How to build Smart Energy Regions

Summary Report

4-5 July 2016
Karlsruhe/Ettlingen, Germany

Contact: JRC-CONFERENCE@ec.europa.eu

European Commission

TechnologieRegion Karlsruhe
Hightech meets the Good Life

Baden-Württemberg
MINISTERIUM FÜR UMWELT, KLIMA UND ENERGIEWIRTSCHAFT

Summary Report – JRC-TRK EVENT: "How to build Smart Energy Regions" Ettlingen, 4-5 July 2016

Index

1. Introduction

This report summarises the sessions of a European event on regional and local energy policy in Ettlingen on 4-5 July 2016. Thanks go to the organisers: the Karlsruhe TechnologyRegion and the European Commission's Joint Research Centre. The conference was supported by and under the patronage of the Ministry for Environment, Climate Protection and the Energy Sector of Baden-Württemberg. It aimed at contributing to the assessment of how regions and local communities can achieve ambitious and sustainable greenhouse gas emission reduction targets in the energy sector.

About 120 participants from 22 European countries participated in the event. Regional and municipal authorities, academia and research organisations, expert networks and industry actively contributed to the discussions.

Topics of the conference:

- *From climate protection to energy action to regional action*
- *From regional perspectives to a European perspective*
- *From regional action to a scientific perspective*
- *How science and research can support*

The **Joint Research Centre** is the European Commission's science and knowledge service. In the energy field, it analyses the regional development of various renewable energy technologies, as well as the status and future trends of the energy market in the different EU regions. It also assesses renewable energy resources, regarding availability, logistics and economic performance at regional level. The Joint Research Centre is also performing comparative regional-level cost-benefit and security analysis for a cost-effective, reliable and secure development of the power system with a high share of renewables. The Joint Research Centre is running the Smart Specialisation Platform for Energy which supports the optimal and effective uptake of the Cohesion Policy Funds for energy and provides guidelines and scientific support for the creation of regional expert clusters to design, evaluate and monitor the Sustainable Energy Action Plans of the Covenant of Mayors initiative.

The **Karlsruhe TechnologyRegion** comprises eleven cities and towns, four administrative districts and a regional planning association. Business, science, culture and administration work closely together to bundle and boost their resources with the aim of strengthening the region as an economic area. Karlsruhe TechnologyRegion is one of Europe's leading innovation regions with excellent connecting infrastructure, world-class academic institutions, a highly skilled workforce, excellent support for start-ups, committed business development agencies and efficient networks. Karlsruhe TechnologyRegion is origin to a high proportion of next-generation technologies in a cross-section of sectors.

2. Rationale

There is global consensus that energy transition is needed as affirmed at the United Nations Climate Change Conference in Paris (Conference of the Parties – COP21) in December 2015. At European level this is underpinned by the European Commission priority of Climate Action and Energy establishing a European Energy Union with the target to make energy more secure, affordable and sustainable.

The integration of renewable energy sources begins at local and regional level where demand and supply of electricity can best be balanced taking into account the capacities of neighbouring regions also. In this context, the European Union offers a wide range of funding opportunities and other instruments to support local and regional authorities in their effort to reduce carbon emissions and become more energy efficient.

Energy is one of the key priorities in Horizon 2020, the EU Framework Programme for Research and Innovation. Horizon 2020 dedicates more than EUR 7 billion in the period 2014-2020 to energy research. The Cohesion Policy through the European Structural and Investment Funds invests about EUR 38 billion in the period 2014-2020 to facilitate the shift towards a low-carbon economy at regional level. In addition, the European Fund for Strategic Investments (EFSI) supports the deployment of strategic infrastructures in the field of energy as well as the expansion of renewable energy and resource efficiency.

Whilst energy policies are mainly set between EU and national level, the implementation of these policies is increasingly realised on a regional and local scale. The deployment of renewables is good example for it, as it is a form of de-centralised generation which relies on local conditions, not only in terms of resources, but also regarding the infrastructure for transmission, distribution and consumption. We also see that very often energy R&I is clustered in regions which host many innovative SME's around leading University Centres. Regions and cities have a pivotal role in creating a friendly environment for public and private investments in research and innovation to boost entrepreneurship, industrial competitiveness, services, inclusiveness and skills, that are essential for growth and job creation.

- Renewables are the fastest growing energy sources. However, the variable nature of wind and solar power requires smarter and more decentralised energy grids.
- The system becomes increasingly complex: This is the result of several trends, including increasing electrification of transport, more decentralised energy generation and consumer empowerment, digitalisation and service-orientation of the energy system.
- Buildings are important elements in the transition to a low-carbon energy system. Buildings can become power houses producing, consuming and managing energy.

Strong urban energy policies and increased coordination between national and local governments is of a vital importance in the potential of urban mitigation of global climate change. This has been emphasised by the Covenant of Mayors initiative, through which the European Commission has

given visibility to the role of local authorities and their relevant contribution to EU climate and energy targets with a bottom-up approach.

This approach has already shown tangible results, as it has been demonstrated in a JRC report[1], monitoring the progress of the Covenant of Mayors according to which GHG emissions have already reached an overall reduction by 23% compared to the reference year[2]; the final energy consumption has decreased by 14% on absolute values; and the share of renewable sources on final energy consumption increased from 3% (in the baseline emission inventory) to 14% (in the monitoring emission inventories).

