary-conference-rostock-30-august-1-september-2015/>

31

Placing your city in the European context: the Urban Data Platform

Type of support / service available

The Urban Data Platform provides a single access point to common indicators on the status and trends of more than 800 cities in Europe.

The web portal is an interactive interface that allows users to explore, visualize, compare and download data. It aims to give a complete and consistent picture of the state and trends (i.e. past and future) of European cities using interactive and visual tools to present and analyse the data. The platform collects open data derived from multiple sources, including DG JRC, DG REGIO and EUROSTAT.

Relevance for regional authorities

One of the main aims of the Urban Agenda for the EU is to improve the knowledge base and the collection of comparable and reliable data on urban development issues – this would in turn facilitate the monitoring and benchmarking of European cities and foster the engagement of citizens in urban related debates.

The Urban Data Platform provides access to many indicators covering the following themes:

- Demography
- Urban Development
- Economic Development
- Transport and Accessibility
- Environment and Climate
- Resource Efficiency
- Social Issues

The data are visualized according to agreed definitions of urban areas, including:

- 807 Cities – Local administrative units (LAU) with at least 50 000 inhabitants
- 672 Functional Urban Areas (FUA)
- 271 Metro Regions – with more than 250 000 inhabitants

Regional and local authorities, as well as citizens, can access indicators to evaluate the status of the urban areas of their interest, compare it with other European cities and monitor the progresses against agreed or desirable targets (e.g. level of employment, quality of environment, etc.).

Policy context

The Urban Data Platform is the knowledge source for Europe's cities that enables urban authorities and stakeholders to compare data, benchmark and monitor, which is one of the aims of the EU Urban Agenda¹.

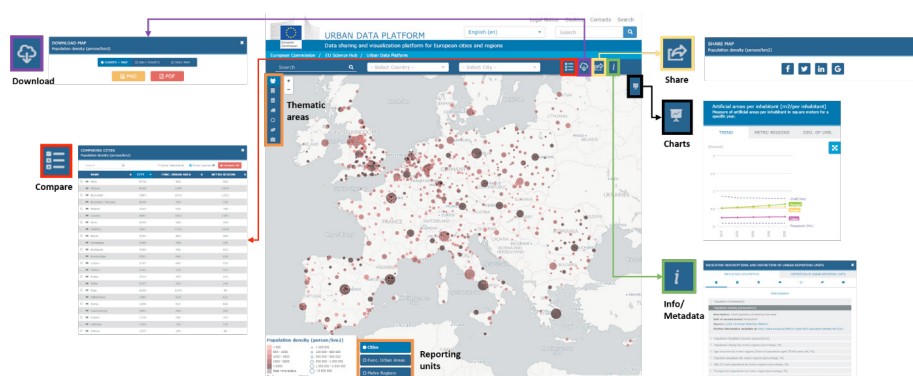
1. <http://urbanagendaforthe.eu/urban-agenda/>

The UDP also provides the knowledge base for the State of European Cities Report², aiming to improve urban policies and the outcome of investments in fields close to the citizens' needs.

The Urban Data Platform is a joint initiative DG-JRC and DG-REGIO. Launched during the European Week of Regions and Cities in October 2016, it has been further presented at the UN Habitat III Conference in Quito, as part of the EU contribution to the Sustainable Development Goals and towards the global Urban Agenda.

How to use

The available data can be visualized in the portal by selecting the desired indicator (from the thematic areas drop-down menu) and reporting unit. The indicator is then displayed on a pan and zoom-able map, as well as in the form of automatically generated charts. The diagram below gives the main functionalities available.

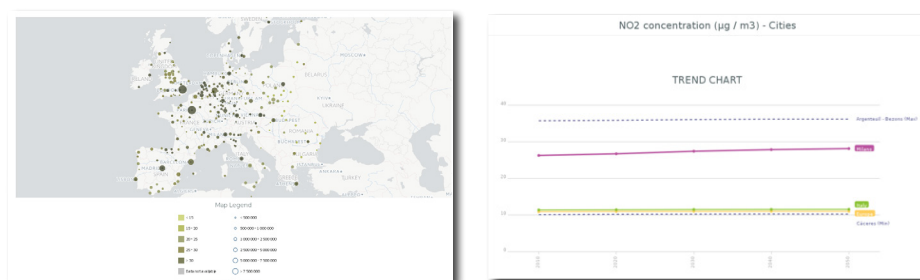


Overview of the main functionalities of the Urban Data Platform.

The data can also be compared (and ranked) at the city level in a list, which is searchable and also allows the selection or de-selection of cities. Capital cities can also be singled out. Both maps and charts can be downloaded and shared, and there is a tab giving further information on each indicator.

Maps

Maps of each indicator can be downloaded as they are presented on the web browser in either PNG (image) or PDF format. The legends are automatically generated, with the colour scale giving the range in values of the indicator, and the size of the icon increasing with total population within the urban area. An example is given below showing the GDP per capita for metro regions for the reference year 2010.



Example of indicators used by the Urban Data Platform.

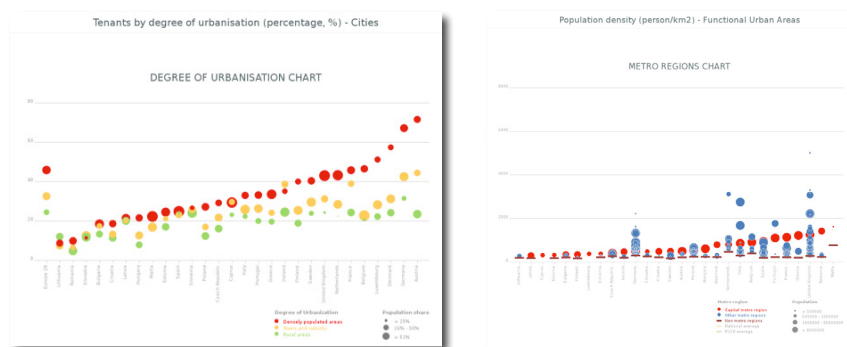
Charts

Three types of charts can be automatically generated, showing trends over time, representing the indicator by type of metro region and finally displaying the data by degree of urbanization.

