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Landscape Research Group

# Energy Landscapes

Perception, Planning, Participation  
and Power



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# Abstracts

Edited by

Markus Leibenath  
Gerd Lintz  
Peter Wirth  
Maria Elena Zegada

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**Leibniz Institute of Ecological Urban and Regional Development (IOER)**

Weberplatz 1, 01217 Dresden, Germany  
Tel.: + 49-351 4679-0  
Fax: + 49-351 4679-212  
e-mail: [info@ioer.de](mailto:info@ioer.de)

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# A Perception

## Theme keynote “Perception”

### Emplacing technologies in energy landscapes: The role of place and identities in the low carbon transition

**Patrick Devine-Wright**; University of Exeter, College of Life and Environmental Sciences, United Kingdom

Over the past decade, a significant body of social science literature has emerged investigating issues around the siting of low carbon energy technologies and associated infrastructures, prompted by policy and industry concerns over the impacts of ‘NIMBY’ (Not In My Back Yard) objections. In this presentation, I will focus upon important spatial dimensions of siting conflicts over low carbon technologies, implicating issues of place, scale and identity. First, I will draw attention to several key studies that have explored the role of place attachments and place identities in explaining public responses to developments such as wind farms, wave and tidal devices, electricity power lines and nuclear power plants. Second, I will show the importance of symbolic ‘fit’ between place and technology related meanings, and how these underlie discourses of both support and objection. This will be illustrated by drawing on recent findings that reveal processes of essentialisation at work in how local residents represent the siting of high voltage power lines in the English countryside. Finally, I will point to several knowledge gaps for future research to explore.

## **A1** Discourses, stories, narratives

### **Old landscapes, new narratives: Addressing the conflict between climate change mitigation and landscape conservation**

**Maunu Häyrynen;** University of Turku; Landscape Studies; Pori; Finland

*Keywords:* climate change mitigation; landscape conservation; landscape imagery; nordic countries; identity narratives

John Urry (2011) maintains that disengaging from a carbon-based way of life is difficult and politically risky due to its deep and socially layered rootedness. The narratives framing identity processes and policy making are still dependent on energy-driven growth. As Kari Norgaard (2011) has demonstrated, the main obstacle for climate change mitigation is not a lack of environmental awareness but emotional passivity and denial. Cultural landscapes are deeply ingrained in social imaginations and identity processes of communities, often ending up institutionally protected and conserved. Emerging energy landscapes produced by mitigation potentially conflict with landscape conservation objectives, challenging perceived historical continuities and collective landmarks.

Mitigation as overriding societal priority divides cultural landscapes into new categories according to their vulnerability to change. Perceived loss of landscape quality because of mitigation may cause resentment and weaken its political support. The marginal position of landscape and its conservation in climate agendas adds to the plausibility of such development.

Nordic countries will be hit hard by climate change and are already bracing themselves for its full impact. They are well equipped to deal with mitigation, which consequently will have large-scale effects in the landscape. The public reaction to e.g. wind power has been chiefly tolerant but may well change with the extending of development and the growth of unit size.

Urry suggests the replacement of current narratives by new ones, based on different scenarios. Combining cultural landscape conservation with these may prove tricky. It is possible that at least some cultural landscapes will be redefined as luxury no longer supported by the future way of life. If one is to ensure their conservation, they must become a part of any new dominant narrative replacing the carbon-based ones.

### **Perceptions of an Irish energy landscape**

**Pat Breerton;** Dublin City University DCU; Communications; Dublin; Ireland

*Keywords:* perception; film; landscape; Ireland

For weather and climate, 'Ireland is a kind of sentry post for much of north Western Europe' and much of Europe watches Ireland for a signal of what is coming down the line' (Sweeney, 2011). At a geographical and also at a symbolic level, the island of Ireland ought to be centrally involved in future debates and research on European environmentalism and representations of landscape and more contentious issues of energy production.

The paper will tease out the country's long standing antipathy towards nuclear power, alongside the harvesting of extensive raised peat bogs in the midlands for energy production, up to recent disputes like the 'Shell to Sea' controversy, focused around piping gas on shore in the west of Ireland, together with the proliferation of wind farm projects and recent attempts to kick start 'new' forms of energy production including fracking, across the region.

To exemplify this I will call attention to the foregrounding of romanticised landscape, from the primitive barren rock-face, to the lush bounteous fertile farming land represented in films from *Man of Aran* (1934) and *The Field* (1990), in contrast to the transformation of the country into a modernist urban-based society, while taking into account the growing recognition of environmental risks portrayed in documentaries like *The Pipe* (2010) together with films like *Eat the Peach* (1986) and *The Butcher Boy* (1997). A close textual reading will also be carried out on *The Powerdown Show* (2009) – an educational documentary, focusing



around environmental concerns over various forms of carbon-based energy extraction. In all of these narratives and creative imaginaries, the roots of an Irish environmentally focused cinema that speaks to a wide range of landscape and energy perceptions will be textually examined. The paper finally calls for the development of greater audio-visual environmental literacy, alongside more active and critical forms of citizenship.

## **Evolving energy landscapes in the South Wales Valleys; creative approaches exploring perception, participation and power**

**David Llewellyn; Karen Lewis;** University of South Wales; George Ewart Evans Centre for Storytelling, Faculty of Creative Industries; Cardiff; United Kingdom

**Rosie Day; Mel Rohse;** University of Birmingham; School of Geography, Earth and Environmental Sciences; Birmingham; United Kingdom

*Keywords: energy, landscape, communities, change, stories*

Up until the mid-19th century, the South Wales Valleys were predominantly rural in nature. The subsequent discovery of coal drove the development of often poorly planned and densely packed towns and villages, starkly juxtaposed with a spectacular natural landscape. Since the peak production of coal just over a century ago when the Valleys produced a sizeable proportion of the world's exports, the decline of 'coal-fired urbanism' has resulted in some seemingly intractable problems, such as depopulation, economic inactivity, and long-term health inequalities. Moreover, deep mining left significant physical scars on the landscapes but successful environmental remediation has largely re-greened the valleys aesthetically. In this post-industrial landscape, the area's natural resources offer renewed opportunities for sustainable economic and community regeneration, augmented by renewable energy such as biomass and particularly micro-hydro power in which there is a burgeoning interest amongst community groups. Of more significance in strict terms of power generation is the emergence of wind energy projects such as Pen Y Cymoedd, one of the largest such onshore developments in the UK, located on land managed by Natural Resources Wales. Other smaller scale yet still considerable wind projects are also developing. However, their resultant direct benefits to Valleys communities are the subject of debate. Against this backdrop of changing landscapes and evolving energy needs and production, we are working, through the Stories of Change project, with diverse communities at a number of locations in the Valleys to explore and unearth their everyday relationships with energy, past and present, and to envisage future scenarios using creative approaches such as digital storytelling and oral histories. In this paper, we reflect upon a selection of the emerging stories, analysing important themes such as place, power, identity, energy futures, and environmental justice.

## **Energy landscapes in Europe – the view from China**

**Tianhong Yu; Holger Behm;** Agricultural and Environmental Sciences; Landscape Planning and Landscape Design; Rostock; Germany

*Keywords: energy landscape; perception; public attitudes; immersive virtual reality; audio-visual impact assessment*

Landscape in Europe are being greatly changed as well as in China by the growth of renewable energies especially of wind energies (Otero et al., 2012; Möller et al., 2006). In Europe there are little scientific durable and almost entirely empirical approaches and results which are strongly depended on political interest (Behm et al., 2013). This shows great uncertainty of acceptance in the installation of these wind turbines in practice. In China this problem area is usually completely ignored and only recently seems to integrate the environment into practical implications (Behm et al., 2007).

The "not in my backyard" phenomena exists, and people's annoyance does not depend only on visual levels, but rather on multi-perceptual factors (Liu et al., 2012; Lachini et al., 2006). The present research aims to

investigate the audio-visual impact of a new wind park project on people, based on the virtually walk-through technology combining audio and visual features of the different landscape. Laboratory experiments were then carried out with well-trained participants to investigate the perception of the wind park project in rural areas. In particular, the experiments consisted of two conditions: 1) an actual landscape without the projected wind park, 2) the same landscape with the projected wind park.

The study represents a first step in understanding the effects of audio-visual interaction on the perception of a projected wind park and determines how the explanation of audible information is essential in this process. Besides, in the context of globalisation carry out this research would have important meaning for the natural science exchange.

## **A2** Visualisation, visual impact assessment

### **Landscape analysis and visualisation technologies – tools in the development and assessment of “energy landscapes”**

**Dieter Gründonner**; landscape architects Gutschker-Dongus; Odernheim; Germany

*Keywords:* landscape planning; assessment of scenery; approval procedure; aesthetic properties and values

The assessment of environmental impacts is the basis for the approval of any power-production plant. Landscape, respectively scenery, is one of the issues which must be considered in the process. In most cases, licensing agencies require numeric analysis to determine the extent and quantity of compensatory measures or taxes. Qualitative or aesthetic aspects are for the most part irrelevant. But the examination of questions of beauty or the sensitivity of landscapes and acceptable concentration of plants or technical character of landscapes requires the consideration of aesthetics and site-specific aspects.

Individual landscape analysis and visualisations aid in prudent decision-making when determining new power station sites (for example Wind power stations) and in making public discussions more objective. With the help of various examples of site-specific landscape analysis and visualisations it will be shown how aesthetic aspects can influence a site-planning and which criteria should play a decisive role in the process. The examples chosen deal with renewable and conventional energy-projects in different landscapes in Kenya, France and Germany.

### **Landscape stories: Collecting, visualising and communicating geo-located perceptual and natural data**

**Dominica Williamson; John Martin**; Plymouth University; School of Geography, Earth and Environmental Sciences; Plymouth; United Kingdom

*Keywords:* visualisation; landscape character assessment; mapping; participation; perceptual data

The paper describes an interdisciplinary project (Artist & Geographer), that uses traditional methodologies (Landscape Character Assessments (LCA)) and technologies (Global Positioning Systems (GPS)), to explore novel ways in which landscape related data can be collected and presented. Focusing on LCA methods, which involve collecting a range of data from both local communities (often perceptual data) and statutory bodies (natural data), this paper presents how data is being collected and gathered through monitoring projects and the use of open source tools and ubiquitous technologies (mobile phone and tablets Apps).

Two case study landscapes were the subject of enquiry; the areas are located within protected landscapes in the South West of England. The two landscapes are data rich; however perceptual data is an area that

stakeholders are still struggling to capture. Addressing this issue, methods showing how perceptual spatial data is captured through digital outreach and workshops are described.

The second part of the paper looks at perceptual and natural data that has been captured and showcases rapid map prototypes of landscape biodiversity, landscape biomass and landscape perception. The discussion examines the question; if stakeholders deliver ways in which to capture and present data back to communities, can this help landscapes be more valued as well as understood. This then leads to the question of does a better understanding of landscapes help capture further perceptual data.

## **Low-cost immersive 3D visualisations for evaluating visual impacts of wind parks using smartphones and free software**

**Thomas Schuppenlehner;** University of Natural Resources and Life Sciences; Department of Landscape, Spatial and Infrastructure Sciences; Vienna; Austria

**Boris Salak; Patrick Scherhauser; Stefan Höltinger;** University of Natural Resources and Life Sciences; Department of Economics and Social Sciences; Vienna; Austria

*Keywords: interactive 3D visualisations; participatory processes; social acceptance; mobile devices; augmented reality*

As the visual sense is the dominant human sensory component, the communication of visual impacts of wind power infrastructure seems to be crucial to increase the acceptance among the local community. Especially in landscape- and outdoor recreation oriented regions, scenic beauty plays an important role, thus local resistance against wind power projects is often led by arguments regarding the protection of the landscape scenery. In the past years, technologies regarding immersive virtual reality or augmented reality entered the consumer market, but many products are still in an expensive early adopter stage, need a lot of infrastructure as well as expert knowledge and are error-prone. Especially financial constraints and technical efforts are factors that make the application of VR technology in most participatory planning projects impractical.

Within the project TransWind we are analysing different perspectives of the social acceptance of wind energy projects in Austria. Therefore we developed methods and workflows that allow highly immersive and interactive experiences for potential future wind parks for the communication and discussion of visual impacts at landscape level. A major goal was to develop a feasible approach regarding technology requirements, software costs and manufacturing expenses, therefore we used free and open source software such as QGIS for DEM processing and vector placement of infrastructure and vegetation, Blender and SketchUp for 3D object modelling and the Virtual Terrain Project for interactive visualisation and stereo content generation. Transferring the output (e.g. as stereoscopic videos or augmented reality models) to mobile devices such as smartphones can ensure a highly immersive and realistic three-dimensional perception of future planning projects. Contributions of these tools for participative processes will be tested for different case study regions using and qualitative (workshops) and quantitative approach (online surveys).

## **Experiential and visual impacts of energy on the Pennsylvania landscape**

**Lacey Goldberg; Timothy Murtha;** The Pennsylvania State University; Landscape Architecture; State College; United States

*Keywords: GIS; probabilistic modelling; planning; energy landscape; crowdsourced*

In Pennsylvania, USA, the constantly evolving energy production and extraction practices have significantly impacted the experiential and visual quality of many rural communities. In north-central PA, the landscape is revered for its pristine woodlands, rolling mountain ranges, and bucolic farmland. These highly valued natural and cultural landscapes are threatened by: siting, forest clearing, and landform grading for well pads and turbines, construction of new roads or widening of existing infrastructure for maintenance, linear clear-

cutting and grading for the installation of pipelines and turbines, and the long-term maintenance of pipeline right-of-ways and transmission corridors.