3. Summary "How to build Smart Energy Regions"

3.1 Current policies

Katrin Schütz, State Secretary in the Ministry of Economic Affairs, Labour and Housing, Baden-Württemberg, emphasised that Baden-Württemberg is well positioned to meet the energy transition. She highlighted the excellent research landscape, comprehensive networks, and motivated cities and regions. European events like this one draw its relevance from the direct exchange of experiences on local and regional level. There is no one-size-fits-all solution for smart energy regions. On the contrary, we need to learn from each other and forge tailor-made solutions.

Frank Mentrup, Lord Mayor of Karlsruhe and Executive Chairman of the Karlsruhe TechnologyRegion, underlined that municipalities in Europe are ready to act. What they need is a clear commitment to a decentralised approach to energy policy supported by the European and national level. Mentrup called, also in his capacity as Chairman of the Karlsruhe TechnologyRegion, to create the appropriate scope of action allowing to experiment and to incentivise cooperation at local and regional level. This gives the formula "think global, act local" a new meaning.

Maive Rute, JRC Deputy Director-General underlined in her opening statement that strong urban energy policies and increased coordination between national and local governments are of vital importance in the potential of urban mitigation of global climate change. Energy transition is a multidimensional challenge and policy makers, scientists, businesses and local communities are called upon to find innovative ways to combine technologies and business models. All dimensions are interlinked: We need a multidimensional and multi-disciplinary approach. Decentralised energy generation, the digitalisation of the energy system and new service-oriented market models empowering consumers will be significant changes in the way we see energy.

Karl Greißing, Ministerialdirigent, Ministry of the Environment, Climate Protection and the Energy Sector, Baden-Württemberg, outlined the energy and climate action targets for Baden-

[1] A. Kona et al. (2015) "The Covenant of Mayors in Figures and Performance Indicators: 6-year Assessment", EUR 27110. Based on an assessment of the reports of 122 signatories (ca. 11 million inhabitants) as of September 2015, JRC has identified a substantial progress towards the GHG target, more pronounced than for renewable energy and energy efficiency.

[2] 1990 is the generally recommended reference year; nevertheless signatories are able to choose the closest subsequent year for which reliable data could be gathered. As a result, most signatories (66%) decided to take 2005, or 2007, or 2008 as their reference year with a share of 34% of the total inhabitants of the dataset.

Württemberg: 50% energy savings, 80% renewables and 90% GHG reduction by 2050. The integrated concept for energy and climate protection has been elaborated with a broad participation of society. It is important to further decouple economic growth from resource consumption. Solar and wind energy sources currently amount to 23% of the electricity production (target for 2020: 38%). A solar energy initiative shall boost the potential especially in cities. The development of power grids aims at a transparent approach taking into account suggestions from local communities. This raises acceptance and minimises conflicts. The energy transition needs a more flexible energy system which includes demand-side management and coupling of the electricity, heating/cooling and transport sectors. Baden-Württemberg supports energy efficiency improvements in industry in "regional competence centres for energy efficiency". These centres co-funded by EU cohesion funds inform and support companies in the implementation of energy efficiency measures.

Lambert van Nistelrooij, Member of the Committee on Regional Development, European Parliament, underlined that energy policy needs to be close to the citizen. The connection and sharing at local and regional level is most important to build smart energy regions. This connection to citizens on specific topics is also crucial to build a new Europe. He underlined the importance of synergies between different European funds: Looking at the state of play, most of the Horizon 2020 investments go to the old Member States, whereas for the European Structural and Investment Funds, most investments are done in the new Member States. The EU territorial cohesion objectives stand for a balanced development. We need to make sure that all regions can benefit through synergies between investments and grant schemes.

The panel discussion moderated by **Karl-Friedrich Ziegahn**, Head of Division “Natural and Built Environment", Karlsruhe Institute for Technology (KIT), outlined the challenges that regions and communities face in order to achieve ambitious and sustainable greenhouse gas emission reduction targets in the energy sector. The target is to make energy more secure, affordable and sustainable, whilst stimulating the creation of new jobs and growth at regional level and investing in Europe’s future. A good tool to support the process in regions is the Smart Specialisation Platform on energy based at the JRC. A key initiative is also the Covenant of Mayors: through a Sustainable Energy Action Plan the Covenant signatory outlines how it intends to reach its CO_2 reduction target. It defines the activities and measures set up to achieve the targets, together with time frames and assigned responsibilities.

3.2 Trends and challenges – science perspective

Session 1 - Scientific evidence to improve the effectiveness of sustainable energy policies and measures

The session focused on existing potentials of greenhouse gas emission reductions and energy efficiency as well as current trends in environmental and adaptation technologies.

Heinz Ossenbrink, JRC Head of Unit for Energy Efficiency and Renewables, presented factors that will increase the share of renewables in Europe in the next five years: (1) technology cost decrease, (2) transport, storage, self-consumption, (3) integrated energy systems, (4) market design. Important

drivers will be buildings, cities (Covenant of Mayors) and regions. The Energy Union Package[3] sets the framework strategy for a secure energy supply, an integrated market with more control for consumers. It boosts the clean low-carbon economy with a renewable target of 27% by 2030. Today, China overtook Europe in renewable energy investments. Europe remains world leader on renewable technologies – especially in prosumer technologies like smart appliances, -homes, -cities, -grids, and energy-neutral buildings.