2. http://ec.europa.eu/regional_policy/en/policy/themes/urban-development/cities-report

As an example, this chart shows the change in the selected indicator over time for the selected city or region. It also allows comparison with the trend in national and European average, and shows the cities/regions with the highest and lowest values of that indicator over time.

This example gives indicator values for all types of metro regions (differentiating capital and other metro regions), as well as average values for non-metro regions, national and European averages. The different categories can be turned on and off, and the scale can be manually adjusted.



Examples of charts generated from the platform

Degree of urbanisation - Here, the selected indicator is shown graphically by degree of urbanisation i.e. comparing the data for densely populated areas, towns and suburbs, and rural areas.

The platform is accessible via the following link: <http://urban.jrc.ec.europa.eu>

Contacts: JRC-UDP@jrc.ec.europa.eu

Further links:

“One-stop shop” portal on EU urban policies³

State of European Cities Report⁴

LUISA Territorial Modelling Platform⁵

Impact

The Urban data Platform provides access to up-dated indicators on the status of about 800 urban areas in Europe. Since its launch in October 2016, the web site has been accessed by several thousands visitors, generally interested not only to just visualise specific indicators but also to download and use the computed indicators for own purposes. This is fully in line with the set objectives of the Urban Data Platform, aiming to increase the knowledge base on the status of European cities, in holistic and multi-thematic perspectives.

The UDP is being used by cities across the EU, to support integrated urban development. Cities can find the platform of great value in various ways. The data available helps cities to establish an evidence base for their action plan and delivery and to look at future trends to inform future casting. The UDP can be applied to compare and benchmark partner cities, both in Baseline Studies and in preparing for partner visits. The user-friendly downloadable graphics and charts are easy to insert into presentations to illustrate urban issues and practices.

The Urban Data Platform has further fed the report on the State of European Cities 2016, a key contribution to the European and Global urban Agendas.

3. <https://ec.europa.eu/info/eu-regional-and-urban-development/cities>

4. <http://ec.europa.eu/cities-report>

5. <https://ec.europa.eu/jrc/en/luisa>

32

Mapping of migrant communities in cities

Type of support / service available

Based on national census data, the JRC produces high resolution maps of migrant communities in cities. The maps provide an indication of how population by nationality or country of birth is distributed and allow analyses of the different models of spatial distribution in the urban landscape adopted by cities and migrant communities.

Relevance for regional authorities

The spatial structure of migrant communities can explain different outcomes of integration and pressures on local services in Europe. Using these high resolution maps of the migrant communities in cities, local authorities will be able to design better, tailor-made policies for education, social services, housing, work, transport, etc.

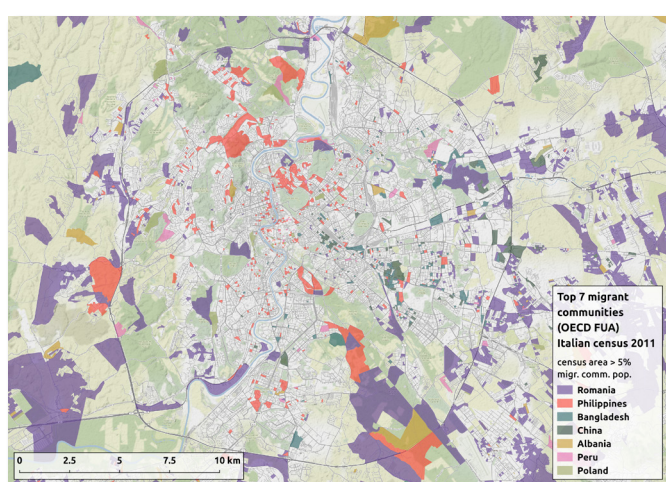
Policy context

The Urban Agenda for the EU, agreed at the informal meeting of EU Ministers responsible for urban matters on 30 May 2016 ('Pact of Amsterdam'), aims at contributing to enhancing the knowledge base on urban issues and exchange of best practices and knowledge. It was concluded that reliable data is important for evidence-based urban policy making, as well as for providing tailor-made solutions to major challenges. A major challenge for many city authorities in recent years is the integration of migrants into their cities.

How to use

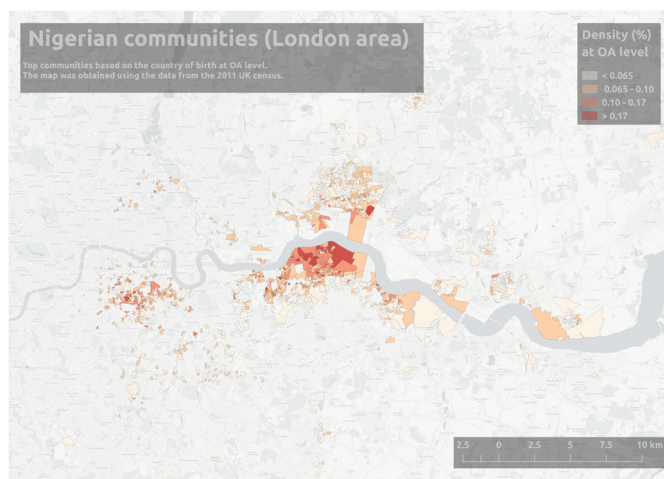
By studying the spatial and other quantitative features of areas with a high concentration of migrants in major EU cities, these maps offer a novel evidence-based perspective to the analysis of migrant integration at the local level. The data allows for comparisons of the spatial patterns, clustering and dispersion of such areas of high concentration of migrants across cities and nationalities of origin.

Examples of maps showing the migrant communities in cities by nationality or country of birth have already been produced for Rome, London and Amsterdam and are shown below. Maps for cities in Italy, Germany, France, Spain, UK, Ireland, Portugal and the Netherlands will become available as from the second half of 2017, and wider dissemination of this data to authorities is planned for 2018. In the meantime, local authorities are welcome to ask for access to the data and the maps by contacting directly the JRC¹.