This study investigates the energy futures of Pennsylvania through the lens of visual and aesthetic resource conservation at a landscape scale. ArcGIS, QGIS, MaxEnt and R software will be used to map current and forecast future sites for energy technologies (Johnson 2010; Murtha et al 2015) and their infrastructure (Murtha et al. 2015), track and predict change in land use types and viewsheds, and to quantify the visual impacts at 14 representative state parks and wild\natural areas. Crowdsourced data will be used to identify human and experiential scale observations of scenic, cultural, and visual importance. Combined, these approaches offer a blended qualitative and quantitative method to integrate design in planning and conservation efforts. The findings will be compiled into a strategic design document that serves as a guide for the State Park system.

Johnson, N. "Pennsylvania Energy Impacts Assessment." Report 1: Marcellus Shale Natural Gas and Wind. Pennsylvania: The Nature Conservancy, November 15, 2010.

Murtha, T., R. Hammond, B. Orland and L. Goldberg. 2015. "Probabilistic Modelling and Complex Energy Landscape Design and Planning: an experimental approach." Buhmann et al (Ed.): Peer Reviewed Proceedings DLA 2015, Anhalt University. Wichmann Verlag, Offenbach/Berlin, June 2015.

## **A3** Survey-based perception research I

### **Do wind turbines really disrupt landscapes? Empirical evidence on economic and social conditionality of public perception**

**Bohumil Frantál**; Institute of Geonics, Academy of Sciences of the Czech Republic; Department of Environmental Geography; Brno; Czech Republic

*Keywords:* wind energy; landscape perception; outcome fairness; economic conditionality

It has been frequently acknowledged in the existing literature that the visual impacts of wind turbines on the landscape are the dominant force behind public resistance against wind energy development. Indeed, the disruption or visual pollution of local landscape remains the most common (stated) reason for not accepting new wind farms. However, the survey of local communities living in four locations in the Czech Republic, where wind turbines have been constructed, has provided an empirical evidence that the perception of negative visual impact of wind turbines on landscape is a substantially subjective and relative phenomenon. The survey indicated that the perception of landscape disruption is not determined by the spatial proximity of residence to wind turbines and/or their daily visibility from the home place but is significantly affected by the perception of outcome economic favourability of projects, consideration of the renewable energies' contribution to mitigating climate changes and perception of other negative impacts of wind turbines (especially noise annoyance). This finding supports the suggestions of Toke (2005) and others that it is impossible to separate landscape factors from economic factors since economic factors play a major role in assessments of whether landscape or pollution reduction values are given greater prominence in planning and implementation decisions.

### **Enlargement of a hydropower reservoir in Switzerland: Visual assessment by tourists**

**Marcel Hunziker**; Swiss Federal Institute of Forest, Snow and Landscape Research WSL; Social Science in Landscape Research Group; Birmensdorf; Switzerland

*Keywords:* hydropower; reservoir extension; landscape preferences; tourism

If the energy turnaround shall be achieved not only a lot of new renewable energy production sites and energy-transport lines are needed but also new and/or enlarged energy-storage facilities such as hydropower reservoirs. Such an enlargement is planned in the Grimsel region in Switzerland, where a dam shall be enlarged by 23m (ca. 20%). Landscape conservation opposes against these plans because of the expected loss of landscape quality and attractiveness for the tourists.

The aim of our study was, thus, to evaluate the effect of the reservoir enlargement on the quality of the Grimsel landscape as perceived by tourists. To this end, a tourist survey using scenario visualisations was conducted in the Grimsel region (N=1229).

A first result was that the Grimsel landscape is highly appreciated by the majority of their visitors, although the region has been dominated by hydropower production since more than 100 years. And the visitors intend to visit the Grimsel region again, particularly due to its landscape quality. The scenario-visualisation assessments showed that the original (but hypothetical) landscape without any hydropower installations would be assessed best, followed by the status quo, whereas the planned reservoir enlargement would cause a (small) scenic loss that neither would lead to negative attitudes towards the Grimsel landscape as such nor to a significant loss in the willingness to return as visitor. The assessment differences depend primarily from the tourists' general environmental values and past participations in guided tours to the power station. In addition, frequent visitors of the Grimsel region, who particularly appreciate its landscape, reject the reservoir enlargement significantly stronger than others.

Thus, although the perceived landscape impact of the dam enlargement is rather small, it might be critical for the tourism development that represents the other important pillar of the economy of the Grimsel region.

## **Landscape externalities of renewable energies and transmission lines in Germany – Results from a nation-wide survey**

**Jürgen Meyerhoff; Malte Oehlmann;** Technische Universität Berlin; Chair in Environmental and Land Economics; Berlin; Germany

*Keywords: renewable energies; landscape externalities; transmission lines; choice experiment; willingness to pay*

We present the results of a nation-wide survey from October 2013 on the development of renewable energies in Germany. The questionnaire included a choice experiment aimed at quantifying the landscape externalities from renewable energy sites and transmission lines. Respondents were asked to choose their best alternative considering an area of ten kilometres within the surrounding of their place of residence. The four alternatives were: Electricity from onshore wind energy, from solar energy, from biogas, and a no choice alternative. The choice attributes included minimum distance to residential areas, the share of landscape not used for renewable energy development, transmission line type, and change in electricity bill. In total, 3,396 respondents completed the survey. Firstly, the results show that the alternative that was selected most frequently was electricity from solar energy (39.71%). Secondly, we show that willingness to pay for specific attributes differs significantly across alternatives. For instance, respondents are on average willing to pay 0.91 € per household per month for a 100 m increase in the minimum distance of wind farms to residential areas. The estimates for solar power and biogas plants were 0.32 and 0.58 € per 100 m, respectively. Regarding the willingness to pay for building new transmission lines underground we find that on average households are willing to pay 7 € per month. Finally, we investigate the relationship between respondents' preferences and the installed renewable energy capacity. Here we find that respondents living in areas with a higher exposure to wind farms, for example, are more likely to choose the alternative energy from wind power. Overall, the results show that, although people are in general in favour of renewable energies, significant landscape externalities exist with their magnitude depending on the energy alternative and the currently existing renewable energy production sites in the respondents' surroundings.

## Measuring renewable energy externalities: Evidence from subjective well-being data

**Charlotte von Möllendorff**; University of Oldenburg, Germany; Department of Business Administration, Economics and Law; Oldenburg; Germany

**Heinz Welsch**; University of Oldenburg, Germany; Department of Business Administration, Economics and Law; Oldenburg; Germany

*Keywords:* subjective well-being; renewable energy; local externality; non-market valuation

Electricity from renewable energy (RE) sources avoids the disadvantages of conventional power generation (air pollution, greenhouse gases, nuclear risk) but often meets with local resistance due to visual, acoustic, and odor nuisance. In research, stated and revealed preference methods have been used to study externalities from RE technologies. Another method which is increasingly used in the context of non-market valuation is the life satisfaction approach (LSA) (for a synopsis of the LSA see Welsch and Kühling 2009). This paper studies RE externalities from the point of view of local subjective well-being using the LSA.

We use representative panel data from the German Socio-Economic Panel (GSOEP) on the subjective well-being of 36,475 individuals in Germany in order to identify and value the local externalities from wind, solar and biomass expansion between 1994 and 2012. The data on RE plants is provided by the four German Transmission System Operator (TSO) and merged with the GSOEP data on the basis of the respondent's postcode area. Controlling for common socio-economic variables and unobserved heterogeneity, the data is analysed using econometric regression techniques, namely a fixed effects and a first differences approach.

The results indicate that the construction of solar, wind and biomass plants has a negative effect on subjective well-being, though unfolding in different ways depending on the type of technology. While the well-being effects of wind turbines refer mainly to initial installations and tend to dissipate over time, the effects of solar and biomass plants build up gradually as their number and capacity rises. In a spatial perspective, power generation from biomass creates negative spillovers to adjacent postcode areas that are absent in the case of wind power. To our knowledge the LSA has not yet been applied in this context and may therefore add to findings from the existing literature on externalities from RE expansion.

## A4 Survey-based perception research II

### Fairness versus efficiency in the optimal allocation of renewable power plants in Germany

**Martin Lange; Frank Masurowski; Martin Drechsler**; Helmholtz Centre for Environmental Research Leipzig – UFZ; Dept. of Ecological Modelling; Leipzig; Germany

*Keywords:* fairness; cost efficiency; optimization; spatial allocation; renewable energy plants

The energy transition plays an important role for the reduction of greenhouse gases. Wind and solar power are the most important and cost-effective resources for renewable electricity production in Europe. But a successful energy transition does not only require the cost-effective allocation of power plants, but also has to be accepted by the public. The perceived fairness plays an important role for the public acceptance.

In a survey, most respondents preferred a cost-effective allocation of power plants where national electricity targets are reached at lowest costs. Second highest compliance was found with the statement that a fair distribution should be based on the land area available for renewable energies. We integrate these findings into a multi-criteria spatial optimization approach to synchronously minimise electricity costs and maximise fairness.

Our optimization results reveal the trade-off between electricity costs and fairness under different assumptions of medium-term technological development. While under solar-optimistic assumptions, i.e. a continuing rapid decrease of photovoltaic panel prices, we found fairness and low energy costs relatively compatible with a cost increase by only 2% to achieve maximum fairness. Less optimistic assumptions regarding the future development of photovoltaic prices result in increasing incompatibilities, with electricity cost increasing by up to 50% to maximise fairness. The difference is caused by the relatively homogeneous distribution of solar power conditions, compared to much more heterogeneous conditions for wind power. The tipping point is located at photovoltaic panel prices of 30-40% compared to recent prices.

We conclude that solar energy plays an important role in the achievement of a fair energy transition, as a prerequisite for public acceptance, at low costs. To fulfil this role, photovoltaic technologies have to further evolve to make solar power economically competitive to wind power.

## The acceptance of photovoltaic panel sites in a tourism region

**Matthias Buchecker**; Swiss Federal Research Institute WSL; Economics and Social Sciences; Birmensdorf; Switzerland

**Annina Michel**; **Norman Backhaus**; University of Zürich; Department of Geography; Zürich; Switzerland

*Keywords: renewable energies; solar panels; perception; authenticity; place attachment*

Extending the production of solar energy is considered a key strategy to achieve the energy turnaround in Europe. Depending on the selected sites, this technology can have considerable impact on the landscape quality. In a pilot project in a Swiss Alpine valley (Goms), the application of avalanche protection constructions as carriers of photovoltaic panels was tested. To evaluate the social effects of this project, we conducted a qualitative pre-study and a standardised survey of the directly affected population. With the survey study, we wanted to find out which factors influence people's acceptance of the photovoltaic panels on avalanche protection constructions located on a slope in close neighbourhood to the ski arena of Bellwald. Furthermore, we extended the research question to alternative hypothetical sites for solar panels in the (regional) landscape. We measured the acceptance of the sites for solar panels directly (rated approval) and indirectly using semantic differentials of authenticity in terms of the landscape elements. The questionnaire was sent to all households of three municipalities that differ in the visibility of the pilot project: Bellwald (N=438), Ernen (N=541) and Münster (N=507). Furthermore, the questionnaire was distributed to local tourists of Bellwald (N=500). The return rate of the household achieved 35 %, the one of the tourists' survey about 14%. The statistical analysis showed that 85 % of the respondents supported the pilot project. A regression analysis revealed that the perceived benefit for the place image and the degree of involvement in the pilot project are the main predictors for local residents' acceptance of the project. In contrast to solar panels on functional constructions (74-98%), sites in the core village (33%), in open fields (16%) or protected areas (9%) were considered as suiting only by a minority of the respondents. The implications for a sustainable landscape development will be discussed.

## Participatory landscape assessment using web survey methodologies for wind farm planning on the regional planning level

**Michael Roth**; Nuertingen-Geislingen University; School of Landscape Architecture, Environmental and Urban Planning; Nuertingen; Germany

*Keywords: digital participation; visual impact assessment; wind farm localisation*

Visual landscape impacts are the main factor causing public opposition against wind farms in formal planning procedures on the local and regional level in Germany. Thus, an objective, reliable and scientifically valid (and therefore legally proof) methodology to deal with visual landscape assessment both of the

present landscape quality but also regarding the negative effects of wind turbines on perceived landscape quality is crucial. In my presentation, I will demonstrate how a validated way of empirical, region specific data collection using web survey methodologies was used in a model project in the German federal state Saarland.

Using digital participatory approaches, experts and lay people, living in the area affected by the planning proposal provided the empirical basis and validation for our landscape assessment method in order to ensure a maximum compatibility between renewable energy production and the maintenance of high visual landscape quality.

By complementing theory- and data-driven GIS methods with workshop- and web-based digital participatory planning approaches, we contribute towards ensuring a better acceptance of wind energy production by avoiding and mitigating conflicts much earlier in the research/planning/design process, than traditional modes of public participation, which usually are used towards the end of the planning process, would allow. The use of validated digital methods with a solid empirical basis also helps to de-emotionalise the planning and design discussions about wind turbine localization and wind park design.