→ *Challenge 1: How can we maintain this momentum? What can local and regional authorities do in support?*

Andreas Zucker, JRC unit for Knowledge for Energy Union spoke on energy self-consumption and regulation schemes. There are energy home storage systems on the market but current yearly battery costs are equal to the average electricity bill thus further cost reductions are required. Storage could become attractive in case of high retail prices and on exemptions of self-consumed energy from grid fees, taxes and surcharges. A study on about 1.000 households with PV systems in 5 different EU countries showed a level of about 30-35% self-sufficiency without batteries. The deployment of a 10kWh battery increases the self-sufficiency rate to 70%. Size and costs of the battery would increase sharply when the self-sufficiency should be extended beyond 70%. Hence, Prosumers will likely not abandon the power grid but they will underutilize it. The profitability of self-consumption strongly depends on the retail tariff structure and taxes, levies and surcharges are key. The JRC develops open datasets allowing transparent assessments for the potentials of biomass, solar and wind energy[4].

→ *Challenge 2: How can local and regional authorities exploit better existing potentials for renewables in order to increase self-consumption?*

Dogan Keles, Head of Research Group "Energy markets and energy system analysis", Karlsruhe Institute for Technology – KIT, presented the impact of renewables on energy markets and on the future market design. The decline of wholesale electricity prices over the last 5 years was mainly driven by decreasing coal and carbon prices. Renewables have a growing price effect and reduce the earnings of conventional power plants. Renewables producing electricity at close to zero marginal costs influence the merit order on spot markets. The current conditions tend to push gas and CCGT power plants out of the market. A market design with an energy-only market foresees just a short-term reserve power market (day-ahead market). Can it give enough incentives for new investments to ensure investments and thus to provide generation adequacy? Or is a capacity remuneration mechanism needed? A KIT study examines the cost of different capacity market designs for Germany up to 2050. The introduction of a capacity market in Germany would increase the cumulative payments to all flexible power generators by 20-30 billion Euros for 2015-2030 compared with an energy-only market. However, scarcity prices will diminish the costs advantage of the energy-only market after 2030-2050. In the long run, an energy-only market with low demand-side management will not supply the needed capacity over all hours of the day. A capacity market would meet requirements mainly due to additional gas-fired power plants but might lead to surplus capacities.

[3] (COM(2015)80)
[4] https://setis.ec.europa.eu/

→ Challenge 3: How can local and regional authorities contribute to a better demand-side management?

Phil Jones, Chair of Architectural Science, Welsh School of Architecture, Cardiff University, presented drivers and barriers for a zero carbon built environment. The built environment consists of existing stock, new build and the supporting infrastructure: energy, water, sewage, waste, transport. In future our "zero carbon" energy supply will have building integrated systems and localised distributed systems. There are a range of levels of low to zero carbon performance, depending on new build and retrofit and scale. There will usually need to be a link to an energy supply system which could be a local distributed energy supply. Policy is slow to permeate into practice ("Policy Practice Gap") and business as usual will not meet the political targets. A new equilibrium between top-down and bottom-up solutions is needed. "Middle-out" agents are needed to operationalize bottom-up activities in response to top-down policy. We should encourage mechanisms for sharing information within and across countries and regions. We should build on and encourage interaction across existing networks, such as the Covenant of Mayors, EUROCITIES, and COST Actions.

→ Challenge 4: How can local and regional authorities speed up the process to turn policy into practice?

Ales Gnamus, S3 Platform, JRC Unit for Territorial Development, gave an overview on economic development perspectives for cities and regions in EU Cohesion Policy and presented the Smart Specialisation Platform on Energy. A key element of Smart Specialisation is the entrepreneurial discovery process and the engagement of actors from the public administration, business, research and the civil society (quadruple helix). The Smart Specialisation Platform works bottom-up with regions aiming for an optimal uptake of cohesion policy funds and supporting energy innovation.

→ Challenge 5: How can local and regional authorities support innovation paving the way towards a low carbon economy?

→ Challenge 6: How can Smart Specialisation become an integral part of local and regional development strategies?

3.3 Local and regional strategies – regional perspective

Session 2 - Local and regional strategies

The session focused on the functionality of measures taking into account the impact of eco-innovations on climate protection whilst strengthening local and regional competitiveness.

Bertrand Zuindeau, Project Manager, Regional Council Hauts-de-France, emphasised that renewable energy and digitalisation mark the 3rd industrial revolution. The dual objective in this industrial revolution is to achieve a low-carbon economy and to encourage the creation of new jobs and growth. The process towards a circular economy has high implications for regions as it requires a multitude of projects with a high diversity of players. Regions like Hauts-de-France created tools to give technical and financial support with the following priorities: (1) employment, (2)

territorialisation/strengthening of the local value chain, (3) collective ownership, (4) quality of projects, (5) opening up internationally and building European synergies.