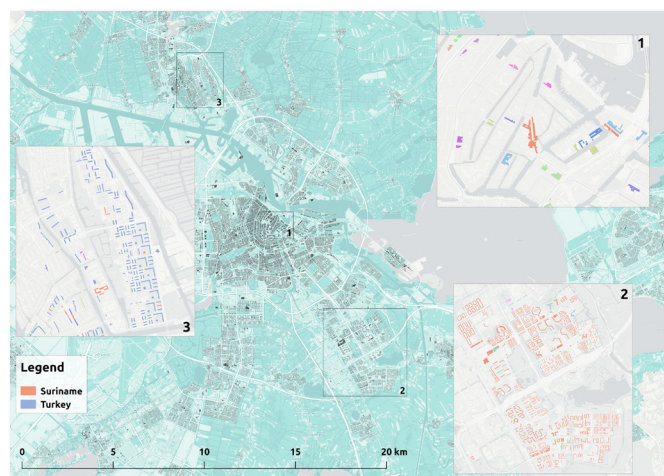


Examples of possible visualisations: migrant communities in Rome.

1. EC-kcmd@ec.europa.eu



Examples of possible visualisations: migrant communities in London.



Examples of possible visualisations: migrant communities in Amsterdam.

Impact

The maps provide an indication of how population by nationality or country of birth is distributed in cities. They provide necessary information specifically for policy makers with responsibility to integrate migrants at the local level. They can also help authorities to better target policy responses related to social cohesion, housing, public services, labour market, education, for example, by tuning public services to facilitate integration in areas with high concentration of migrants.

The need for Urban Indicators to facilitate evidence-based integration policies in cities by exploiting existing EU-wide datasets and developing new or expanded data gathering modules was clearly indicated by the Partnership on Inclusion of Migrants and Refugees under the Urban Agenda.

33

Cultural and creative cities monitor

Type of support / service available

The **Cultural and Creative Cities Monitor** is an interactive platform designed to help national, regional and municipal policy makers identify local strengths and opportunities, to promote mutual exchange and learning between cities and to inspire fit-for-purpose policies to boost economic growth and job creation, and strengthen resilience.

The Monitor builds on 29 carefully selected indicators, which measure the cultural 'pulse' of a city in terms of cultural infrastructure and participation in culture, capture how the cultural and creative sectors contribute to a city's economy in terms of employment, job creation and innovation, and describe the tangible and intangible assets (human capital, openness, tolerance, international connections) that help cities attract creative talent and stimulate cultural engagement. Key qualitative facts complement what is measured by 'numbers' (e.g., main cultural sites, art schools or live events, funds, tax incentives, creative incubators, fab labs) proving the city's commitment to support culture- and creativity-led development.

Relevance for regional authorities

In a period in which sustainable and resilient growth models are highly sought after, the importance of the cultural and creative sectors is increasingly recognised. Yet, mapping cultural and creative assets and measuring their impact in a systematic and comparable way across Europe is a challenging exercise, with no shared definitions, metrics or data, particularly at city level. The Cultural and Creative Cities Monitor offers policy makers, businesses, non-governmental organisations, academics and citizens a reliable, independent and comparable data source to assess how cultural and creative a city is, to fully appreciate the importance of culture and creativity on today's society and trigger related investments.

Policy context

Since the adoption of the first 'European Agenda for Culture in a Globalising World' (COM(2007) 242), culture has taken an increasingly prominent place in European Union policymaking. The transversal dimension of culture and creativity as a contributor to smart, inclusive and sustainable growth and as a catalyst for innovation in a wider economy has been recognised in different EU policy documents, such as the Communication on promoting the cultural and creative sectors of growth and jobs in the EU (COM(2012)537), the Communication on cultural heritage (COM(2014)477) or the 'Urban Agenda for the EU' (COM(2014)490).

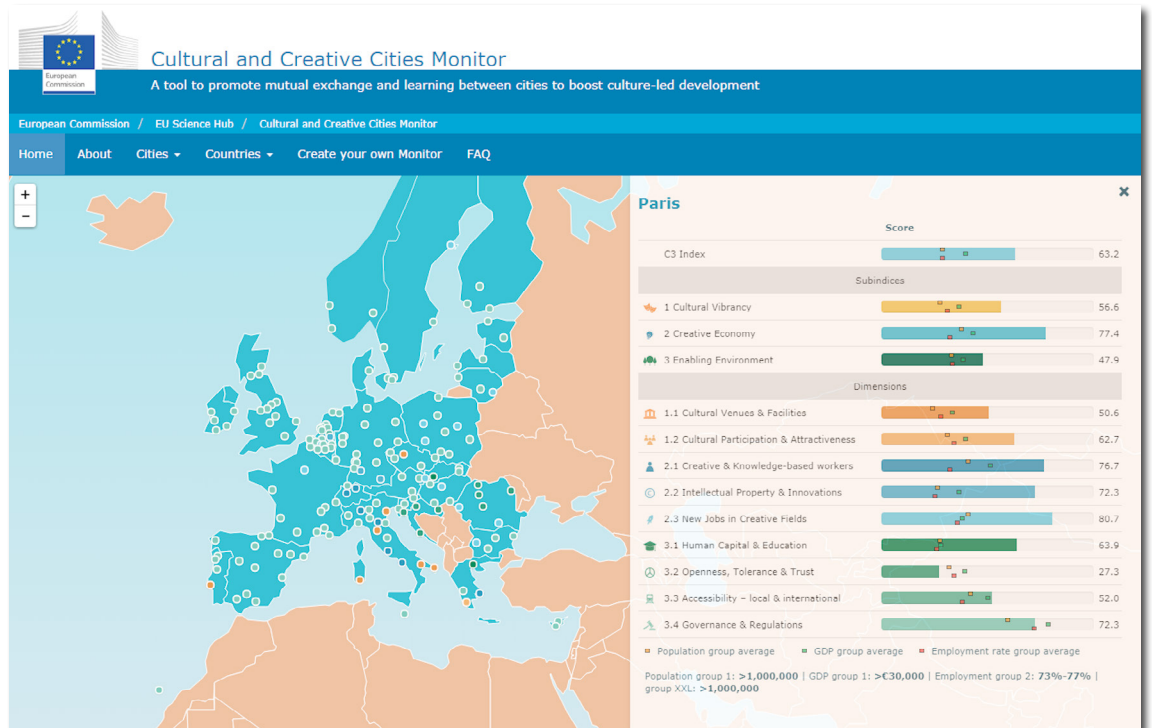
In their joint communication 'Towards an EU Strategy for International Cultural Relations' (JOIN(2016) 29), the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy pre-announced the development of the Cultural and Creative Cities Monitor: "The Commission's Joint Research Centre is developing a tool for monitoring cultural and creative initiatives at city level, which will support more targeted investments and learning from best practices."