## **Rethinking the role of design of pylons. A discussion and empirical study**

**Barbara Sophie Zaunbrecher; Katrin Arning; Kai Kasugai; Martina Ziefle;** RWTH Aachen University; Human-Computer Interaction Center; Aachen; Germany

*Keywords: technology acceptance; power lines; user-centered design; architecture; renewable energies*

Concerning energy technologies and their impact on landscapes, it is often argued by opponents that they "spoil" the landscape and are "ugly". This is especially the case for electricity pylons. However, new power lines are needed in Germany to meet the demands of a grid that is increasingly penetrated by renewable energies. Until now, the design of most pylons exclusively follows functional and structural considerations. Hence, their planning strongly reflects environmental and practical conditions. But unlike other buildings, they do not follow architectural criteria, which would include aesthetical interests and seek to create an appearance that does not stand in stark contrast to its environment. Singular attempts have thus been made to modernise the design of pylons to ameliorate their fit in the landscape. Even so, little is known about the extent to which improved appearance can possibly increase public acceptance for new power lines. Also, the influence of user diversity on the evaluation of appearance and acceptance of pylons is yet unclear. This study therefore seeks to analyse whether pylons with a new design are more accepted than traditional (A-shaped) ones and if design is considered a promising measure to increase acceptance in comparison to other strategies (participatory processes, compensation payments). An online-survey with N = 182 participants was conducted. Results indicate differences between attitudes towards the old A-shaped pylon design compared to a new design. Although not decisively more positive in all aspects, a lower potential for protest and a perceived more appealing outward appearance of the new pylons suggest that a new design has the potential to address some of the concerns associated with new power lines. Nevertheless, results also showed that a new design alone is not enough, participants also wished for more participation (in the choice of design) and favored the spatial integration into infrastructure such as motorways.

## **A5 Special perspectives**

### **Landscape values and wind generation in west Mayo, Ireland**

**Kenneth Boyle;** Dublin Institute of Technology; Environment and Planning; Dublin; Ireland

*Keywords: landscape and resource values; blanket peat; wind power; Delphi survey; landowners*



The landscape of west Mayo, in North West Ireland, is dominated and shrouded by an extensive area, 3,539Km<sup>2</sup>, of blanket peat soils. The landscape and its habitats have multiple values associated with them including a source of peat for fuel, agriculture, forestry, conservation, tourism, biomass production, tourism, cultural and archaeological. Historically communities have relied on peat as a source of energy and in the 20th century the state harvested peat on an industrial scale to generate electricity. Biomass production using willow (*Salix* spp) on cutover blanket peat and extensive planting, on deep peat, of *Picea sitchensis* and *Pinus contorta* was part of the expansion of the Irish afforestation programme. In recent years a long fought dispute over bringing gas to land from the Corrib gas field has highlighted the issues of how locals and outsiders react to the actions of multinationals and the state in the exploitation of natural resources.

This study examines the future of wind power in this landscape. Ireland's first wind farm is located in Co Mayo but today the county generates from wind a fraction of what it could potentially generate. Mayo county council, the local authority, has identified areas it considers to be priority and preferred sites in the west Mayo landscape for the location of wind farms. Much of this area is within the blanket peat landscape. Using the Delphi method three expert panels, resource managers, landscape professionals and local landowners are asked to identify locations for future wind generation in the landscape and to outline the extent to which wind generation will impact on other values in the landscape. The work seeks to answer the question are the values and futures that landowners hold for the landscape different to those held by landscape professionals and resource managers and to what extent do the expert values and futures for this landscape agree.

## **Perception of the scale effects of wind turbines in the Scottish landscape**

**Caroline Stanton;** Edinburgh College of Art, The University of Edinburgh; Landscape Architecture; Edinburgh; United Kingdom

*Keywords:* wind energy; windfarm; scale effect; landscape and visual impact assessment; conjoint analysis

Scale is fundamental to our experience of the landscape – from towering mountains or skyscrapers, to the intricate textures of plants. Nonetheless, many people find it difficult to predict the scale effects of proposed energy structures, sometimes prompting in Scotland great concern where wind turbines up to 150m tall are planned.

Difficulty in predicting scale effects often relates to two factors: one, new structures are of disparate size to other landscape features with which people commonly make scale reference; and, two, computer-generated visualisations provided are often judged as not representing people's experience in reality.

So what are the scale effects of different sized windfarms in different landscapes? To address this question, this PhD research built upon a framework of existing knowledge in aspects such as visual perception, landscape design and environmental psychology. It applied three methodologies: standard Landscape and Visual Impact Assessment (LVIA); experiential landscape assessment; and public attitude studies. The latter included questionnaires, workshops and interviews with both professionals and communities in three case studies: an area of an existing windfarm; an area of a proposed windfarm; and an area with neither. This allowed consideration of how perceptions altered over time with landscape change. After narrowing down the key attributes influencing scale effect, an Adaptive Choice-Based Conjoint (ACBC) analysis questionnaire was used to examine people's preferences for different scale effects when faced with difficult choices between attributes.

The findings of this research improve understanding of how different scale effects of wind turbines are experienced in the landscape by different people. It also identifies various methods of assessment that can be taken forward in the future to help people better understand the potential effects of new large-scale energy structures in their landscapes.

## Promoting local acceptance of wind turbines by proactive law. Theoretical and methodological perspectives

Marie Leer Jørgensen; Copenhagen University; Institut for Food and Ressource Economics; Copenhagen; Denmark

*Keywords:* regulation, wind, acceptance

In Denmark two specific policy schemes entered into force in 2009 with the purpose to promote local acceptance towards wind turbines. The schemes were closely related to the objectives to further expand wind energy capacity in Denmark by promoting local acceptance. The two policy schemes are 1) a compensation scheme on property value loss to neighbours and 2) a co-ownership scheme.

The paper explores the theoretical framework and key concepts for the development and use of this type of regulation. This includes exploration of the concept of “proactive law” and the possible application of this concept for identifying and analysing the characteristics of this type of regulation.

Further the paper will analyse how an interdisciplinary approach involving sociology of law, environmental psychology and environmental sociology could benefit or deepen the understanding and analysis of the effects of such policy measures in practice and bring about new ideas to the development of new “proactive” regulatory approaches towards renewable energy projects in specific and sustainable development in general.

For example could theories and research on environmental risk perception including uncertainties (Böhm, Gisela (2013) in Steg, Linda et. al. Environmental Psychology an Introduction pp. 13-25), landscape perceptions, place attachment (e.g., Bell, Paul A. (2001), Devine-Wright, Patrick (2010, 2011, 2012), Environmental Stress (Bilotta, E and Evens, Gary W. (2013) and public trust (e.g., Midden Huijts (2009) and social dilemmas (Schuitema, Geertje and Bergstad, Cecilia Jakobsen (2013) that illustrate factors of importance on the individual and community level be important knowledge when analysing the functioning of the schemes in practice and be relevant considerations to involve in future lawmaking processes on wind turbines and other large scale energy projects.

## A6 Conflicting values and attitudes

### Changing perceptions of geothermal energy landscapes in Iceland

Karl Benediktsson; University of Iceland; Faculty of Life and Environmental Sciences; Reykjavík; Iceland

*Keywords:* geothermal energy; Iceland; landscape values; industry; planning

In the paper, questions about the perception of energy landscapes of Iceland are raised, focusing on geothermal power production. The use of geothermal energy has a long history in the country, but mostly for space heating purposes. The first geothermal power plant was built in the 1980s. Only in the 21st century, however, has electricity from geothermal plants become a major part of the country’s energy budget. Ongoing framework planning for the energy sector has identified a number of possible locations for the construction of new such plants and it seems highly likely that several new power stations will be built in the next few years, mainly to cater for a growing heavy industry sector. Concerns about landscape and energy have until recently mostly been related to the building of hydropower stations, dams and reservoirs, with geothermal options being seen as having considerably less impact. This is changing. Located in some of Iceland’s most distinctive landscapes of high-temperature geothermal activity, the large power plants with corresponding boreholes, pipelines etc. are perceived by many as rather incongruent technological intrusions. Such opinions were frequently heard during the construction of the newest (and largest) geothermal power plant, just east of Reykjavík. The building of another such plant in the area was called off, partially due to landscape-related issues. But mixed with the concern about landscape were also

concerns about corporate power, politics of a developmental state, and the fair distribution of benefits and costs. While many Icelanders are justly proud of the country's record in harnessing renewable energy, considerable doubts are also present about whether the loss of landscape values is justified, especially considering that the end users of the bulk of the energy are multinational corporations. Any analysis of energy landscapes thus needs to be attentive to the complex perceptions that shape public attitudes to landscape change.

## **Changing public viewpoints on wind energy development in Belgium**

**Vincent Vanderheyden; Serge Schmitz;** University of Liège; Geography; Liège; Belgium

*Keywords:* wind energy; landscape; public viewpoints; acceptance; Belgium

The amount of wind turbines has increased exponentially in Belgium in the last eight years (175 in 2007, 771 in 2015). During this period, especially in the last two years, critics of this energy have become more organised, virulent, and active in delaying or stopping many projects. The landscape impact of wind energy is central to their arguments.

We wonder if people's attitudes towards wind turbines and landscape changed in the last years in Belgium and how they changed.

This paper compares public perception of wind energy in two researches about landscape perception. The two studies used slightly different methodologies but with similarities in the designs, allowing some comparisons.

The first research (2007-2009) aimed to study the perceived landscape impact and the social acceptance of wind turbines in Belgium. 1542 Belgians were surveyed about their landscape preferences using a photo-questionnaire, including some pictures with wind turbines. 75 stakeholders of wind energy projects were also interviewed.

The second research (2012-2014) aimed to examine deeper the landscape preferences among 54 residents in three areas in Wallonia where wind turbines are present, using the previous photographs. During the conduct of the first research, changing attitudes were already observed. People had become more familiar with wind turbines and were less reluctant. The symbolic positive aspect of wind energy was highlighted seven years ago. This view continues. However, people seem more categorical in their viewpoint. All respondents have now been confronted to wind energy, which was not the case seven years ago. Some persons are not against wind farms but their increase in number start to overwhelm them. Others point they get used to the turbines, as long as they are not too many and too close. The huge increase in wind farms in the last seven years has changed the acceptance of wind energy. Some doubts about the real efficiency of this energy also shaped the attitudes.

## **Conflicting values of heritage, landscape and wind energy: A case study in perception, the past and planning in Scotland**

**Helen Green;** University of Glasgow; Archaeology; Glasgow; United Kingdom

*Keywords:* perception; planning; landscape justice; wind energy; heritage

In Scotland, as elsewhere in Europe, wind energy is a highly contested issue: one in which perceptions, aesthetic ideals, cultural values and economic demands come into conflict in the planning system. Scotland's landscapes are highly valued for their scenic, natural and cultural qualities; they are rich with traces of the past. Yet historic landscapes are not static: the needs of the present give rise to landscape change. Scotland's outstanding wind resource, economic imperatives and government climate change targets have all contributed to rapid and widespread proliferation of wind energy development. My PhD research involves analysing cases where perceived opposition between heritage and wind energy has been significant in processes such as EIA and public inquiries. My main focus is the experiential dimension of archaeological sites in their landscape setting, something which is enshrined in the planning process through the concept of 'setting' which primarily relates to the visual context of the site. Given that heritage

aspects of landscape are primarily treated in a visual manner, the visual dominance of wind turbines along with negative aesthetic associations for some people (e.g. 'industrial'; 'modern') can consequently result in conflict with heritage values. Despite its rationalistic credentials, the planning system must therefore take account of subjective phenomena such as perception and experience. In this paper I will present interim conclusions from my ongoing research, using a small but intensely contested wind farm proposal in an internationally significant and highly designated heritage landscape in Orkney, as a case study in such seemingly irreconcilable values. With reference to local/national planning processes and associated discourse related to the resultant public inquiry, I will discuss the interplay of perceptions of, and ideas about, heritage and landscape, highlighting the tensions underlying this complex situation

## **Landscapes of Conflict: Contested energy landscapes in the German Energiewende**

**Fritz Reusswig; Eva Eichenauer; Ines Heger;** Potsdam Institute for Climate Impact Research (PIK); Transdisciplinary Concepts and Methods; Potsdam; Germany

*Keywords: energy conflicts, participation, power; planning culture; role of landscape arguments*

While the majority of Germans supports the Energiewende, concrete projects more and more face local opposition, which has the potential to substantially slow down the government time schedule. More recently, we have seen that local opposition groups form nation- and Europe-wide networks, and their arguments make their way into the political sphere, partially via the new German Euro-skeptical party AfD. Our paper is based upon a BMBF-funded collaborative research project on energy conflicts. We will take a closer look at the local opposition to concrete Energiewende projects in three regions in Germany: Schleswig-Holstein in the high North, Berlin-Brandenburg in the East, and Baden-Württemberg in the South-West. These regions have been chosen due to the heterogeneity of their energy and wider socio-political situation, as well as due to their different planning cultures and protest histories. In a first step, we will present three case studies from these regions and characterise the local conflicts. We will do so by linking discourse analysis, actor analysis, and argument mapping. In a second step, we will take a close look at the role of landscape features in the argument maps and histories of key actors involved. Do landscape arguments (such as protecting its beauty, integrity and identity, or protecting its characteristic biodiversity properties) play an important role, or are they less important as compared to economic arguments (such as the costs of the Energiewende, or the value of one's property)? Do people 'mask' their basically economic self-interest by pseudo-arguments relating to nature conservation or landscape identity? Or do government officials and project developers underestimate the degree to which people feel linked to their landscapes—even in times of globalisation? The paper will end by giving some recommendations towards the process of planning and, last but not least, communicating the German Energiewende.