→ *Experience 1:*

- Renewables and digitalisation come as a radical change for a transition region, giving completely new development perspectives (transition region)

- Territorial embedding is essential

- Five key orientations: Employment, territorialisation, appropriation, quality of projects, opening up internationally (= focus added value for the people)

Jochen Ehlgötz, Executive Director, Karlsruhe TechnologyRegion, underlined that regional competitiveness depends on innovation and sustainability. The development strategy of Karlsruhe TechnologyRegion identified mobility, energy and ICT as priorities. In the context of a regional specialisation strategy, local authorities are needed as initial investors as they can provide a balanced territorial foothold for the planned investments (ERDF Objective 1). In the context of sustainability strategies, cities and municipalities are "enablers" whose main role is to secure their residents' support for and involve them in the development of the urban infrastructure (ERDF Objective 4). Regions and municipalities can act as change agents providing support to local actors during the implementation. However, many regions and municipalities in Europe are insufficiently equipped and overstrained. They often lack power and sufficient resources to take an active part in their own development. They are constrained by silo-thinking and hampered by unnecessary bureaucracy. A successful environment is where local authorities, industry and academia can work closely together (consortium partnerships).

→ *Experience 2:*

- Developing a joint strategy was extremely helpful and motivating (High-tech, more developed region)

- Cities are "enablers" that can bring sustainability strategies to practice

- Investments are sometimes difficult to realise and frustrating

Astrid Madsen, Process Manager for Energy Transition, City of Rotterdam, presented innovative urban energy infrastructure planning which combines an optimal combination of measures (use, exchange, storage) and supports development and (local) innovations. Local governments need to analyse actual and future urban energy infrastructure concepts and its financial and technical impacts. In the process from ambition to what is possible and needed, it is important to involve all stakeholders. Also social and behavioural aspects need to be taken into account.

→ *Experience 3:*

- Smart urban energy planning combines infrastructure projects and local innovation (High-tech, more developed region)

- Bringing partners together is essential

- Social and behavioural aspects are to be taken into account

Nikola Kibritev, Director of the Sustainable Development Department, Ruse Municipality, shared the example of Ruse, a city located in the north-eastern part of Bulgaria, on the right bank of the Danube. The building stock of the city includes many old prefabricated buildings made with concrete slabs. There is a lack of diversity of energy suppliers with a very limited share of renewables. The electricity networks suffer high losses of up to 25% (theft). Decision makers would require more experts in the energy field. The city of Ruse took measures to tackle these issues with an energy efficiency plan and a strategy for sustainable energy development. EU projects are an important source of funding and to gather knowledge and expertise. Following a first phase of participation in projects, Ruse is now preparing own projects as a leading partner. For the future, the municipality wants to create an energy efficiency fund and an IT platform to monitor the energy consumption of municipal buildings. Local renewable energy sources should help to reduce the capital outflow and to reinvest in sustainable projects.

→ *Experience 4:*

- Focus on energy efficiency projects (feasible features for less developed region)
- Capacity building is an important element (i.e. local energy efficiency fund, IT platform)
- Reduction of capital outflow and increasing reinvestment

Furio Honsell, Mayor of Udine, spoke about whether smart cities are also healthy cities. The population of many cities is aging and elderly people often wish to continue an autonomous life in their homes. At the same time there is a trend to more single households. A city needs to react to the expectations and life perspectives of its citizens. This includes urban public transport, affordable clean energy, the reduction of waste, social inclusion, intergenerational activities and much more. At the same time, cities like Udine face problems with high youth unemployment due to the closing down of manufacturing industry. Innovative initiatives like Fab Labs and Pop-up Spaces provide a meeting place for new business ideas. Especially energy efficiency and social care are emerging sectors. To tackle such challenges top-down or bottom-up approaches need to be combined to a "middle-out" approach. The city needs to provide the infrastructure to enable innovation (i.e. broad band internet). Digitalisation allows involving citizens: Udine has a platform enabling citizens to turn into a "controller" indicating what needs to be fixed in the town. The re-use and retrofitting of public buildings, the reduction of passive traffic and the creation of urban gardens ultimately increase the quality in a smart and healthy city.

→ *Experience 5:*

- Health as catalyst to connect basic needs with top down energy policies in an intelligent way (transition region)
- Middle-out approach
- IT infrastructure indispensable to involve citizens in quality control

Jeremy Draper, Energy Manager, Milton Keynes, presented the cities' roadmap to a sustainable low-carbon city by 2050. Milton Keynes collaborates with seven other European cities in an INTERREG IVC programme - meetings and idea exchanges with these cities was crucial to the methods used. The process for each city was heavily influenced by the sharing of experiences (good and bad) of all partners. Meetings and workshops created a stronger link with citizens, business and universities by

creating a forum to inform about plans and decisions with the council and giving direction to joint endeavours. Partners like "Energy Cities/Covenant of Mayors" facilitated the process.

→ *Experience 6:*
- INTERREG was crucial to develop the methodology (transition region)
- Strategies are necessary but not sufficient
- The roadmap process is the key to success (involvement across political parties, citizens, etc.)