How to use

The interactive platform for the Cultural and Creative Cities Monitor allows users to:

- Browse quantitative and qualitative information on 168 selected cities (EU28 plus Norway and Switzerland)
- Create a new city entry and compare it to peer cities (based on income level, population size or employment rate)
- Adapt weights to reflect local priorities and produce customised rankings

- Build scenarios by simulating the impact of policy actions (e.g. increased shows and concerts)
- Explore policy and research questions such as: *In which cities do 'Cultural Vibrancy' and 'Creative Economy' seem to reinforce each other most?*



The Cultural and Creative Cities Monitor is an interactive platform freely accessible at:
<https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/>

#EUCreativeCities

Impact

The Cultural and Creative Cities Monitor supports the European Commission's efforts to put culture at the heart of its policy agenda. It does so by providing a reliable, independent and comparable dataset, offering interactive visualisations that allow creating new city entries, adapting the weights to reflect local priorities, simulating the impact of policy actions, and exploring the role of **experimental data sources** (Tripadvisor at present; Open Street Map in the next edition) to inform policy making. The JRC has already started **working together with municipalities** for whom cultural and creative industries are a very important topic, in order to help them benefit the most of the wealth of information in the Cultural and Creative Cities Monitor. An **app** will complement the Cultural and Creative Cities' profiles **with perceptions, local experiences, facts and opinions provided by citizens and visitors** on cities' hidden treasures. Ultimately, the Cultural and Creative Cities Monitor is expected to encourage cities to take further action to enhance culture-driven development in ways that go beyond models based solely on efficiency, in a more sustainable and inclusive approach to economic growth.

VI

Crisis management and resilience

34

JRC Support to the European regions in the area of Resilience

Type of support / service available

Assisting regions and cities in improving their level of resilience through better modelling capabilities. This is done using the capabilities of a computer platform called Geospatial Risk and Resilience Assessment Platform (GRRASP). It models critical infrastructure interdependencies and assesses the economic impact of infrastructure disruption.

Relevance for regional authorities

It is beyond doubt that modern societies face several challenges, while emerging issues will severely affect the daily life, economic performance, stability of our society and the security perception of citizens. In addition, climate change and natural hazards, the quickly evolving security landscape, the economic crisis and migration flows constitute additional stressors that can overstretch our resources and affect societal cohesion. The role of regions towards developing more resilient societies is crucial for a number of reasons:

- Regions have a better overview of the local challenges and the problems that may emerge during crisis situations
- At regional level it is easier to have an overview of more operational activities which is much more difficult to be achieved at state level, especially in big countries
- The level of working relationships and trust among operators and authorities is higher at local/regional level which allows a better flow of information and data sharing.

Policy context

Though resilience has not been recognized as a common organizing principle for policy thinking, it has already entered into many specific EU policies and actions. Examples include the Resilience Action Plan for Crisis Prone Countries, the EU Strategy on Adaptation to Climate Change, the Roadmap to a Resource Efficient Europe, the EPSON program supporting the effectiveness of EU cohesion and structural policies, A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, the Communication on Effective, Accessible and Resilient Health Systems. Resilience is also an important element of the external policies of the EU. The EU Global Strategy (Shared Vision, Common Action: a Stronger Europe, presented in June 2016) enlists state and societal resilience as one of its five priorities. The Joint EU-Africa Strategy also foresees resilience (of food security and health in particular) as one of the key societal challenges and issues for its 2018-20 priorities.

How to use

JRC has developed Geospatial Risk and Resilience Assessment Platform (GRRASP) in order to support communities in improving resilience modelling capabilities. GRRASP can be considered as a hybrid tool that combines the power of web-GIS (Geographic Information System) systems with mathematical models in order to provide a complete analysis environment with strong visualization and simulation capabilities.

GRRASP can facilitate the collaboration among analysts and policy makers by enabling the development of communities of experts to perform analyses on specific topics. In addition, GRRASP's architecture allows for the development and integration of new models and modules that can be useful for expanding GRRASP's capabilities into new directions (e.g. social network analysis, crisis management data visualization, etc).

GRRASP is available as an open source software¹. The installation and use of the software is explained

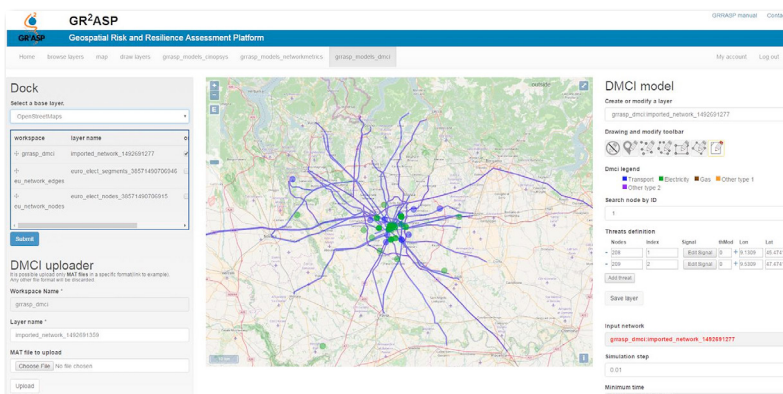
1. See: <https://ec.europa.eu/jrc/en/grrasp>; <https://ec.europa.eu/jrc/en/scientific-tool/geospatial-risk-and-resilience-assessment-platform>; https://www.researchgate.net/publication/269924292_GRRASP_Geospatial_Risk_and_Resilience_Analysis_Platform_-_Version_20

in the user manual.