# B Planning

## Theme keynote “Planning”

### Unlocking the potential of spatial planning for the development of renewable energy landscapes

**María José Prados Velasco**, University of Seville, Faculty of Geography and History, Spain

The economic crisis has affected the commitment to energy transition based on renewable resources by, on one hand, halting the construction of large solar power plants (what some in Spain have called the *solar bubble*) and on the other hand by drastically reducing the profits to be made in energy production. In view of this situation it is necessary to analyse and discuss the transformation of cultural landscapes into energy landscapes. The siting of these landscapes is not linked to the quality of cultural landscapes, to the energy demands of the local people or indeed spatial planning rules. This presentation intends to rethink the relationship between renewable energy and energy landscapes from the perspective of spatial planning. Spatial plans are here defined as tools that integrate the actors involved in the construction of renewable energy plants. The analysis of some case studies will help to elucidate the complex development of these projects and the need for regulation by means of a set of planning rules. The goal is to design sustainable land use proposals in the field of energy landscapes.

## **B1** Urban (energy) landscape, urban-rural relations

### **Carbon heroes: Exploring higher-density energy landscapes**

**Sven Stremke; Ilse Voskamp;** Wageningen University; Landscape Architecture; Wageningen; Netherlands

**Dirk Oudes;** Wing; NA; Wageningen; Netherlands

*Keywords:* urban; energy-conscious; landscape planning and design; zero-carbon; case studies

Since a decade or two we can witness the emergence of renewable energy landscapes that are considered low- or zero-carbon: a new generation of ‘carbon heroes’. Without questioning these achievements, we must acknowledge that these landscapes have low population densities. Global trends are quite contrary: More and more people live in cities and densities are increasing in many parts of the world. Many cities have high ambitions in terms of emission reduction (e.g. C40). Yet most cities fall short to achieve their targets. This might be due to the fact that ‘energy’ presents an additional function in the intensively used, competitive urban environment. Either way, cities continue to rely on imported fossil fuels.

Given this situation, some might say renewable energy should simply be dealt with elsewhere while others postpone energy transition altogether. In this paper, we like to explore a third scenario that might be best introduced by Lorenzetti’s painting ‘best practice urban-rural relationships in Siena’ (1339). At first glance, this might seem romantic but in 2014 – almost 700 years after Lorenzetti – the Province of Siena was announced the very first zero-carbon region in the European Union. The rural landscapes surrounding the provincial capital serve as energy source and carbon sink to this Italian city.

In our paper, we share experiences and findings from various Dutch projects on higher-density energy landscapes, based upon which the following tentative conclusions can be drawn. Energy transition presents a historical chance to re-invent (beyond romanticism) urban-rural relationships that enable higher-density energy landscapes while addressing socio-economic challenges in rural areas. The scales of these energy landscapes depend on energy quality, quantity and a range of socio-economical parameters. The discourse on higher-density energy landscapes may evolve around a triplex: Ethical considerations, aesthetical challenges and planning/design questions.

### **Sustainable governance of energy landscapes and land use conflicts – Rural-urban interactions in Germany and China**

**Jürgen Scheffran; Peter Michael Link; Kesheng Shu; Jinxi Yang;** University of Hamburg; CliSAP School of Integrated Climate System Sciences; Hamburg; Germany

*Keywords:* energy landscapes; land use conflicts; sustainable governance and planning; rural-urban interaction; Germany and China

The proposed transition from a fossil-fuel-based to a low-carbon renewable energy society will increase the demand for land in many parts of the world. Concurrently, new energy infrastructures will be required as well as a paradigm shift from “energy for space to “energy from space” in the post-industrial period. Energy landscapes will be influenced not only by climate change but also by climate policy and space-intensive energy approaches which are potentially in conflict with other land uses such as environmental preservation and food production.

To explore elements of an adaptive sustainable governance framework, we discuss planning conditions and criteria for a sustainable energy transition that is environmentally responsible, economically efficient and politically acceptable. Our research identifies functional types of land use pathways and conflicts that consider the dynamics of land, energy and climate change. We investigate the allocation of land regarding renewable energy in an agent-based spatial environment, integrating natural processes and social interactions in rural-urban contexts and accounting for benefits, costs and risks of key stakeholders.

Northern Germany (with a focus on Hamburg and Schleswig-Holstein) and Eastern China (Shanghai and Jiangsu province) serve as two case study regions where the energy transition is relevant. Taking regional conditions and differences into account, possible planning implications of renewable energy generation, carbon mitigation and land competition among agents in the energy sector will be addressed. Alternative pathways and patterns of land allocation will be assessed and compared as elements of the governance framework, paying attention to ecological and economical perspectives, rural-urban interactions and differences between coastal and in-land areas.

## **Urban energy landscapes: From theory to planning and design practice**

**Changsoon Choi; Tom van Heeswijk Sven Stremke;** Wageningen University; Landscape Architecture; Wageningen; Netherlands

*Keywords: urban metabolism; sustainable energy transition; sustainable urban landscapes; energy conscious; landscape architecture*

Growing concerns on climate change and the depletion of fossil fuels motivate a shift to sustainable energy systems. Such energy systems are characterised by efficient use of renewable energy sources. The relationship between renewable energy and space involve spatial planners and landscape architects to facilitate energy-conscious organization of the physical environment, in other words the planning and design of sustainable energy landscapes. Rapid urbanization and vast energy consumption of cities challenge environmental designers to envision urban landscapes with sustainable energy systems. With the metaphor of the city as ecosystem or organism, the concept of urban metabolism has emerged as a tool for understanding urban energy systems with quantified urban resource flows. Urban metabolism has inspired a new approach to sustainable urban developments with the idea of circular metabolism model shifted from a current linear one. In spite of the potentials in planning and design of sustainable energy landscapes, the urban metabolism concept is hardly applied to spatial planning and design disciplines. The central question of this interdisciplinary study is how models and assessment tools of urban metabolism can support environmental designers to envision sustainable energy transitions of cities. This paper suggests a model of optimised-linear metabolism, in particular focused on energy and identifies a number of strategies with relevance to energy-conscious spatial planning and design. The energy-conscious strategies are framed by theoretical components of urban metabolism to reveal how an optimised-linear model of energy metabolism can be achieved. The envisaged values of urban metabolism for sustainable energy transition of a city are explored with a case study on Amsterdam through quantitative analysis of urban energy systems and applied strategies.

## **B2 Land use planning related to energy crops / biomass**

### **Biomass energy as a catalyst for landscape restoration and forest design**

**Carmela Canzonieri;** Kore University; Architecture; Enna; Italy

*Keywords: landscape restoration; landscape quality; forest landscape design; native vegetation; biomass energy*

Different aspects of energy landscapes can be dealt with by landscape planners and landscape architects, with various degrees of involvement and outcomes. The paper will first give an introduction about how planners and designers are giving major contributions to minimise impacts of energy production artefacts in the landscape; then it will examine their significant role in making decisions about appropriate siting of different energy sources, mostly wind and solar energy. The focus of the paper is then the possibility for

landscape architects to go one step further, and, following indications from the European Landscape Convention, to create new landscapes.

Multifunctional biomass energy production areas, as opposite to artefacts requiring mitigation, are instead an opportunity for quality landscapes, both in ecological and visual sense. Biomass production can be the catalyst for forest design processes, as for example described in the UKFS Guidelines and other documents, which would be not taken into consideration otherwise. Spatial master plans could not only determine the energy potential, but also, using ecological principles, promote biodiversity and connectivity, while careful design will include visual and recreational values.

A case study will be discussed where, in addition to the energy goal, the restoration of an area to its original native vegetation could be achieved. Originally the study area was covered by a mixed woodland of native oaks and other species. In time, non-native eucalyptus has changed the landscape, destroying biodiversity and local character. Local government has recently built a biomass plant with the aim of using eucalyptus wood. This operation could be linked to a process by which gradually the forest could be restored to its original vegetation and habitats, while still providing for energy demands and, at the same time, offering recreational and tourism opportunities.

## **Biomass use and cultural landscape conservation: Analysis of territorial potential and guidelines for the Goriška region**

**Mojca Golobič; Nika Benčina;** University of Ljubljana, Biotechnical faculty; Department of landscape architecture; Ljubljana; Slovenia

*Keywords: renewable energy; biomass harvest potential; spatial analysis; cultural landscape management*

The decision to increase the share of biomass usage to 14.6 % in gross final consumption of energy in Slovenia till 2020 is justified by an increasing share of country's forested surface (58.4 % in 2012) and the tradition of sustainable forest management, which provide enough solid biomass and lignocellulosic material. Spontaneous afforestation due to abandonment of agriculture and overgrowth of cultural landscape have been among main concerns of landscape management and retaining production potential of soil for last couple of decades. Paper presents a research in Goriška region in western Slovenia, where overgrowth has affected more than 14.000 ha (34.500 ac) of land (6.3 % of the region). GIS spatial analysis using data from national institutions was used to identify biomass harvest potential for forestry and agricultural feedstock. A model has been developed to identify suitable areas. The types of biomass usage were proposed for the abandoned land and visualisations were prepared to demonstrate the spatial impact on pilot locations. Research findings identify the slope as the main restricting factor in primary sector and the determinant for spatial development. Highest woody biomass harvest potential is in dense forests covering plateaus and larger flat areas, which are mainly owned by the state and deliberately managed for centuries. Most of the areas characterised by overgrowth are on steep terrain where viable maintenance can only be obtained by manual mowing and revival of pasture farming. The remaining one third of the discussed land is suitable for mechanical collection of lignocellulosic materials and could be the stock for the upcoming commercialization of second generation biofuels. Early adaptation and deployment of proposed management model would enable commercially attractive use of biomass, achieving the stated objectives in renewable energy as well as preservation of typical cultural landscape identity.

## **Complementary biomass use through landscape quality management - Case: Three Countries Park**

**Anja Brüll;** Stichting Euregio Maas-Rhein; Dreiländerpark; Eupen; Belgium

*Keywords: biomass; bioenergy; landscape quality; landscape management; sustainable production*



The paper investigates the use of biomass for bioenergy in a way which does not compete with agricultural food production, but complement it in terms of providing ecosystem services and improving landscape qualities in a place based context. It draws on results of a PhD study by the author generally dealing with “complementary biomass (re)production through Landscape Quality Management (LQM)”. Based on the concept of ‘landscape management’ as promoted by the European Landscape Convention LQM is drafted as a multi-scale and collaborative stakeholder process, which allows creating landscape reference systems for the assessment and development of sustainable (biomass) production, both in a standardised and context dependent manner. Guided by a theoretical approach of “natural productivity / (re)productivity” it is centred on regenerative ecosystem services in connection to various aspects of landscape quality. The concept of ‘LQM’ and the Leitbild of ‘complementary biomass use’ will be exemplified by a case study of the Three Countries Park, a cross-border region and cooperative landscape platform in Belgium, Netherlands and Germany, which presently undertakes project development in this field. Beyond bioenergy and within a technical research consortium the park furthermore explores ways how new electrical DC grid technology may offer opportunities for landscape oriented regional energy concepts.

## **B3** Landscape governance I

### **Landscape Act – New law regulations for creating wind power plants in Poland**

**Monika Domanowska;** Warsaw University of Life Sciences.; Departament of Landscape Architecture; Warsaw; Poland

*Keywords: Landscape Act; law regulations in wind farms localisation; wind power plants; landscape planning in Poland*

Regulations governing the location of wind power plants are a key tool for shaping energy landscapes. Decisions about shaping new landscapes are the result of the law regulations and the possibilities that arise from them. Currently Polish government is working on the final version of the so-called Landscape Act, which in its content also refers to locating of wind power plant at municipal and provincial level. Proposed paper is an answer to the question how do legal provisions impact upon planning and decision-making processes in the context of energy landscapes at local and regional level is formed. In proposed paper analysis of changes in Polish legislation regarding the formation of energy landscapes with an emphasis on wind power farms is conducted. The paper presents the process of change in Polish legislation over the past decade and the simulation of changes in the Polish countryside after the entry into force of the Landscape Act.

### **Planning energy landscapes: remarks from the Italian case study**

**Marcello Magoni;** Politecnico di Milano; Architettura e Studi Urbani; milano; Italy

**Chiara Cortinovis;** Università di Trento; Ingegneria civile, ambientale e meccanica; Trento; Italy

*Keywords: energy landscape planning; renewable energies*

The paper discusses some critical aspects of planning processes related to renewable energy landscapes starting from the analysis of the Italian experience. Here a first attempt to overcome singular and often biased decisions and to consider the relation between energy and landscapes in a more comprehensive and rigorous way has been made through the promulgation in 2010 of a national law, which entrusted the regions to define criteria and parameters in order to identify areas unsuitable for the location of renewable energy plants. Through the analysis and the comparison of different approaches and outcomes it is possible to highlight some relevant issues regarding energy and landscape planning. The first one is related to the object: in the case of energy landscapes, conflicts between different goals and between goals and

constraints often emerge. Even if renewable energy can be considered a way to express the potential of a territory, both quantitative target and protection boundaries are usually defined a-priori. The second issue refers to the process. The possibility of conceiving a positive relation between energy and landscape and of perceiving energy landscapes as representative of shared values is strictly related to the model of process applied in the decision making. In addition, renewable energy landscapes emerge more and more as products of bottom-up processes both positive (spread of distributed production) and negative (opposition, NIMBY, ...). Stakeholder identification and engagement, from consultation to co-design, is thus a relevant matter. The last issue regards tools. Planning of energy landscapes is strictly linked to spatial planning as well as to economic policies and has to consider multiple spatial and time scales. To be effective in supporting the decision-making process, tools have to be flexible enough to be easily fitted to the diverse local condition while maintaining the overall vision essential to reach the goals.