3.4 Evaluation – practitioner perspective

Session 3 - Optimisation of policies and measures to build Smart Energy Regions

Three parallel workshops analysed policies and measures to build smart energy regions. What measures make sense and how to avoid disincentives, was the central questions of this session. Participants discussed good practices and innovative concepts to efficiently reach the energy and climate targets.

Workshop 1: Smart Grids as backbone for Smart Energy Regions

Many European countries are facing an energy transition where conventional fossil energy sources are replaced by renewables for electricity generation. This requires a change in paradigm for two reasons. First of all, renewables are mostly intermittent so in the future demand will have to follow to some extend electricity production. Second, production will be much more decentralized e.g. most of the photovoltaic installations are placed on rooftops of private homes. According to the presenters, a cellular organized Smart Grid will be able to overcome some of these challenges already at local level, releasing stress from transmission grid, which is already today in certain situations and regions at its knees.

Beside the technical aspects of Smart Girds with IT-integration between energy consumers, network operators and producers, the whole energy market will change due to the arrival of new actors. For example some new aggregator will collect and combine the potential for demand side management of individual households. This will allow the individual energy consumers to market the flexibility they have in the energy consumption.

Realising the energy transition from fossil to renewable energies may also require a transition to new business models, of which many require a large investment, most of all in financial terms but also considering framework and state regulations. Such new business models are located in different cross cutting sectors, such as ICT (Internet of Things), in energy trading, and a remarkable number require prosumer involvement up to community ownerships.

Finally the Smart Grid and the energy transition as a whole will require huge investments. When these costs are distributed among the energy consumers, one should not forget the social aspects (“social equity”) as poor people might not be able to bear these costs.

→ *Result Workshop 1:*

- *A change in paradigm is indispensable: Demand will follow production and this will be more decentralised*
- *A cellular approach opens new possibilities for local and regional authorities*
- *Demand-side management opens new opportunities for energy consumers and new business models*
- *Huge investment requirements, combined with multiple conflicts of interest as a major political challenge*

The JRC Smart Grid Database

Since 2010, the JRC has been strengthening its role as an independent data broker in the field of smart grids. The first Smart Grid Projects Outlook was released in 2011, with the aim of monitoring the direction Europe is taking and providing insights to stakeholders and policy makers on the main challenges ahead. The Report was updated twice, in 2013 and 2014.

Recently, JRC also extended its monitoring efforts to European laboratories (Smart Grid Laboratories Inventory, 2015). The idea here is to get an overview of all the smart grid technologies operational at laboratory level and to identify research activities, gaps and future trends.

JRCs latest effort is the DSOs Observatory Report, whose aim is to contribute to a better understanding of the challenges that the transition to a new energy system is posing to European Distribution System Operators (DSOs). The Report presents some technical indicators regarding the main DSOs assets in Europe and proposes several representative networks built from the collected data that can be used to perform different kinds of analysis without the need to have access to the real DSOs data.

The new Smart Grid Outlook Report will present an updated overview of the smart grid state of the art in Europe. A new addition this year is the focus on the path of smart grid solutions from innovation to deployment. Building on the experience gathered in many R&D and demonstration projects, several smart grid solutions and applications are now approaching market maturity. The new solutions however will only work once all the pieces of the puzzle are put together (technology, regulation, consumer acceptance and engagement with the new technology, a valid business case for all the stakeholders involved, etc.). The Report aims at providing a clear overview of this process by investigating the technological maturity of the tested solutions, the different kinds of barriers to their deployment (economic, regulatory, and social), the adopted business models and the commercial transactions already ongoing in the market (emerging business value).

All reports and much more information can be found under:
http://ses.jrc.ec.europa.eu/survey-collection-european-smart-grid-projects

Workshop 2: Research and Innovation Strategies for Smart Specialisation

Smart Specialisation strategies are national or regional innovation strategies that are necessary preconditions for the use of European Structural and Investment Funds to support R&I (thematic objective 1).[5] RIS3 priorities are set in an inclusive process of stakeholders' involvement centred on "entrepreneurial discovery".[6] This aims to be an interactive process in which market forces and the private sector are discovering and producing information about new activities that have the potential to enhance the economic development of a region in terms of growth and jobs. The government assesses the outcomes of the entrepreneurial discovery process and empowers those actors most capable of realizing this potential. In the context of ESIF-funds implementation the strategy should embrace a broad view of innovation**,** supporting technological as well as practice-based and social innovation. This allows each region and Member State to shape policy choices according to their unique socio-economic conditions.

The workshop discussed dialogue oriented instruments and the sub-regional implementation of Smart Specialisation. For instance, in Baden-Württemberg stakeholder participation includes sectorial, thematic, and regional dialogues. In the context of ERDF-OP implementation, RegioWIN which is an interregional competition based on smart specialisation was developed as an instrument within the regional dialogue column. Its goal is to support cities and regions to enhance their competitiveness. It brings Smart Specialisation to the sub-regional level. Ownership of the strategies developed during the competition and project implementation stays with the city/region.

In the Greek Region of Eastern Macedonia and Thrace, a methodology for Entrepreneurial Discovery Process (EDP) was designed and tested by the Joint Research Centre in the context of a European Parliament Preparatory Action. The EDP methodology was implemented on a series of thematic focus groups. The experience obtained in the Region of Eastern Macedonia and Thrace was transferred to the Western Greece Region where participation of enterprises in the total R&D expenditure is very low compared with the Greek average.