The JRC is currently working with Polytechnic school of Milan and with Lombardy Region administration in order to expand the capabilities of GRRASP and incorporate additional datasets, improve the interdependencies modelling and thus provide a better estimation of the resilience status of the whole region. The support and training by the JRC on the use of the platform will increase the capacities of the region to address future challenges with respect to the resilience of their critical infrastructures and services.

Once the installation process and the training phase are completed the staff of Lombardy region will be in a position to run what-if analyses, identify areas that require more investment and even use the tool for developing scenarios for table top exercises in order to improve the level of preparedness and response of the whole region.

Similar competences can be built up with any region in Europe.



The computer platform Geospatial Risk and Resilience Assessment Platform (GRRASP) assists regions and cities in improving their level of resilience through better modelling capabilities.

Impact

Investing in the resilience of a region is a major competitive advantage for any region in Europe, if they want to attract investors to create jobs and growth. Using tools such as GRRASP will help to identify weaknesses and to steer resilience investments in those areas where the investment will have the biggest impact to increase the resilience of a region.

As an example, Regione Lombardia (Lombardy region) is the second biggest region in Europe in terms of GDP (more than EUR300 billion) and population (almost 10 million inhabitants). To this end, improving the resilience of such a region has a major impact on the well-being and economic development of an important part of European population.

In the aftermath of a number of disruptive events, the Lombardy Region administration intensified the efforts to improve the resilience of the whole region. Working closely with operators of critical infrastructures it managed to collect a large amount of data about the performance of critical infrastructures and their interdependencies. Working closely with the Polytechnic school of Milan it was possible to develop a model that can be used in order to assess the level of resilience of a series of critical infrastructures and services. This model and the corresponding dataset have been imported in GRRASP. These dataset were used for performing a series of what-if analyses by injecting a disruptive scenario in a series of critical infrastructures.

35

Early Warning Systems for Natural Hazards

Type of support / service available

The Copernicus Emergency Management Service (EMS) is part of EU support to Member States to address disasters including meteorological hazards, geophysical hazards, deliberate and accidental man-made disasters and other humanitarian disasters. The products developed and managed by the Commission's Joint Research Centre include:

- Forest fire/floods/droughts early warning and monitoring
- On-demand, high-resolution maps derived from satellite remote sensing for the prevention, preparedness, response and recovery to disasters.

Three modules constitute the Copernicus Emergency Management Service: The European Flood Awareness System (EFAS), the European Forest Fire Information System (EFFIS) and the Copernicus EMS – Mapping, a satellite imagery tool which provides maps and analyses before, during, or after a disaster. Similarly, the European Droughts Observatory (EDO) provides information on droughts and heatwaves.

Relevance for regional authorities

Regional and local authorities are invariably called upon to warn their local communities of the risk of a disaster and often also have responsibilities to coordinate and organise the efforts of the emergency services. Access to accurate early warning is crucial. Maps of the scene after a disaster can help response efforts.

Copernicus EMS can also provide useful information for regional claims on the Solidarity Fund. Regional disasters with direct damage exceeding 1.5% of regional GDP can trigger compensation by the Solidarity Fund to assist the reconstruction process. Copernicus EMS damage data derived from satellite or aerial imagery is an important source of information for calculating direct damage.

The European Flood Awareness System (EFAS) aims at providing complementary flood early warning information providing longer lead times (using ensemble forecasts) than are typically available at the national or regional forecasting centres, which generally focus on the first 24 to 48 hours before a flood event. The European Forest Fire Information System (EFFIS) can provide fire danger forecast and near-real time mapping of the fires before and during the evolution of the fire events.

Finally, the risk assessment component of the Copernicus Emergency Management Service can also be used by regional authorities to support their actions on climate change adaptation and disaster risk reduction.

Policy context

The Union's Civil Protection Mechanism aims to ensure a practical and timely contribution to prevention, preparedness and response to disasters of all kinds occurring inside or outside the Union (Decision No 1313/2013/EU of 17 December 2013). Article 8 of this decision includes provisions for the European Commission to 'contribute to the development and better integration of transnational detection and early warning and alert systems of European interest in order to enable a rapid response, and to promote the inter-linkage between national early warning and alert systems'. The European Union Solidarity Fund (REGULATION (EU) No 661/2014 of 15 May 2014) was set up to respond to major natural disasters and express European solidarity to disaster-stricken regions within Europe.

1. Available at: <http://emergency.copernicus.eu/>

How to use

The Copernicus EMS portal¹ provides information and access to the early warning systems as well as to the mapping components. User guides and video tutorials facilitate the discovery of the EMS and provide details on EMS components' use. Most of the products are publicly accessible but in some cases information may be restricted to the relevant authorities to safeguard their responsibility for warning their local communities.

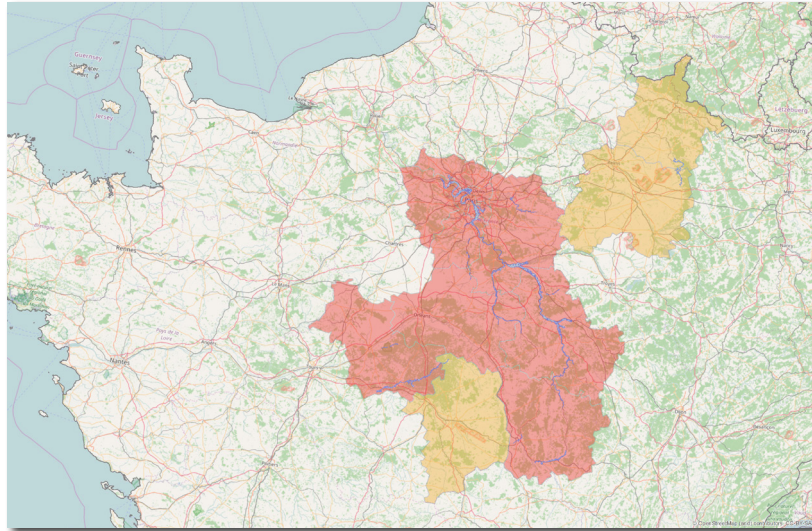
An example of use is illustrated by the following case.