## **Environmental planning and environmental economic instruments with regard to energy landscapes**

**Felix Ekardt**; Forschungsstelle Nachhaltigkeit und Klimapolitik; Leipzig; Germany

*Keywords:* *planning, economic instruments, land use, climate*

Starting point of the presentation is the insight that environmental policy in the EU and Germany has only achieved moderate success, despite an impressive amount of norms. This is true even for areas which superficially suggest otherwise. Key reasons are rebound effects, (geographical/sectoral) shifting effects, compliance deficits, problems of presentation and too little ambitious regulation. This is quite similarly applicable regarding energy, resources, phosphorus, biodiversity or other problematic issues. The presentation discusses to which extent – if at all – this problem occurs in environmental planning as a governance instrument as well. Mentioned issues could be solved by a consequently applied quantity regulation (direct or indirect through tax based prices) on a materially and geographically broad scale. The presentation therefore looks at how and under which circumstances this is applicable and whether environmental planning could act in this capacity, if arranged differently. If not, the question remains exactly how it might be possible to complement mentioned measures better than so far. This leads to a holistic picture which might allow for an assessment of the capacity of environmental planning from the point of view of governance research. It will also be considered if it is possible to regulate several environmental issues at once through economization and/ or planning, e.g. loss of biodiversity, phosphorus scarcity and climate change.

## **B4 Landscape governance II**

### **Understanding “landscape governance”: The case of wind energy landscapes in Germany**

**Markus Leibenath**; **Gerd Lintz**; Leibniz Institute of Ecological Urban and Regional Development; Landscape Change and Management; Dresden; Germany

*Keywords:* *political decision-making; values; power; knowledge; governmentality*

There is growing interest in the notion of landscape governance. As both “landscape” and “governance” can carry many different meanings, they serve as boundary objects that help bridge the divide between scientific disciplines as well as between academia and society. Landscape has been variously characterised as physical setting, visual representation, lived space, a complex of culture, traditions, law and practices, or as a combination of all these aspects. Governance is often employed to denote forms of political decision-

making beyond the state (“government”), the inclusion of actors from civil society in the circuits of policy-making and the devolution of powers from the national level to regional and local as well as supra-national arenas. However, there are other readings of “governance” in which elements such as governmentality, knowledge, values and power come into play.

Given the rather general use of the term “landscape governance” until now and the plethora of possible understandings of both “landscape” and “governance”, it is the aim of the paper to develop a variety of conceptualisations of landscape governance, to explore their analytical strengths with regard to wind energy landscapes, and finally to identify remaining gaps and avenues of further research.

As energy transitions are currently among the strongest factors in landscape development, the paper takes up the example of wind energy in Germany. The country has committed itself to significantly increasing the share of renewable energies, including wind energy, in the total energy mix. In 2014 alone, new wind turbines with a capacity of 4.750 MW were installed onshore. The empirical findings are derived from case studies on wind energy landscapes in the Saxon region Upper Elbe Valley / East Ore Mountains and other parts of Germany, based on interviews, participating observation, and the analysis of newspapers and other written material.

## **Who pulls the strings? Analysis of the dialogue between the energy and planning sector: Example of Slovenia**

**Naja Marot; Mojca Golobič;** University of Ljubljana, Biotechnical Faculty; Department of Landscape Architecture; Ljubljana; Slovenia

*Keywords:* national energy policy; planning process; national planning policy; evaluation; institutional analysis

The paper will address two of the four P's of the call namely planning and power. More into detail, the relationship between energy providers and planning is discussed from two perspectives to see how this relationship resonates in the landscape. As a basis, the evaluation of the national spatial development strategy including the interviews with the stakeholders predominantly serves as a source of information. On one side, representatives of the Ministry of Infrastructure present what kind of conflicts with different stakeholders they are encountering, on the other the planning sector argues about how they manage to address the conflicts and optimise the outcomes of the planning processes. Currently, in Slovenia the dialogue between the energy provision and landscape is managed through various planning and environmental protection instruments, including EIA, SEA, public consultation in the planning process and other, yet their efficiency to tackle the complexity of modern development conflicts is challenged. The high percentage of the protected area (37% Natura 2000) also the consequences of the EU legislation, add up to the problem. Good example of the struggle between the physical characteristics, politics and power is the case of locating wind power plants which also points to the problem of the absent regional administrative level in Slovenia. Thus, the paper reveals who in the current framework of the policies and responsibilities has the most power to dominate the process and decision making, why other do not and what solutions could be presented to improve the dialog and integrity of the spatial development also in relation to the landscape. As results show the environmental policies mostly dictate the outcome of the planning procedures and try to maintain the current landscape without any major interventions like fostering energy landscapes, leaving the energy sector to defend the development aspect and planning as a mediator between the stakeholders.

## **Energy policy landscape governance: Analysing the multi-level nature-society impacts of hydraulic fracturing**

**Jennifer Baka;** London School of Economics; Geography & Environment; London; United Kingdom

*Keywords:* hydraulic fracturing; social metabolism; political ecology; multi-level environmental governance

Hydraulic fracturing raises a host of multi-level and multi-resource governance challenges because the process involves numerous resources whose access, usage and management rights are controlled by separate agencies located at different scales of government. Yet, existing studies of hydraulic fracturing insufficiently capture the political and biophysical complexity of the process. This paper develops an energy landscape governance framework that integrates social metabolism and political ecology to simultaneously analyse the material and energy throughput of hydraulic fracturing and how these resource flows shape human-environment interactions. Landscape approaches to environmental governance have gained increased prominence in recent years, particularly with the establishment of the UN Global Landscapes Forum in 2013 (Global Landscapes Forum, 2013). At the same time, resource geographers have called for analysing energy transitions as geographic processes and have recommended developing 'energy landscapes' as a unit of analysis in order to evaluate the assemblage of biophysical and cultural features influencing energy provision (Bridge et al., 2013). Influenced by industrial ecology research on socio-metabolic transitions (Fischer-Kowalski and Haberl, 2007), the energy landscape governance framework extends Görg's (2007) concept of landscape governance, which advocates incorporating the material and biophysical conditions of environmental challenges into multi-level governance and builds upon recent work examining the intersections of industrial and political ecology (Newell and Cousins, 2014, Baka and Bailis, 2014). Case studies of hydraulic fracturing at select field sites in the US and UK will be used to empirically ground the framework.

## **Linking energy systems and landscapes: The mediating role of local energy initiatives**

**Jessica de Boer**; University of Groningen; Spatial Planning and Environment; Groningen; Netherlands  
**Katharina Gugerell**; **Christian Zuidema**; University of Groningen; Spatial Planning and Environment; Groningen; Netherlands

*Keywords:* energy landscape; co-adaptation; energy initiative; spatial planning; link

The shift to renewable-based energy has spatial consequences for the landscape. Hence, landscapes provide opportunities and barriers for the accommodation of renewable-based energy systems. Spatial plans and policies can help accommodating by linking energy systems and landscapes institutionally. However, this requires an institutional shift, which is not entirely clear since we do not exactly know how renewable-energy systems integrate in landscapes. Energy initiatives engaging in local energy production can help us understand how. In previous papers we already found that area-based energy initiatives are integrating in local landscapes and by doing so stimulate the energy transition. Such initiatives are linking the physical, socio-economic and institutional domains of both energy system and landscape on a local scale. This paper inquires how local energy initiatives form linkages with their spatial contexts and how this informs spatial planning and governance. For our analysis we make use of the theoretical concept of co-adaptation. Based on empirical evidence from 10 local energy initiatives in The Netherlands we found that initiatives functioning as cooperative form a more diverse set of linkages than initiatives functioning as company. This paper concludes with a call for spatial plans and policies that trigger energy initiatives to form various linkages with their energy systems and landscapes and hence help accommodating the energy transition.

## **B5** Landscape governance III

### **The making of "a sustainable society and a renewable energy consensus": Shared perception and remaining disagreement**

**Shota Furuya; Tetsunari Iida;** Institute for Sustainable Energy Policies; Nakano-ku, Tokyo; Japan

**Tatsuya Wakeyama;** Japan Renewable Energy Foundation; Minato-ku, Tokyo; Japan

**Yasushi Maruyama;** Nagoya University Graduate School of Environmental Studies; Department of Social and Human Environment; Nagoya city; Japan

*Keywords: renewable energy; multi-stakeholder dialogue; consensus building; landscape and biodiversity*

In the spring of 2015, a voluntary stakeholders group is to publish a paper called "Sustainable Society and Renewable Energy Consensus" in Japan. The consensus paper is the result of two years' dialogue among general stakeholders regarding to renewable energy planning and development, such as sustainable energy NGO, climate NGO, nature conservation NGO, developer, consultant, scientist and governmental officer across all kind of renewable energy.

In the series of the dialogue, facing Fukushima nuclear disaster, all stakeholders generally agreed on the need for renewable energy as the essential option for the future of energy supply in Japan in terms of energy security, climate, economy and social point of view. However, there were several different perspectives among them.

For example, nature conservation NGO remarked the anxiety for the indiscriminate exploitation of precious natural species and landscapes, then also remarked the suspicion of the current fast renewable energy development under Feed in Tariff. Sharing the changing legal meaning of "national park" (it was initially landscape protection, later added biodiversity), the nature conservation NGO claimed renewable energy development should not spoil the nature landscape and biodiversity.

Other NGO, developer and scientist took the claim and they shared some good practices, such as zoning policy, participatory assessment, adaptive management or community ownership model. Then the participants identified that there are many more possible concrete measures to balance renewable energy development with nature and landscape protection. There were still some disagreement, however, they agreed such precautionary approach needs to be put into practice based on general and local consensus building.

Then, the general items of shared understanding were summarised in the consensus paper, and it is expected to serve as a starting point for the further sustainable renewable energy development in Japan.

### **Bridging governance gaps in energy landscapes: Reflections on the case study of Leipzig, Western Saxony, Germany**

**Christian Strauß; Thomas Weith; Annegret Repp;** Leibniz Centre for Agricultural Landscape Research; Institute of Socio-Economics; Muencheberg; Germany

*Keywords: urban-rural linkages; governance gaps; Leipzig; land use conflicts; land management*

In consequence of the nuclear accident in Fukushima, in 2011 the national German parliament has decided the nuclear power phase-out. But following the concept of decentralised energy systems, at least the bigger municipalities will not be able to cover their demands within their own boundaries. The core challenge for these municipalities is thus to realise the supply in exchange with surrounding areas. However, until now it is not clear how decentralization can be achieved, since modelling approaches have yet to be developed.

Because renewable energy sources change the land use, a decentralised energy system also raises the question of an integrative spatial policy. An institutional problem is the gap between governance of flows and governance of space and place, with the current energy policy being basically a sectoral policy of flows.

The discussion about new governance modes of energy policy should be combined with concepts for solving land use conflicts and for improving regional land management. This topic has been one of the reasons why the German Federal Ministry of Education and Research has initiated the funding measure “Sustainable Land Management”. The research programme focuses on regions which are severely affected by climate and structural-demographic changes.

Therefore, the main objective of this paper is to structuralise existing governance modes including current governance gaps, and furthermore to contribute to conceptualizing integrative governance modes for energy and land. Intersectoral, horizontal and vertical governance gaps shall be discussed, as well as the ways to bridge these gaps. In conclusion, trans-sectoral, transboundary and trans-scalar forms of cooperation shall be investigated in a bid to provide deeper understanding of new forms of cooperation such as urban-rural energy partnerships. Building on a conceptual theoretical perspective, the paper analyses the case study of the region of Leipzig and Western Saxony in Germany.

## **Energy landscapes in the Alps. Planning of and conflicts over renewable energy systems in an Alpine region**

**Bruno Zanon;** University of Trento; Department of Civil, Environmental and Mechanical Engineering; Trento; Italy

*Keywords:* *renewable energy sources; Alps; policy field; spatial planning; landscape defence*

Energy has shaped large portions of the Alps. While woodlands have always been a traditional source of energy, in 1900 hydroelectric power plants started to modify the landscape, and other transformations have taken place in recent decades, when fossil fuels were easily available.

The increasing cost of energy and the awareness of the limits of fossil sources as well as of the effects on climate are soliciting to make use of new technologies, but conflicts are hampering the innovation and the effective use of renewable sources.

The paper aims at focusing the conflicts emerging when renewable energy systems, affecting the use of space and the landscape, are proposed. The concept of ‘policy field’ (Massey and Huitema, 2013), which can help in better analysing conflicts and opportunities in view of the integration of different actions, is used and tested.

The paper will analyse the case of Trentino, an Alpine region in Northern Italy, where consolidated procedures aimed at managing land use, protecting the environment and controlling landscape change, are operating. A number of initiatives, which are creating conflicts among actors and among different public decision procedures, are taken into consideration.

The analysis considers that actions take place within a cognitive and agency dimension defined by the interaction of three areas regarding knowledge, time and space, describing actors’ different – and conflicting – attitudes. The three areas interact with the determinants of what have been called ‘policy fields’: the responsible authorities (and their modes of governance); the institutional form given to processes and procedures (plans, in particular, but also resource use and building permissions), which allow actions to take place; the expertise at play. The paper discusses whether a coherent definition of a new ‘policy field’ can allow integrating different perspectives for a better use of renewable energy sources.

## **Identifying institutional development paths of local energy transitions**

**Marion Hitzeroth; Mathias Jehling;** Karlsruhe Institute of Technology; Institute of Regional Science; Karlsruhe; Germany

**Martin Brückner;** Murdoch University; School of Management & Governance; Perth; Australia

*Keywords:* *institutional changes; local decision processes; renewable energies; landscape; comparison of energy transitions*

Energy landscapes are invariably affected by energy systems and technologies, which in recent decades have undergone significant change as part of countries' energy transitions towards renewable energy. Underlying these energy transitions are planning processes that to a large extent need to guide decision-making processes that include economic, political and civil society actors. Current research aims at identifying success factors to improve planning and hence its capability of including actors from different spheres. Consequently, general success factors have been elaborated mostly to enhance the acceptance of renewable energies. As we look at institutional factors that promote or retard energy transitions, we argue that these success factors must be understood in their spatial and temporal context. Hence, an analysis of local or regional development paths should give us a better understanding of how energy landscapes are transformed.