Innovation platforms like focus.energie in Baden-Württemberg are suitable structures to connect participants of the entrepreneurial discovery process. Their role can go from consultation up to the co-creation of implementing policies. Innovation platforms enable actors to create new market opportunities and contribute to economic growth and job creation at local and regional level.

As ERDF implementation takes place under the shared responsibility principle, projects are often financed through several funding schemes. This results in a vast number of difficulties as the conditions of all funding schemes involved must be met at the same time. It is difficult to overcome all obstacles to proper project funding. One major problem is the interpretation of rules on when public spending falls within, or outside, the scope of EU State aid control.[7] Another problem with ERDF funding is the principle of reimbursement, as it forces project partners to pre-finance large sums for a long time: Already the planning of infrastructure projects is a long process which creates

[5] Guidance on European Structural and Investment Funds 2014-2020: http://ec.europa.eu/regional_policy/en/information/legislation/guidance/

[6] Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3): http://ec.europa.eu/regional_policy/sources/docgener/presenta/smart_specialisation/smart_ris3_2012.pdf

[7] The European Commission recently published guidance on the notion of State aid to clarify the scope of EU State aid rules to facilitate public investment (2016/C 262/01).

costs at the side of the project partners. During the application for funding, lots of unexpected small print turns up and it often takes a long time before applications are approved. There is a considerable financial risk at the side of the project partners involved, which tends to make EU funding unattractive. Project partners need to secure refinancing and especially large players do not want to wait too long whilst small partners do not have the necessary pre-financing capacity. Workshop participants pleaded for systematic approaches on each administrative level aiming to make synergies of funding schemes more accessible.

→ *Result Workshop 2:*

- *The Entrepreneurial Discovery Process is a broadly applicable method without restrictions as regards to the type of region or the sector concerned*
- *A balanced representation from administration, industry, academia and society is essential to create ownership and positive dynamics*
- *Bureaucratic hurdles in connection to ERDF funding and legal uncertainties are major drawbacks: simplification is a constant challenge*

The Smart Specialisation Platform on Energy

The Smart Specialisation Platform on Energy (S3PEnergy) is a joint initiative of the European Commission's Directorates-General for Regional and Urban Policy, Energy, and the Joint Research Centre. The S3PEnergy is an enabling tool for regions to coordinate, rationalise and plan their respective energy strategies, develop a shared vision on knowledge-based energy policy development, and set up a strategic agenda of collaborative work. The main objective of the S3PEnergy is to support the optimal and effective uptake of the Cohesion Policy funds for energy, and to better align energy innovation activities at national, local and regional level through the identification of the technologies and innovative solutions that support in the most cost-effective way the EU energy policy priorities. The S3PEnergy contributes to the EU energy policy priorities by facilitating partnerships between EU regions that have identified renewable energy technologies and innovative energy solutions as their smart specialisation priorities and by promoting alignment between local, regional, national and European activities on energy sustainability, competitiveness and security of supply.

The S3PEnergy is addressing 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 strategy and the EU Plan in strategic investments in jobs and growth, the latter to be realised through the European Fund for Strategic Investments (EFSI). Numerous activities foreseen in the EU's Energy Union five dimensions including a fully-integrated internal energy market, supply security, energy efficiency, emissions' reduction and research and innovation in low-carbon technologies need to be put in practice at local or regional level. The ultimate objective of the S3PEnergy is to contribute to the shift towards a low-carbon economy and to respond to some of the societal challenges related to the EU's climate and energy targets.

The activities of the S3PEnergy are targeted at information, knowledge and expertise provision for policy-makers, authorities and stakeholders in charge of energy and research and innovation policies and Cohesion Policy funding. The Platform serves Member States and regions, supported by a web-based facility where policy-makers are directed to relevant information linked to their needs. Effective cooperation can also be facilitated by thematic seminars and guidance materials to strengthen regional/local capacities.

The S3PEnergy wants to collaborate with interested regions and Member States to: (i) analyse current energy priorities and policies, and (ii) identify good practices and roadmaps for bottom-up transregional and transnational cooperation. The subsequent goal is to set up a strategic agenda of collaborative framework which will accelerate the development and deployment of innovative low carbon technologies. The Platform prepares thematic papers and carries out active outreach activities to build and disseminate knowledge to Member States, regions and interested stakeholders on the possibilities for investing in energy projects from the Cohesion Policy funds. It also supports the identification of common challenges and the establishing of solutions.

For more information and upcoming activities: **http://s3platform.jrc.ec.europa.eu/s3p-energy**

Workshop 3: Smart Cities and Communities

In the context of the whole event "How to build smart energy regions", this workshop allowed to discuss other aspects linked to energy in smart cities and communities. The three speakers, who deal with energy in their daily work, brought in their experience in a broader administrative context. These were a representative from the energy agency of the state Baden-Württemberg in Germany – in charge of coordinating around 40 local energy agencies; the energy manager from the municipality in Litoměřice in the Czech Republic; and the head of the environmental management system from the municipality of Udine in Italy.