From 28 to 31 May 2016, a heavy rainfall event reached the northern part of France. The episode was persistent and followed by additional rainfall that lasted until 3 June. The high amounts of rainfall led to severe flooding in northern France, mainly over the Upper and Middle Seine river basin and in several tributaries of the Middle Loire river basin. The peak flow at the Seine River in Paris (6.10 m, whereas it is lower than 1.5 m in usual conditions) was reached in the early hours of 4 June. It was estimated to be the highest level in nearly 35 years. It caused flooded banks and forced landmarks located close to the river (such as the Louvre and the Orsay museums) to shut down.

EFAS started sending flood warnings on 27 May to the relevant national and regional authorities. EFAS forecasted a high probability of flooding in the Cher, Seine and Yonne basins, with peaks expected between the 1st and 4th of June. Subsequently, on May 28 and 29, notifications were sent for expected floods in several departments (Essonne, Indre, Loiret). On May 30, additional warnings were sent for the downstream part of the Loire, with expected peak on June 5. An example of the flood warnings as sent out until 29 March for the relevant French river basins is shown in the first figure. On 1 June, as the rivers started to inundate larger areas, the French authorities activated the EMS Rapid Mapping component. Within less than 24 hours the first satellite-based maps of the flood were available to emergency responders. A total of 21 post-disaster maps were produced for this flood event between 1 and 10 June 2016. An example of a flood extent map is shown in the second figure.

Impact

The availability of continental scale natural hazard monitoring systems has improved early warning on several levels. First, it has strengthened the analytical capacity of the European Emergency Response Coordination Centre (ERCC). The ERCC main role is to support a coordinated and quicker response to disasters both inside and outside Europe using resources from the countries participating in the EU Civil Protection Mechanism. The alert systems provide real-time awareness of ongoing disasters and imminent natural hazards. Second, these monitoring systems serve as a benchmark for national early warning systems. EFAS and EFFIS facilitate thriving scientific communities with strong participation of national and regional competence centres, which keep improving people-centred early warning systems. Equally, through collaboration with authorities, the systems foster knowledge exchange and data sharing amongst the national hydro-meteorological and forest fire protection authorities. Third, these systems have contributed directly to support cross border cooperation between regions, e.g. through the International Commission for the Protection of the Danube River (ICPDR). In its 2015 Flood Management Plan, EFAS is a supportive regional flood-warning-system among Danube countries improving transboundary cooperation.



Triangles: EFAS flood notifications based on the forecast of 30 May 2016. Red/orange denotes regions which are forecasted to have a high/medium impact, respectively.



Flood extent map for 4 June 2016 for the area around Mantes-la-Jolie as provided by the Copernicus EMS Rapid Mapping component (Copernicus Emergency Management Service (© 2016 European Union), [EMSR165] Mantes la Jolie: Delineation Map).

36

Population-based Registries for Epidemiological Studies

Type of support / service available

Provision of evidence-based EU health data on cancer and rare diseases.

The JRC is harmonising cancer health data by i) developing and providing quality-checks software to more than 160 registries in the European Network of Cancer Registries (ENCR) and ii) hosting a central registry for all European countries (regions). Similar efforts are being taken in the field of rare diseases including networks on congenital anomalies (EUROCAT) and cerebral palsy (SCPE).

As the custodian of EU-aggregated data for cancer and rare diseases, the JRC will soon (1-2 years) introduce linkage between geographical position and epidemiological parameters. This will unleash the potential of the data for multifaceted epidemiological studies at regional and even local levels..

Relevance for regional authorities

To advance work on disease prevention and control, it is of paramount importance to have access to the latest available information on the burden of disease in the EU, member states, and regions. Health outcome disparities exist not only between EU member states but also within them. For regional authorities to tackle these issues head on, accurate, reliable, and comparable data is indispensable, affording insight into disease incidence, prevalence, mortality, survival, and other key epidemiological parameters.

Once the linkage between geographical position and epidemiological parameters has been established, this can be overlaid with other data sets, such as environmental and socioeconomic. This will provide a very powerful resource for policy and research strategies at regional levels, allowing us to understand and describe the aetiology of diseases in high resolution and from multifaceted perspectives.

Policy context

Treaty of Lisbon Article 168; Commission Communication COM (2009) 291 final of 24 June 2009 on Action Against Cancer: European Partnership; Directive of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare; COM Implementing Decision 2011/C 358/06; Regulation (EC) No 141/2000 of 16 December 1999; The European Parliament Written Declaration of 14 December 2009 on the fight against breast cancer in the European Union; Council conclusions of 10 June 2008 on reducing the burden of cancer; Council Recommendation 2003/878/EC of 2 December 2003 on cancer screening; Council conclusions (7 December 2015) on Personalised medicine for patients; Council Recommendation (2009/C 151/02) on action in the field of rare diseases; Council Recommendation (2009/C 151/02) on action in the field of rare diseases.

How to use

What the EC develops in health information is for EU citizens and thus will be available to the public, to politicians and to professionals.

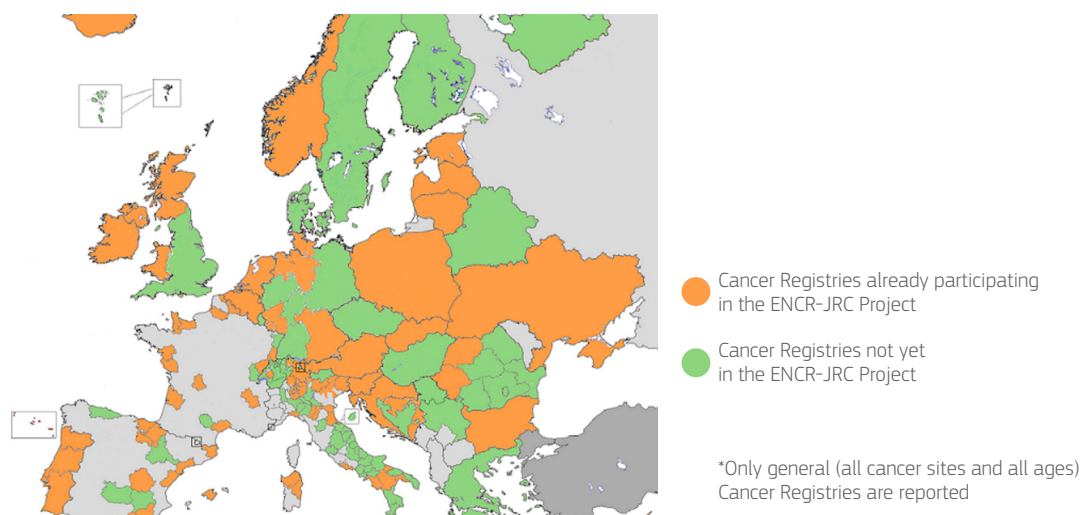
For cancer information, the new European Cancer Information System website will be launched in October allowing users to create maps, charts, graphs and figures in real time.