To this end, we develop an institutionalist approach to connect changes in formal and informal institutions on state, regional and local levels. We apply a comparative case study approach to gauge the impact of specific institutional constellations. Specifically, using data derived from expert interviews and relevant policy documents, we analyse the usage of PV and wind in two municipalities in Germany and Australia; two countries with opposing national renewable energy policies and energy systems in technological terms. We show that while both countries have followed different energy paths they nonetheless lead to similar impacts on the landscape. In analysing the interdependencies of external institutional changes and the decision-making processes between enterprise, planning and civil actors, we arrive at a better understanding of the changes in an energy system that allow for a local energy transition but also of how local actors are able to define their own agenda.

## **B6** Landscape assessment in the context of siting decisions

### **GIS based assessment of designated forest areas for wind farms**

**Torsten Lipp; Robert Glaser;** University of Potsdam; Earth and Environmental Science; Potsdam; Germany

*Keywords:* wind turbines in forests; GIS based assessment; nature conservation criteria

To reach the aims of climate change mitigation, renewable energies need to grow further. In the federal state of Brandenburg as well as in other federal states of Germany, wind turbines should be installed in forests and woods, as there is not enough space left on agricultural land for more wind farms. To find the most suitable areas, nature conservation issues have to be considered. Practicable criteria were established and a stepwise procedure was developed which considers the following steps:

- Selection of potential areas in forests, based on existing digital biotope mapping
- Definition of areas to be excluded, e.g. SCI, nature conservation areas
- Assessment of remaining areas regarding their nature conservation values – Analysis of the effects on selected species, especially mammals
- Consideration of organizational and technical aspects, e.g. trails, improvement
- Availability of up to date data and information

All the steps are integrated in GIS, which makes it easy to execute specific requests. The application helps to evaluate proposed areas for wind farms (e.g. in regional plans) and allow to give sound statements about their suitability from the point of nature conservation. Some examples, showing the strength of the application can be given. At this point, the tool is focused on the situation in Brandenburg but it could be improved for the use in other federal states as well.

## **A toolkit to assist landscape-scale spatial planning in relation to landscape capacity for renewable energy installations**

**John Martin;** University of Plymouth; School of Geography, Earth and Environmental Sciences; Plymouth; United Kingdom

**Bryony Fowler;** Cleanearth Energy Ltd; Planning; Wadebridge; United Kingdom

**Roger English;** South Devon AONB; Project Office; Totnes; United Kingdom

*Keywords:* landscape sensitivity; renewable energy; strategic spatial strategies; landscape capacity; wind turbines

Planning plays a key role in supporting the delivery of renewable energy throughout the UK; striking the balance between the need for energy security with the management of landscape quality is vital for the transition to a low carbon future. A toolkit was developed to provide methodology for assessing landscape sensitivity and capacity to onshore wind turbines and large scale photovoltaic development. The purpose of the toolkit was to ultimately produce landscape scale spatial plans that can be applied and replicated throughout the UK and used to guide future planning decisions with regards to onshore renewable energy installations.

A case study area, The South Devon Area of Outstanding Natural Beauty, was used to implement the methodology and guide areas for further development. Stakeholder engagement proved to be valuable due to the subjective nature of past assessments; public consultation methods were developed using geocaching and image-based photo interpretation to increase the public awareness of landscape in line with the European Landscape Convention. Methodology also ensured the impact of development on landscape character and the visual impact were considered independently though the use of visual impact assessments and carefully defined sensitivity criteria.

Monitoring methods were also developed to promote the longevity of the assessment and the viability of the landscape strategies over time through the use of a continued assessment of landscape change, cumulative impact and public perception.

The toolkit provides a simple and transparent approach to assessing the impacts of renewable energy development in protected and non-protected landscapes throughout the UK and promotes the use of applicable, long-term landscape scale spatial plans.

## **Spatial patterns of vulnerable sites as predictors for conflicts caused by wind energy plants**

**Frank Masurowski; Martin Lange; Martin Drechsler;** Helmholtz Centre for Environmental Research Leipzig – UFZ; Dept. of Ecological Modelling; Leipzig; Germany

*Keywords:* wind power; conflict assessment; minimum distance; energy production potential; statistical model

The energy transition represents a change from conventional, centralised energy supply to renewable, decentralised energy supply. This decentralisation is associated with a high potential for spatial, social and ecological conflicts, where wind energy plays a special role because wind turbines produce noise, are highly visible and pose a threat to many bird and bat species. One strategy for the mediation of wind power related conflicts is the establishment of minimum distances between wind turbines and vulnerable sites like human settlements, bat roosts or nesting sites of sensitive bird species. Increasing these minimum distances results in a reduced energy production potential (EPP).

Using the example of human settlements in Germany, we present a spatially explicit analysis of the reduction of the EPP with increasing minimum distances between vulnerable sites and wind turbines. We also analysed the relation between the spatial pattern of vulnerable sites and the reduction of the. Using model selection techniques, we found the coverage and spatial distribution (i.e. clustered or dispersed) of settlements to be good predictors for the reduction of the EPP. The spatial pattern of potential wind power



areas was of minor influence. From this regression analysis, we obtain a simple model that allows for a rapid assessment of geographic regions for their suitability for wind power production in the sense that EPP is insensitive to an increase of minimum distances. In addition, the presented approach can be used to identify areas of high conflict potential and it is promising to apply it to other types of vulnerable sites to assess e.g. ecological conflict potentials.

In this way, the presented approach may help to identify and mediate various kinds of conflicts that occur in the course of the energy transition.

## **Tools and criteria for the assessment of landscape impact in the Guide for Landscape Integration of Andalusian Wind Parks**

**Michela Ghislanzoni; Miguel Torres García;** Territoria, análisis y gestión del medio sl.; Landscape planning; Seville; Spain

**Francisco Cáceres Clavero;** Regional Ministry of Environmental and Spatial Planning of Andalusia; Assessment and Environmental Information; Seville; Spain

*Keywords:* landscape, assesment, planning, visual impact

Due to its size and scope, any development of a wind park is a territorial project that creates an energy landscape (Di Bene, 2006; Frolova, 2008). The construction of wind farms is compatible with the preservation of high quality landscapes, provided that their design is sensitive and respectful to landscape character (Swanwick, 2002). This contribution presents The Guide for Landscape Integration of Andalusian Wind Parks (Ghislanzoni, 2014), a compilation of criteria and tools devised by initiative of the Andalusian regional government, which provides a region-specific methodology for analysis and management of landscape impact (Observatori del Paisatge).

Specifically, this guide describes tools for critical assessment of the landscape and visual impact of wind turbines. These are the result of the review and analytical comparison of a wide range of experiences and guidelines from Spain, Italy, France, the United Kingdom, Denmark, the Netherlands, Australia, Chile and Canada. At a regional level this guide translates into two instruments for planning, managing and monitoring the impact of wind farms upon the landscape. The Shared Landscape Information System of Andalusia (Zoido, 2014) and the Visibility System of Andalusia (Cáceres, 2014) are currently in use by the regional administration, and they are also available to the public through the Environment Information Network of Andalusia (REDIAM).

Two aspects stand out in this study as criteria for assessing landscape quality: optimal location and wind farm morphology. Optimal location is determined by productivity, zoning and land use, visibility, co-presence and co-vision, social perception and interaction with local character expressed by relief, patterns and resources. Morphological factors are found in the arrangement and characteristics of generators and auxiliary structures in wind parks. This paper presents these two groups of criteria in detail and in relation to the aforementioned managerial tools.

## **B7 Special perspectives**

### **Recycling energy landscapes: Limits and opportunities**

**Martin Pasqualetti;** Arizona State University; School of Geographical Sciences and Urban Planning; Tempe, AZ; United States

*Keywords:* energy; landscape; planning; environment

Over the centuries, energy development has largely been a linear enterprise, ending in disrupted landscapes abandoned and forgotten. This approach is no longer viable for many reasons. For example, we may need

the land for other purposes, the land might be too valuable to abandon, and abandonment could result in health and safety hazards. This paper presents an introduction to the concept of recycling energy landscapes, focusing on a comparison between traditional energy landscapes of coal, oil and natural gas, and the emerging landscapes of renewables. Examples will be taken from research in Europe, Canada, and the United States. We will demonstrate that there are options for recycling all these landscapes, but there will be specific limitations and opportunities associated with the characteristics and histories of the energy resources themselves.

One conclusion is that renewable energy landscapes of wind and solar energy not only are ideal uses of previously abandoned energy landscapes, but they also promise to have the least long-term impact on the land, making them suitable for alternative future non-energy uses.

## **Designing anticipative transformation in resource-intensive production landscapes. Rhenish Mining Area, Germany**

**Timo Matti Wirth**; RWTH Aachen; Chair of Landscape Architecture; Aachen; Germany

*Keywords: energy transition; resource-intensive production landscapes; anticipative transformation; circular flow economy; regional development*

Lately, many European regions pursue ambitious agendas regarding energy transition. Often, such agendas implement successfully in “rural”/low-density settings. In contrast, many industrial regions face long-enduring structural change and unresolved challenges, due to complex interdependences between fossil energy consumption and varieties of resource-intensive production systems. How can we design ‘anticipative transformation’ in those regions and their production landscapes? How can common goals and effective ways forward get several decades ahead of time? Where are entry points for spatial implementation and pilot projects?

This paper will investigate those questions, first by framing anticipative transformation as a new (or less theorised) concept, derived from “preventive structural change” (Gärtner et al 2014). Literature from regional policy/-planning and environmental sciences will be drawn upon, including rare examples of precedents. Special interest will be given to intelligent ways of dealing with “path dependencies”. As an experiment for anticipative transformation, expert meetings on the future of Rhenish Mining Area (RMA) in Germany will be reflected upon. Also, first steps for setting up long-term strategies for the RMA within a regional stakeholder initiative will be exemplified.

For the RMA, the current political status determines a phased closure of lignite mining for electricity generation between 2030 and 2045. This will drive the region’s structural change – together with the impacts of energy transition more broadly and open questions regarding the future management of a variety of raw materials/natural resources. Innovative strategies regarding energy production, various industries, agriculture and land reclamation will be needed, targeting circular flow economies and a high-quality landscape. This paper is based on the hypothesis that anticipative transformation is a realisable concept for patiently fulfilling such latter objectives.

## **Renewable energies and the landscapes of the future**

**Claudia Hildebrandt; Kathrin Ammermann**; Federal Agency for Nature Conservation; Nature Conservation and renewable energy; Leipzig; Germany

**Alice Schröder; Matthias Herbert**; Federal Agency for Nature Conservation; Nature and the Landscape in Planning and Projects; Leipzig; Germany

*Keywords: renewable energies; landscape; environmental planning*

The federal government of Germany intends a restructuring of the energy supply in the coming years, which requires the expansion of renewable energies. The landscapes of the future will thus be characterised by technical reshaping with wind power and photovoltaic systems and also by the cultivation of energy crops.

A significant part of the landscape in Germany is subject to an enormous transformation pressure. The corresponding predictions show that there is an urgent need for a landscape-design of the current and future change. The implementation of the energy system transition needs overarching visions and a social balance of interests, which also takes into account nature conservation. The question is how it is possible to develop “images” for the landscapes of the energy change that enable identification with the corresponding processes of modernisation. The challenges are complex, therefore a more forward-looking spatial planning is a crucial requirement, which should be implemented especially at a regional level. This must also take into account the cumulative effects on the landscape imposed by the interaction of the three most-developed technologies biogas, wind power and photovoltaic (open spaces). A nature- and landscape-compatible implementation of renewable energy projects minimises subsequently cumulative effects. In order to reduce uncertainties in dealing with cumulative effects in environmental planning, the necessary framework conditions must be established on a legal and political level. For this purpose, efforts should be made in the future to not only control locations of wind turbines, but also photovoltaic systems and biogas plants. Consensus is that cumulative effects of the development of renewable energies can best be reduced on a regional planning level. In addition, a development which also deals with demands for nature and landscape referring to renewable energies can also occur in regional energy concepts.

## **The role and potentialities of Landscapes Approaches to planning for wind farm expansion; a view from Scotland.**

**Jose Munoz-Rojas;** James Hutton Institute; Information and Computational Sciences; Aberdeen; United Kingdom

**Marc Gonzalez-Puente;** Independent Researcher; Barcelona; Spain;

**Felipe Cortines-Garcia;** EURAC Research; Institute for Alpine Environment; Bolzano; Italy

**Julius Proell;** Unviersität für Bodenkultur; Department of Landscape Architecture and Landscape Planning; Wien; Austria

*Keywords: landscape services; landscape character; landscape visualisation; wind farms; Scotland*

The expansion of renewable energies is a political priority of the EU, with targets having been set for 2020 (EU Renewable Energy Directive, 2009), and then extended towards 2030 (2030 EU Energy Strategy, 2014). The Scottish government translated these targets into its own policy framework, initially resulting in the approval of a Climate Change Act (2009) and a Route Map for Renewable Energy in Scotland (2011). These have since been complemented by a set of policy and planning instruments addressing updated targets and routes for implementation. The resulting framework is characterised by three main attributes; an intention to go beyond the standards agreed at EU level, a role attributed to spatial planning as the main political arena for decision making, and a concern about interactions amongst renewable energy and other components of the land use system, including landscapes. Amongst the various typologies of renewables considered in Scotland, wind farms have proved to be especially controversial. Here we will explore the efficiency of policy and planning in Scotland in addressing synergies, trade-offs and opportunities amongst wind farms and landscapes. Drawing from examples from rural (NE Scotland) and peri-urban (Central Scotland Green Network) regions we will argue how various Landscape Approaches can potentially help resolve tensions and make best use of synergies between landscape protection and wind farm expansion. Three main Landscape Approaches will be considered; Landscape Services, Landscape Character, and Landscape Visualisation. These approaches will be considered in their potential to reverse the common perception of Landscapes as pristine settings that need protection from humans, and move towards a paradigm that is underpinned by the principles in the European Landscape Convention (2000). The paper will close with a route-map for renewable planning policy that is sustained by these alternative Landscape approaches.