A main conclusion common to the three experiences – despite the different administrative levels and geographical areas – is that energy management is not smart nor sweet, but dirty and hard. Still, energy management is a fundamental aspect towards getting smarter cities and communities. It needs to be integrated with and at the service of other aspects, such as quality of life and comfort. The motto e.g. for the Udine municipality is that a smart city is a healthy city.

This multi-aspect approach requires involving more stakeholders and creating broad consensus. This is necessary with citizens but also in-house amongst employees in the municipality or the energy agency in order to build commitment. Building smart cities and communities also requires thorough planning well in advance and a monitoring system, in order to assess results and fine-tune actions. Communication with citizens and all stakeholders about actions and results is a crucial element.

Moreover, if the state/national level fertilises the ground, the activities of local authorities and other players can grow. One needs supportive regulations on higher political level to trigger the process on the local level. The municipalities can be role models, service providers and at the same time motivators.

→ *Result Workshop 3:*

- *Energy management needs to be integrated with and at the service of other aspects, such as quality of life and comfort*
- *This multi-aspect approach requires involving more stakeholders and creating broad consensus*
- *A smart monitoring system is needed in order to assess results and fine-tune actions*
- *Political support from the national/regional level is crucial*

European Innovation Partnership on Smart Cities and Communities

European cities regularly score well in international comparisons of quality of life, competitiveness and sustainability. Nonetheless, many cities face challenges such as austerity, market fragmentation, heightened societal expectations, non-sustainability and a plethora of technology options with unclear benefits.

The European Innovation Partnership (EIP) on Smart Cities and Communities by the European Commission helps European cities, companies, research organisations and other partners face these challenges. Through thematic "Action Clusters", partners have started to align efforts and help realise new models of open collaboration, seeking to roll-out technology and service innovations at scale. These include for 2016:

- 50 cities and 50 industry partners will collaborate to establish interoperable urban platforms, with the aim to increase pace and scale of roll-out of open solutions;
- 30-50 cities and partners will collaborate to align and later on bundle demand to install up to 10 million intelligent lampposts in Europe by 2017;
- Up to 100 cities and partners will collaborate to put positive energy blocks into place, particularly in small and medium sized cities;
- 15 cities and 40 industry partners will collaborate to replicate smart electro-mobility solutions, seeking 50 new projects with 50 new city partners and strong SME participation;
- 10 cities and regions with partners will collaborate to replicate regional innovation clusters and open-data platforms for smart mobility services in up to 50 replicator cities.
- 50 cities will co-create a guidance package on integrated planning for smart city solutions, including KPIs;
- 50 cities and their partners will further test and adopt approaches for citizen engagement, including co-design and co-creation, and will engage in signing of a Citizen Engagement manifesto.
- The "Small Giants" network - with a focus on cities below 150.000 population - will support replication through knowledge exchange and advice on business models and funding;
- The 6-Nations Smart Cities Forum will create a blueprint of best practices to support smart city action at national level in Member States.

The EIP partners work in an open, collaborative market place to drive market transformation through development and replication of solutions.

For more information and how to apply: **https://eu-smartcities.eu/user/register**

3.5 Drivers of Change

Session 4 - How to build Smart Energy Regions

The session focused on drivers of change to overcome prevailing market, policy and institutional barriers to low carbon growth. The panellists discussed the specific role of the regional and local level. The guiding questions of the panel were (1) how to stimulate innovation; (2) how to boost investments in low-carbon emission infrastructures; (3) how to allocate scarce resources more efficiently in order to overcome both market and policy failures.

Diego Pavía, CEO of KIC InnoEnergy emphasised that a key to stimulate innovation and boost investments on the regional level lies in the great potential of demand side management. The challenge is to find valid business models that offer a broad range of services. KIC InnoEnergy supports the creation of innovative start-ups that push existing technologies as enabler or develop technologies required as building blocks for new market products or services (TRL 7-9). Specialised partners like research institutes and universities play an important role in the supply chain. Partnerships with big companies also play a role in integrating specialised products in larger systems and by adding the credibility require by the end users.

It was mentioned that many households are indifferent to their energy bills. There would probably be more interest when the user could see the individual energy consumption of their appliances. As for smart home apps, people use them intensively for two weeks and then less and less. Realities in Europe are different: Whilst some regions think about how to enable household to become prosumers, other regions' households struggle with collapsing district heating systems.

The importance of common standards and harmonised regulations was mentioned. Current legislation in many Member States does not allow to fully exploit the potential of smart grids. The area of e-mobility was mentioned as an example of where common standards need to be further developed. Artificial layers for standards and regulations should be avoided. A level playing field would benefit European competitiveness.

Ralf Goldmann, Head of Division, Energy and Solid Waste Division, JASPERS, European Investment Bank (EIB) explained that JASPERS is a technical assistance partnership between the European Commission, the European Investment Bank and the European Bank for Reconstruction and Development. It covers assistance on infrastructure projects from the project preparation, independent quality review to post-submission appraisal function for all major projects submitted directly to the European Commission.

It was mentioned that companies in some Member States have difficulties to borrow capital for investments. The EIB also gives out simple loans in countries where it can provide the cheapest offer. Currently, it can be observed that traditional banks make no money in their core business which increases their appetite to get into other businesses. This could have positive effects on private energy infrastructure projects. In addition, the European Fund for Strategic Investments (EFSI) addresses structural investment gaps that are important in view of the global competitiveness challenges.