Contact JRC-CANCER-POLICY-SUPPORT@ec.europa.eu.

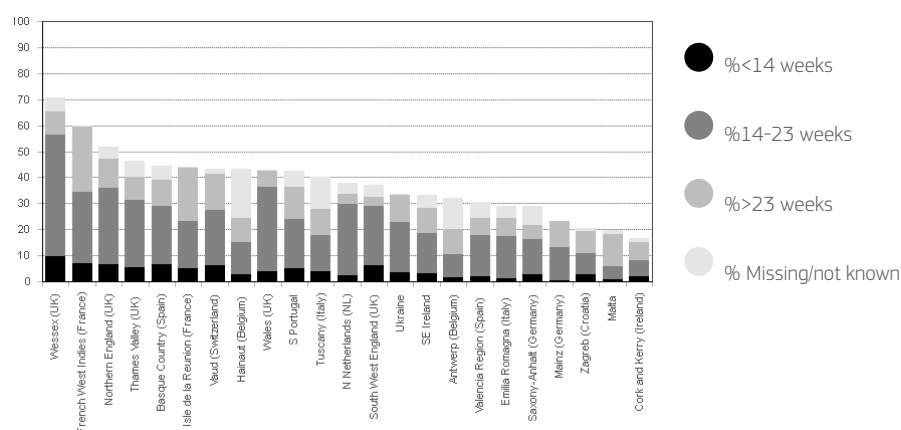
For rare diseases, the JRC is developing the EU platform for Rare Disease Registration, which will provide interoperability between the presently fragmented 600 rare disease registries. This will be an invaluable resource

to the over 30 million EU citizens who are living (often in isolation) with a rare disease. For example, it will gather data from a sufficient number of patients for clinical, pharmacological, and translational studies – a real example of EU-added value. The EU Platform is being developed and will be launched in the coming 2-3 years

Contact JRC-EUROC@ec.europa.eu; JRC-SCPE@ec.europa.eu.



Geographic distribution of the Cancer Registries* Progress overview of applications to the first ENCR-JRC data call and to the ENCR-JRC project.



Example of population-based epidemiological statistics:
Proportion of all anomalies (excluding genetic conditions) cases prenatally diagnosed by gestation at diagnosis, 2011-2015).

Impact

The overarching impact is generating new knowledge to spearhead actions to prevent and curtail the ever-increasing burden of cancer and rare diseases. The key to success will be to do this at regional and local levels, holistically promoting health while taking into account environmental, lifestyle, and socioeconomic factors. The eventual impact from this will not only guide health policy and nourish epidemiological research, but will also affect cross-sector health policies and strategies).

37

Tools to manage tree pests

Type of support / service available

To support the measures against harmful tree pests, JRC is developing a set of analytical tools that use remote sensing and models to better detect and understand epidemics of tree diseases.

Relevance for regional authorities

Managing plant pests is challenging, particularly when they are new to Europe, and there is no established body of research and practices to draw on. In such cases, it is often difficult to assess how far a disease could spread, which is paramount to designing preventive or remedial measures. Once an alien pest has been detected, plants that might be vulnerable to it need to be identified and checked for disease symptoms. These tasks, which often falls to regional authorities, tends to be very labour-intensive, particularly when potentially infected areas are large or difficult to access. Therefore, new technologies that can support pest management by improving readiness, monitoring capabilities, and damage assessment, can directly benefit these authorities.

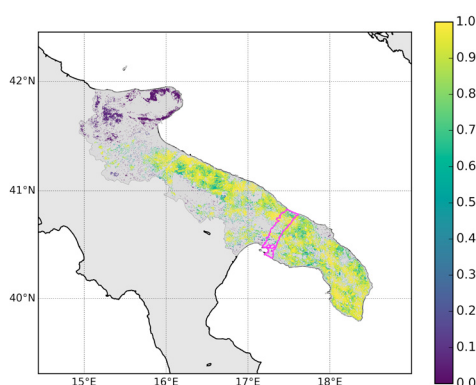
Policy context

The increasing threat of plant diseases and pests is a worldwide phenomenon due to the globalization of the plant trade and the effects of climate change, among others. In the last decade, the EU has been confronted with several large-scale outbreaks of new plant pests. Tree pests are of considerable concern to Europe's EUR 155 billion forestry sector¹ and have a large impact on regional landscapes and livelihoods, often affecting age-old traditions and local economies.

Directive 2000/29/EC lists certain harmful organisms that may be targeted by specific control measures. If such organisms are found in an EU Member State, the country concerned must notify the Commission and the other EU countries plus eradicate or prevent the pest from spreading. Directive 2000/29/EC will be repealed on 14 December 2019 and will be replaced by Regulation (EU) 2016/2031 of the European Parliament and of the Council concerning protective measures against pests of plants.

How to use

Understanding the impact of exotic tree pests can be difficult, because the range of hosts the pest can affect and how it spreads are often not immediately known, e.g. for the *Xylella fastidiosa*² the list of host plants is still growing. To assess how far a poorly-understood disease can spread, JRC is developing models that investigate which portions of a landscape are at greatest risk of infection, and where opportunities for preventive measures may lie (see figure that follows).