# C Participation

## Theme keynote “Participation”

### Participation as co-production

**Maarten Wolsink**, University of Amsterdam, Department of Geography, Planning and International Development, The Netherlands

Currently Germany is struggling with finding a path towards a new energy system. Interesting is that, globally, with Denmark it is the only country really trying to create a 'turn' (Wende) in its energy system. Many countries have announced an "energy transition", suggesting a similar 'turn', but ignoring or neglecting the institutional changes needed for such a transition. For example, this term was coined in the Netherlands as "transition management" (Rotmans et al, 2001), but soon this idea was hijacked by policy and adapted to fit existing institutional frames. One of the first things done was the introduction of a 'transition manager'. In the talk I will elaborate on the idea that innovation can be 'managed' this way, particularly in the centralised and hierarchical ways most governments operate in energy policies.

The acceptance within society of all consequences of an energy system based on low-carbon and renewable sources, and the adoption of such a system is primarily about the acceptance of changes in crucial institutions. It is about escaping from the institutional "carbon-lock-in" (Unruh, 2000). First, I will review the essential elements of a power supply system based on renewables. This concerns integration of supply by all different kinds of renewable sources, but also the adaptation and integration of demand. These elements should be accepted by society – which is socio-political, market, and community acceptance. And by all relevant actors, so all three dimensions go far beyond 'public acceptance'. They concern stakeholder and citizen involvement in decision-making, in establishing new infrastructures – mostly distributed generation – and literally 'co-production' (Ostrom) is absolutely crucial. Hence, the second focus will be on the institutional changes needed for establishing a framework opening the possibilities for co-production and the required involvement. First of all, participation should be considered as involvement beyond any form of "tokenism" (according to Arnstein, 1969). For renewables, this means co-production in energy supply and real power in decision-making about how to establish a good 'fit' between the new socio-technical system and the geographical character of the community. For example, place attachment and place identity – as explained by Devine-Wright in his keynote – is determining certain options for a good 'fit' between the energy system and the community. Landscape is a major issue in siting renewables' infrastructure, and hence, participation in decision-making on landscape and crucial. Similarly, supply patterns of renewables must fit the demand patterns that are determined by the geographical identity of the consumers. Moreover, the energy available for power generation is abundant, but the real scarcity becomes the space needed for the infrastructure. Existing institutional frameworks currently hardly support the establishment of co-production and participation in decision-making.

## **C1** Engaging the public I – Tools and methods

### **A transdisciplinary study of energy landscapes in Sweden**

**Agatino Rizzo; Bjorn Ekelund;** Lulea University of Technology; Architecture and Water; Lulea; Sweden

*Keywords: energy landscape; renewable energy; responsive landscape; transdisciplinarity; activism*

For decades alternative (to carbon) sources of energy in Sweden have been linked to hydro- and nuclear-power. However, this is set to change as the new Swedish government agenda put an extraordinary emphasis on renewables and in particular on wind farms (Waldo, 2012). It has been projected that by 2020 the Markbygden Wind Farm (the largest in Europe) in Pitea, Norrbotten will have a capacity of up to 4 GW. However, the implementation of renewables such as large wind farm projects in Sweden poses several challenges. In particular, society grassroots in Sweden contend the visual impact of, for example, wind turbines and their potential negative impacts on cultural-based activities (Khan, 2003). This trend has been reported in neighbouring Nordic countries too (Nordvind, 2011).

Sweden has a long tradition of stakeholder engagement in state-funded projects in the form of participatory meetings and written feedbacks. However, other participatory techniques are less established (Henningsson et al., 2014). Furthermore, individual and informal agencies as well as small associations (förening) do not have the same visibility and influence in the planning process as other institutional stakeholders do.

Since 2014, LTU has been engaged in a number of research projects dealing with energy, landscape, art, and participation (Albano in Stockholm, Lulea, and more recently in Pitea, Norrbotten). These projects have aimed to put the citizen at the centre of the design process in order to empower her/him in the new energy landscape of Sweden. The aim of this paper is to review such experiences and practices in light of emerging transdisciplinary practices for knowledge production in the fields of landscape and planning (Doucet & Janssens, 2011; Rizzo & Galanakis, 2015).

### **Participative energy planning in Hungary**

**Norbert Kohlheb; Csaba Centeri; Gábor Ónodi;** Institute for Nature Conservation and Landscape Management, Szent István University; Department of Organic Farming and Agri-environmental Planning; Gödöllő; Hungary

*Keywords: strategic energy planning; participation; renewable energy use*

Current energy patterns have their imprints on our landscapes like “horizon pollution” of chimneys or electric transmission towers. The energy transition, which we also have to face in our country sooner or later, will restructure the existing groundwork creating new challenges for our landscape. In the framework of the Coach BioEnergy project (Central Europe Program) a methodology for participatory renewable energy strategy planning (RESP) was developed and tested in Hungary. In this methodology local inhabitants were intensively involved in a collaborative planning process paving the way for the local community’s energy transitions towards renewable energy utilisation. In this process several transect walks were made with local inhabitants who vividly described the landscape features in the past surrounding the municipality. Based on these landscape structures the planners also invited local stakeholders to create the future landscape of the municipality integrating renewable energy facilities. These inputs were then used for creating both the overall strategy and the step-by-step projects within the strategy. The lessons learned from this experiment and the motivation factors of investing in energy transitions in Hungary are summarised in our paper.

The experiences at hand had primarily a social character. Mobilization of local people was a very challenging task and could only be accomplished with local support provided by key local stakeholders (e.g. the mayor). Yet, there was a communication problem between the local stakeholders and the planning team that

distorted the original planning targets. In summary, collective and strategic decision-making regarding RESP is only possible if legal preconditions are set and predictable, transaction costs are kept down and planning practices are prevalent.

## **Integrating planning and landscape management to deliver public policy on energy and land use**

**David Miller; Gillian Donaldson-Selby; Chen Wang; Jane Morrice;** James Hutton Institute; Information and Computational Sciences; Aberdeen; United Kingdom

*Keywords: public participation; European Landscape Convention; spatial planning; renewable energy; community planning*

Policy-makers (e.g. EU Energy 2020) are challenged with delivering competitive, sustainable, secure and affordable energy. As production and consumption of energy are linked to all aspects of sustainable development, increasing demands are placed on natural and social resources. The Ecosystem Approach (EA) seeks to integrated management of living resources in equitable ways, advocated in the Convention on Biological Diversity and aligning with the European Landscape Convention. Implementing EAs requires identification of governance structures relevant to land management and planning at different spatial scales (e.g. Cash's: spatial, temporal, jurisdictional, institutional, management, networks and knowledge), setting socio-economic and biophysical opportunities and constraints. An EA approach is presented to explore land use options in NE Scotland using IPCC SRES scenarios and national planning policy as contexts for socio-economic change. Virtual reality tools were used to present and develop stakeholder-led choices of future land uses, focusing on renewable energy, and assess impacts on local landscape character. Events were run with land managers, public agencies, and children local and remote to the area (England and Scotland), to identify of differences and similarities of choices by stakeholders, and discussion on who has rights to participate in determining land use. E.g. local audiences were positive towards small-scale wind turbines, associated with farming and communities, whereas remote audiences proposed larger wind farms on hilltops. Local participants recognised roles for renewable energy in diversifying farm business and rural development. Remote audiences sought to maximise energy production. Findings are discussed with respect to scale and decision-making, and Community Planning as structures for EAs to facilitate cooperation across public, private and third sectors, and connect landscape planning from national to neighbourhood levels.

## **Social networks and the energy landscape: Toward a dynamic communications model**

**Danielle Barrios-O'Neill;** University of Ulster; English/Media Arts; Belfast; United Kingdom

*Keywords: energy networks; social media; public engagement; communication; technology*

The first broad synthesis of research knowledge regarding digital media engagement strategy-building in the energy sector, this paper reviews literature across four major areas to address the question, how can sustainable energy projects and organisations best use the strengths of digital and social media for public engagement with the evolving energy landscape? The author proposes a meta-evaluative structure of five key engagement principles recurring across the literature, and proposes a framework for developing communications strategy based on these principles. Initial findings indicate that sustainable interactions and transitional behaviours within the energy network, comprising political, economic and environmental agents, are likely to be most effectively influenced through dynamic social interactions using diverse platforms, in order to be meaningful in contemporary social and technological contexts. Furthermore, such interactions may become integral to future energy delivery systems, while supporting the development of complex and more broadly ecological conceptions of the energy landscape in the 21st century.

## **C2** Engaging the public II – Case studies

### **Caught between ‘hard’ and ‘soft’ taboos? – Public participation in spatial planning for wind energy landscapes in Saxony**

**Juliane Albrecht; Markus Leibenath; Maria Elena Zegada; Gerd Lintz;** Leibniz Institute of Ecological Urban and Regional Development; Landscape Change and Management; Dresden; Germany

*Keywords:* wind energy; public participation; legal framework; spatial planning; regional planning

Public acceptance of wind energy facilities and the resulting landscapes is often regarded as key to the successful implementation of energy transitions. The literature offers a number of hypotheses on factors that might positively impact upon public acceptance, for example in-volving stakeholders in the decision-making process. However, in countries such as Germany with elaborate systems of statutory spatial planning, the designation of sites is subject to cumbersome procedures that are guided not only by legal provisions but also by jurisdiction. Furthermore, political commitments to increasing the proportion of renewable energies have to be taken into account.

The paper centres on two questions: What leeway is there for public participation in wind energy planning at the local level in Germany? And what practical problems can arise when spatial planners begin to involve the public in the site selection process? The contribution combines legal analysis with a case study in a Saxon region where the planning agency established a panel of anti-wind protest initiatives and the wind industry to discuss criteria for siting decisions.

This example is embedded in the institutional context of wind energy planning and regional planning in Germany. Firstly, the competent authorities and the planning procedures, especially the public participation procedure, are viewed from a legal perspective. Secondly, the requirements of substantive law and the jurisdiction concerning the designation of priority areas for wind energy in regional plans are analysed. Current legislative amendments such as the possible introduction of minimum distance regulations regarding settlements are also considered. Thirdly, the case study is discussed in the light of these formal and substantive requirements. Furthermore, the empirical analysis illustrates the different functions of public participation as well as the interplay of statutory and informal planning approaches.

### **The rise of “private participation” in the planning of energy development in the US**

**Jeffrey Jacquet;** South Dakota State University; Sociology and Rural Studies; Brookings; United States

*Keywords:* participation; shale energy; energy policy; planning

Public participation in local planning decisions is widely advocated as an important component of democratic decision-making. It is linked to a number of positive outcomes, including increased resident satisfaction and more effective decision-making. In the realm of energy development, many local governments lack regulatory control and thus lack a venue for public participation in this type of land use decision. Private landowners are increasingly afforded the ability to participate in the planning and siting of these energy developments through contractual land leasing negotiations. Even as this form of participation becomes widespread, it occurs outside of the public sphere and challenges the traditional notions of participation in land use decisions. This article introduces the concept of “private participation” and provides results of a mail survey (n= 1028) that reveal such participation appears to increase landowner perceptions of control and information access, and ultimately positive attitudes towards the developments.



## **Framing the collaborative management for river landscapes in an Eastern Anatolian province**

**Emel Baylan**; Yuzuncu Yil University; Department of Landscape Architecture; Van; Turkey

*Keywords:* collaboration; landscape management; hydroelectric power plants; Van;

Since the beginning of 2000s, according to the national policies to close the deficit of electrical energy in the country, the number of hydroelectric power plant (HPP) projects have increased dramatically in the water basins and on the associated rivers in Turkey. This is one of the results of delegation of planning and construction of HPP to the private sector from government as well as of the top-down management approach and lack of national and local level landscape policies. During this time, from the beginning of the construction of HPPs, river landscapes, related ecosystems and local communities in many regions in Turkey have been negatively affected. As such, due to the conflicting interests, local and national stakeholders of water and landscapes have confronted with each other in several platforms such as law courts and local protests. River landscapes and associated ecosystems in Van Province that is located in the eastern Anatolia are also confronted with similar threats and conflicts to the other regions in the country. In the provincial border of Van, additional to the existing ones, currently more than 50 HPP projects have been planned to be constructed in the near future. These developments will put high pressure on to the relatively unexploited river landscape and associated local communities in Van. As such, conflicts among stakeholders and degradation of river landscapes seems inevitable. In this respect, landscape management approaches that allow active stakeholder participation that support negotiation and consensus on the varying expectations from landscapes are needed. The aim of the paper is to identify the components and objectives of a possible collaborative landscape management process for river landscapes in Van Province. In this context, potentials of water and landscape related national legislation as well as international ones, stakeholders, conflicting issues and shared expectations on river landscapes in Van Province will be explored.