Reasons for the complexity of funding schemes were discussed. It was underlined that smart money goes for value: whilst private investors see the main value in economic benefits, public investors also consider values like clean air or employment rates.

Peter Heydebreck, Interreg EUROPE, Lille, presented the Policy Learning Platform. It is a new feature opening up the Interreg programme's knowledge for the benefit of all project partners and the whole community of regional policy stakeholders. Its aim is to act as a knowledge and education centre, to bring together potential partners, and to provide targeted expert advice to improve public policy design and implementation.

The relationship between advanced and lagging regions was discussed. Cooperation between regions is important for the exchange of good practices and capacity building. There are several platforms that act as potential interphases between regions or cities. It was recommended that the communication between related platforms should be improved.

Kristine Kern, Professor for Governance of Urban Infrastructure and Global Change, Leibniz Institute for Research on Society and Space (IRS) underlined that municipalities and regions at all levels of development now have the opportunity to take actions to reduce the risk of climate change whilst laying the ground for sustainable economic growth. The conference has shown that there is a huge potential to invest in greater efficiency and sustainability in the energy sector. Urban development will become more interconnected. Smart Specialisation will help urban management to develop comprehensive approaches to putting new technologies to best use.

It was discussed that in order to stimulate innovation, Europe should make use of its strengths: this includes social innovation, transparency and behavioural sciences. The development of marketable products depends not only on the mastering of cutting edge technology but also on embedding it in the larger socio-economic environment. The local and regional level is well placed to be a testing ground for such innovative concepts if it manages to build a close relationship with its citizens.

→ *Recommendations:*

- *In order to stimulate innovation, smart energy regions should focus on their strengths and involve society in the process. Smart Specialisation Strategies and the Entrepreneurial Discovery Process as well as supporting platforms can be helpful to reach out and involve potential partners.*
- *In order to boost investments in low-carbon emission infrastructures, simplification, standardisation and transparency of regulations and funding rules are needed. Policy needs to keep pace with the technological progress. Capacity building for the project quality review process is important.*
- *In order to allocate scarce resources more efficiently and to overcome market and policy failures, closer collaboration, exchange of best practice and capacity building are helpful. Supporting platforms should be better linked to make use of synergies.*

4. Conference Conclusions

Heinz Ossenbrink, JRC Head of Unit for Energy Efficiency and Renewables, summarised the conference. "Smart" triggers thinking of what can we do? What is smart to do? We need clean energy in order to build environmentally friendly regions. Energy is connected to grids and IT services – but also connected to the customers. Demand-side management will play an increasing role in the future but business ideas still need to be refined. Concrete examples where the Joint Research Centre can support are via the Smart Specialisation Platform and via the technical helpdesk of the Covenant of Mayors. Member States will have to be accountable for the climate goals. The climate targets will not be reachable by regulations and rules alone. They can only be reached when citizens want them. Therefore it is crucial to involve citizens and this is most successful at the local level. Cooperation at local level – even cross-border – is much more successful than at any other level. We face a time of massive technological change. One of the first sectors that experiences significant change is the energy sector where we need to integrate decentralised, variable renewables. Mr Ossenbrink's prediction for the coming years is that we will see the creation of an internet of energy supply and demand.

Frank Mentrup, Lord Mayor of Karlsruhe and Executive Chairman of the Karlsruhe TechnologyRegion concluded that climate and energy policy has passed the point of no return. We are not discussing about "whether" we need to act but about "how" we need to act to build smart energy regions. There is consensus that we need to better link the objectives for economic growth with climate targets. More than quantitative growth, we need to create jobs and a healthy environment for our citizens (qualitative growth). More difficult is the question of how to integrate renewables in our energy system. The examples presented at this conference show that there are many possible approaches. We can only make full use of the potential when (1) municipalities and regions are actively involved in the process; and (2) the national and European level sets the required framework conditions. The objective should be to increase the scope of the local and regional level to be able to play a stronger role in the implementation of the energy transition. For instance, the limited financial means of municipalities need to increase. Innovative financial instruments are needed to mobilise private capital. Administration and management systems need to modernize and silos need to be broken up. The Lord Mayor thanked Baden-Wuerttemberg for the "RegioWin" competition which enables Karlsruhe to actively participate in EU regional development policy – an instrument that might also be interesting for other European regions. The Lord Mayor concluded by emphasising that (1) Politics needs to be citizens-oriented and follow a comprehensible narrative. (2) Funding conditions need to be simplified to allow municipalities, businesses and research institutes to participate in an equal manner. Especially the EU rules for state aid should be critically revisited. (3) EU and national projects need faster and more efficient procedures with fewer controls. (4) The success of projects at local and regional level mirror European efforts: this is the level where we gain or lose the trust of citizens. (5) Municipalities need to broader their horizon and intensify collaboration also cross-border. The territorial instruments of the European regional policy can strengthen this collaboration. The climate targets need to be systematically integrated in local and regional decision making processes. In order to build smart energy regions, we need pioneers who boldly go ahead, and we need local and regional strategies that set the right conditions allowing this.