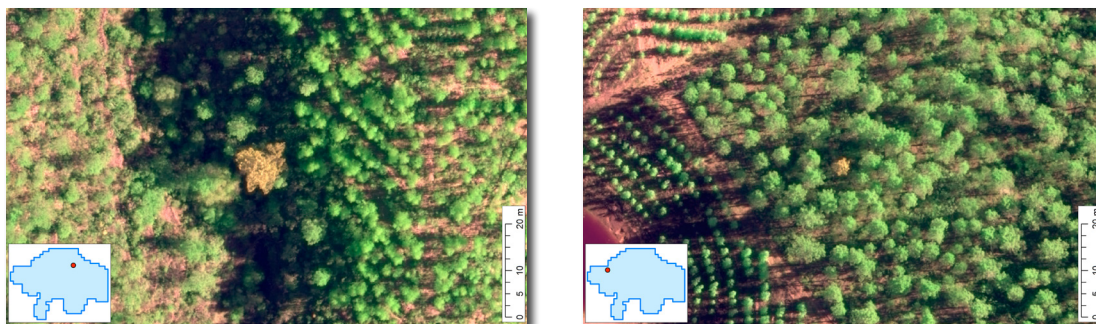
Relative importance of olive orchards as spreaders of *Xylella fastidiosa* in Puglia. Colours show the probability of an orchard becoming infected with *Xylella fastidiosa* in a hypothetical situation where the bacterium becomes endemic in the Puglia region and no preventive measures are taken. The pink line delineates the current buffer zone that aims to prevent *X. fastidiosa* from spreading north³.

1. Gross value added of forestry, logging, and wood-based industries for EU-27 in 2011/2012. Sources: Eurostat and FAOSTAT

2. <https://www.nature.com/articles/s41598-017-00077-z>

3. See: <https://www.nature.com/articles/s41598-017-00077-z>

Detecting and then curing or removing the trees that are probably infected by a particular pathogen is critical to stopping or slowing down disease epidemic, especially in so-called “buffer-zones” that are set up to contain an outbreak. For example, to support the detection of coniferous trees that are most vulnerable to Pine Wood Nematode infection⁴ in the 2.2 Mha buffer zone separating the Portuguese outbreak from Spain, JRC is collecting and analysing remote sensing data for this purpose⁵. These data allow the identification of individual coniferous trees and assessing the health of their crown. The precise location of individual trees in poor health over areas of 100s of km² is then provided to the local authorities for follow-up on the ground (see next figure).

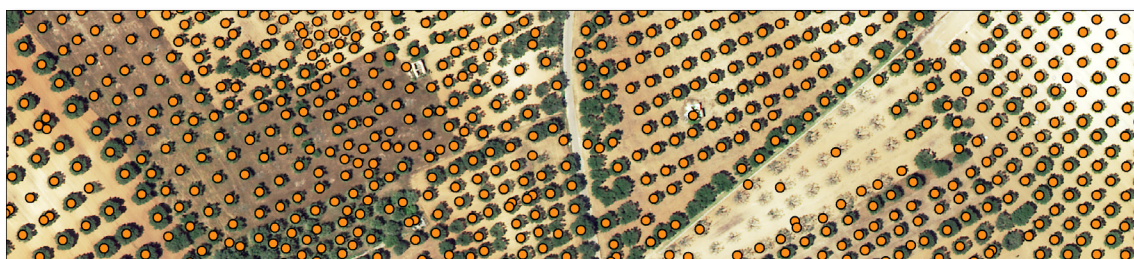


Examples of coniferous trees in poor health, detected by the JRC in the buffer zone established in Portugal to prevent the Pine Wood Nematode from spreading into Spain. The trees were detected using remote sensing in November 2016, and their exact location conveyed to the local authorities for follow up. If on-the-ground inspection confirms to declining status of the trees, they need to be felled according to EU Decision 2012/535/EC.

Examples of coniferous trees in poor health, detected by the JRC in the buffer zone established in Portugal to prevent the Pine Wood Nematode from spreading into Spain. The trees were detected using remote sensing in November 2016, and their exact location conveyed to the local authorities for follow up. If on-the-ground inspection confirms to declining status of the trees, they need to be felled according to EU Decision 2012/535/EC.

In parallel, JRC is developing advanced remote sensing techniques for the early detection of pest infection in trees, including hyperspectral and thermal instruments to detect infection before symptoms are visible to the naked eye⁶.

Remote sensing data can also be used to assess damage caused by tree pests. Here JRC is developing an automated method to count intact olive trees over entire regions using aerial photos commonly collected in national surveying programs (see figure below).



Example of automated olive tree detection applied to a sample of aerial photographs. When applied over time, the tool can be used to tally the number of olive trees in a landscape and how it changes over time, e.g. due to *Xylella fastidiosa*.

Impact

This work aims to support the EU's capacity to minimize the impact of harmful exotic tree pests, and can support the implementation of measures against tree pests by regional authorities. Indeed, the set of tools developed at JRC can support multiple phases of the pest management cycle. Identifying areas at greatest risk of infection can improve readiness, mapping tree health from remote sensing can improve monitoring and counting the number of trees lost in pest infected areas is fundamental to assessing damages.

4. See also <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC95972/lb-na-27290-en-n%20.pdf>

5. This work is being carried out in partnership with DG SANTE

6. e.g. <http://www.xfactorsproject.eu/remote-sensing-field-evaluation-activities-carried-apulia-region/>



Practical Handbook for Regional Authorities

This handbook is inspired by the longstanding, fruitful cooperation between the Directorates-General Joint Research Centre, Regional and Urban Policy as well as other departments of the European Commission, plus the Committee of the Regions and local and regional authorities in European Union Member States. Its purpose is to elaborate, in a clear and concise manner, how regional and city authorities may support their work by using existing JRC knowledge, information and tools.

Manuscript completed in September 2017

European Commission
Joint Research Centre
<https://ec.europa.eu/jrc/>

EUR 28744

JRC107967

Luxembourg: Publications Office of the European Union, 2017

PDF	ISBN 978-92-79-72265-3	doi:10.2760/102130	ISSN 1831-9424
Print	ISBN 978-92-79-72266-0	doi:10.2760/40492	ISSN 1018-5593

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EU law and related documents

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Open data from the EU

The EU Open Data Portal (<http://data.europa.eu/euodp/en/data>) provides access to datasets from the EU. Data can be downloaded and reused for free, both for commercial and non-commercial purposes.

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