## **The governance, acceptance and justice of wind energy. A qualitative study of stakeholder perceptions in Austria**

**Patrick Scherhauser**; Institute of Forest, Environmental, and Natural Resource Policy, University of Natural Resources and Life Sciences, Vienna; Department of Economics and Social Sciences; Vienna; Austria

**Stefan Höltinger & Johannes Schmidt**; Institute for Sustainable Economic Development, University of Natural Resources and Life Sciences, Vienna; Department of Economics and Social Sciences; Vienna; Austria

**Boris Salak**; Institute for Landscape Development, Recreation and Conservation Planning, University of Natural Resources and Life Sciences, Vienna; Department of Landscape, Spatial and Infrastructure Sciences; Vienna; Austria

*Keywords:* wind energy; social acceptance; participation; justice; governance

Wind energy is a key technology towards a low-carbon society, as it is the most competitive in terms of energy productivity and cost effectiveness compared to other renewable energy sources. However, already today social acceptance is considered to be a constraining factor in achieving ambitious wind deployment targets. Surveys repeatedly show that while people support wind energy in general, specific wind farm projects often cause local opposition. Local resistance against wind energy cannot be explained by singular issues such as simple cost-benefit calculations, the public support for renewable energy sources, the implementation strategy of the developer, the number of wind turbines installed, the intensity of the turbine noise, the protection of local birds and animals, or the “not-in-my-backyard”-effect, although a very dominant influence seems to be the specific value of the landscape, the familiar surroundings and the habitat. Hence, the acceptance of wind energy depends on a complex set of individual and societal

indicators, perceptions and preferences rooted in institutional and socio-political arrangements. This study is based on semi-structured interviews with representatives from 28 Austrian institutions in the field of wind energy (NGOs, operators, energy providers, environmental and nature protection groups etc.). The interviews tackle the issues of governance, acceptance, participation and justice during the planning and siting process of wind farms. The qualitative data is analysed regarding different forms of participatory methods, planning options, technological potentials and ecological constraints. Addressing social acceptance therefore will enhance the understanding about the economic, political, ecological and social feasibility of wind power plants and help to better communicate benefits and risks of wind energy to local, regional and national authorities, developers, the public and local communities.

## **C3** Special perspectives

### **Challenges of regional participation in Germany's Energiewende – insights from the Wendland and the Prignitz**

**Andreas Röhring;** Leibniz Institute for Regional Development and Structural Planning (IRS); Research Department 2 Institutional Change and Regional Public Goods; Erkner; Germany

*Keywords:* cultural landscape; energy transition; participation; governance; actor constellation

Decentralisation is a key catchword of the German Energiewende (energy transition) due to the fact that renewable energy sources (e.g. solar radiation and wind) are generally found everywhere. For this reason the energy transition is often idealised as providing opportunities for greater regional, local and citizen participation, especially in rural areas. However, central government incentives for promoting renewable energies, especially by the national Renewable Energies Law (EEG), have also generated extensive private investments of corporate enterprises in these technologies.

From a social science perspective this paper explores regional impacts and strategies of German Energy transition via a comparison of two very different regional coping strategies at the nexus between central policies and decentralised practice: to allow things to happen and deal with the resulting problems or, alternatively, to exploit opportunities for developing collaborative strategies. Both strategies and their consequences will be illustrated and discussed with reference to two neighbouring cultural landscapes with different actor constellations, governance arrangements and regional policy strategies, shaped by divergent historical trajectories and spatial structures:

- Prignitz, in the State of Brandenburg, which has been transformed by external investors into an “energy landscape” producing 250% of its energy demand but facing a lack of participation and consequent problems of acceptance and “energy justice” and
- Wendland, in the State of Niedersachsen, which markets itself as a “100 % Renewable Energy Region” and as a “Bioenergy region” with its renewable energy villages, aiming at exemplary participation based on well-established civil society initiatives.

The presentation contributes to debates about the constitution of new energy spaces and draws conclusions on the implications for regional actors' strategies to deal with challenges and opportunities of the Energiewende.

## Participatory development of landscape scenarios for sustainable bioenergy strategies

**Ralf-Uwe Syrbe; Karsten Grunewald;** Leibniz Institute of Ecological Urban and Regional Development, Dresden, Germany

*Keywords: scenario, bio crops, biogas, renewable energy, ecosystem services*

According to European and German energy policies, the proportion of renewable energy supply has to be increased significantly in the near future. The extended cultivation of energy crops has both positive and negative effects for economic, social, and environmental concerns. It can lead not only to impacts on groundwater, soils, biodiversity and the overall appearance of the scenery but can also cause conflicts between bioenergy actors and local population. In order to ensure a suitable development, there is a demand for instruments to regulate energy crop cultivation and to enhance the regional cooperation.

On the example of the study region Görlitz district (Germany), we employed and enhanced a participatory approach to develop landscape scenarios, which enables us to develop appropriate acceptable planning decisions and controlling instruments that can influence biomass production purposefully. Looking at regulatory measures such as laws, subsidies, and planning rules, it can be shown that instruments exist but they are not sufficient regarding landscape quality and the needs of rural society yet.

Together with regional stakeholders, we identified strategic options to organise the bioenergy provision more sustainable. Different bioenergy crops, alternative cropping systems and a better local cooperation to provide bioenergy substrates, heat loss or to recycle organic waste matters are examples of the proposed measures. Results gained from this participatory approach were transformed into recommendations for decision makers and practitioners. Not only are the solutions transferable, but also the scenario framework, which can be applied to encourage a local population and stakeholders from different fields of action to cooperate and to develop unorthodox ways to sustainability.

## Communal energy planning – Participatory planning considering preferences for autarky, aesthetic aspects and energy mix

**Nina Mostegl; Ulrike Pröbstl-Haider;** University of Natural Science and Life Sciences, Vienna; Institute of Landscape Development, Recreation and Conservation Planning; Vienna; Austria

**Wolfgang Haider;** Simon Fraser University; School of Resource and Environmental Management; Vancouver; Canada

*Keywords: spatial planning; preferences; nudges; choice model; visualisation*

Past developments in the energy sector provided communities with several opportunities to use diverse renewable energy systems. Current energy planning mostly focuses on energy consumption and future requirements, yet neglects suitable combinations of renewable energy sources. In most cases, choices are based on top down decision making with little participation and consideration of local preferences. In order to aid communities in steering sustainable development and responsibility towards a low-carbon lifestyle, this project focuses on human dimensions of climate change and adaptation and addresses energy consumption (electricity only) and the opportunities to deal with current issues on a community level and through communal planning instruments. In addition to national and regional strategies communities play a unique role. The focus of community planning needs to shift from preventative planning to a discussion about the influence of community lifestyle, opportunities of various local energy strategies, personal and local responsibilities, and prospects for local energy autarky. Multiple communities developed their own approaches to maximise local alternative energy supply and self-containment. Despite an innovative nature, these approaches often lack long-time planning and public participation processes. This study was developed as an integrated, interdisciplinary project, which ties energy use and social mobilization together with landscape and spatial development. The case study of Langquaid, a community in Bavaria, is built around a public participation process, which applied a survey containing a discrete choice experiment to

investigate the communities' preference towards several energy provision systems, their willingness to change private energy consumption, and ways to achieve behavioural change. The overarching goal of the project was to develop a community-based landscape integrated energy use plan through a model of integrated energy use planning.

## **Smart energy cities in Europe. Urban transformation towards carbon neutrality**

**Jürgen Oßenbrügge**; University of Hamburg CEN / Geography; Geography; Hamburg; Germany

*Keywords:* energy transformation; smart city; participation; urban regimes

Based on experiences of an EU funded project of six European cities (Amsterdam, Copenhagen, Hamburg, Vienna, Lyon, Genova) the paper explores urban transformation agendas which attempt to rebuild and retrofit the urban landscape in favour of energy reduction, rising energy efficiency and use of renewables. Based on a comparative perspective two research questions are central. First: Do the recent experience allow to model a generic transformation agenda for "The European City" which outlines the coming shape of urban areas? This research question includes a reflection of tensions coming from specific locational settings operating in each city and general transformation issues as outlined on international or national level. The second research question is directed towards the relations between energy based socio-technical systems which come up due transformative energy planning and forms of participative governance. On the one hand it is clear that far reaching targets of energy transformation are only achievable if a broad stakeholder involvement and a social movement towards energy transformation will evolve in order to overcome transformation barriers. On the other hand there are proofs that a broad participation in infrastructure planning may foster conflicts and time spending planning processes ending in culs-de-sac. The paper offers arguments which attempt to integrate answers to both research questions informed by theories of urban complexity and self-organization.

# D Power

## Theme keynote “Power”

### Landscape: Power materialised

**Don Mitchell;** Syracuse University, Department of Geography, USA

This talk will focus on how the geographical landscape is a materialization of – and therefore the basis for the continued exercise of – power. Drawing on examples of alternative energy landscapes in Gotland Sweden, sprawling suburban landscapes in Northern California, and the struggled-over landscape of the US-Mexico border, I will explore what it means to understand landscape as a materialization of (and basis for) power and the implications of that for the development of more just energy, residential, and labour landscapes, while showing how energy, labour, and home-life are always linked. Landscapes are powerful, I will argue, precisely because they create the conditions of possibility for (or against) justice, whether justice is understood in a redistributive or substantive sense.

## **D1** Hidden landscapes, visualised landscapes

### **Invisible landscape of hydropower: Identifying power issues embedded in Alpine energy landscapes**

**Viviana Ferrario**; Università Iuav di Venezia; dCP; Venezia; Italy

**Benedetta Castiglioni**; Università di Padova; DISSGeA; Padova; Italy

*Keywords:* *invisible landscapes; hydropower; territorial conflicts; power and energy; Italian Eastern Alps*

Renewable energies have been one of the main driving forces of European landscape change in the last ten years. Despite its acknowledged contribution to sustainable development, “renewable” is not ipso facto “sustainable”: on the contrary renewable energies can have negative impacts and create both environmental and social conflicts. Landscape is often at the heart of these conflicts, both as an asset to protect and as a tool for use in debate. This paper investigates the relationships between hydropower production and the territory, using landscape as a tool for a critical review.

Investigating the invisible dimension of landscape can highlight the contradictions between sustainability and renewable energy development, discussing issues of social and spatial acceptability. Hydropower exploitation in the Piave river basin in Italian Eastern Alps (with its two main phases: “integral development” in the first part of twentieth century, until the Vajont tragedy, and micro-hydropower exploitation at present) is the case study in which we test the heuristic effectiveness of some categories of “invisible landscapes”: hidden and masked landscapes, erased and removed landscapes, never realised landscapes (i.e. projects remained without implementation), reciprocal landscapes. We explore invisible landscapes in depth in some local circumstances, so “unveiling” embedded power relations shaping the interplay of energies and landscapes, both within the mountains and between the mountains and the plain.

### **Uncovering the hidden landscape of bioenergy in the Czech Republic; a study of the emergence of fast-growing tree crops**

**Stanislav Martinat**; Institute of Geonics, Academy of Sciences of the Czech Republic; Department of Environmental Geography; Ostrava; Czech Republic

**Dan Van der Horst**; University of Edinburgh; School of Geosciences; Edinburgh; United Kingdom

*Keywords:* *bioenergy; fast growing trees; agriculture; Czech Republic*

Bioenergy has been a major but hidden factor in shaping and maintaining the agricultural landscapes of the Czech Republic. Although windfarms and solar power plants have drawn visual attention as they appeared in rural areas in the Czech Republic, the most significant energy transition has been on arable land, 38% of which is now used to produce annual energy crops, including maize for biogas, oilseed rape for biodiesel and sugar beet for bioethanol. Starting with a synthesis of this remarkable development, our paper then focuses on the most recent trend in bioenergy on Czech agricultural lands; the planting of fast growing tree species for biomass energy, which has grown eight fold in the last five years. We examine the spatial patterns of adoption by farmers of fast-growing trees as biomass energy crops, and seek to understand the reasons why growing of fast-growing trees under agricultural subsidies is emerging as an integral part of farmers’ economic strategies in the near future. Natural conditions, land use changes, agricultural production areas, location towards existing biomass incinerators and also socio-economic conditions of given municipalities, where this type of renewable source of energy is strongly represented, are analysed. Drawing on international comparisons we examine the drivers for this trend, as well as its consequences for the political economy of rural Czech Republic and its agricultural landscapes.

## **Walking the field: Wind power planning and the politics of visualisation (Eure-et-Loir, France)**

**Alain Nadai;** Centre International de Recherche sur l'Environnement et le Développement; CIRED (CNRS); Nogent-Sur-Marne; France

*Keywords:* wind power; visualisation; politics; France; Eure-et-Loir

In spite of supportive policy frameworks in many countries, wind power deployment has remained uneven at the national level, partly because of local opposition and landscape issues. Recent case studies suggest that the process through which landscape is visualised is decisive for spatial planning to account for these issues (Cowell R.; Nadai A. & Labussière O.).

When scenic landscape – meaning by this the visual dimension of landscape – is an object of State protection, which definitely is the case in France, visualising wind power projects before they are constructed and sited, is a prerequisite for the State to gain legitimacy in planning and regulating wind power development. This issue is all the more critical when visualisation is under the hand of diverging, sometimes conflicting interests, such as wind power developers or opponents and State officers. The question then points to a politics of visualisation in wind power processes. The issues are twofold. First, how do State officers manage to visualise not-yet-installed wind power projects? Second, how does such a visualisation allow for a State viewpoint on the planning of wind power to emerge?

The paper draws upon STS developments in the fields of visualisation (e.g. Amman K & Knorr Cetina K.; Lynch M.; Yaneva A.) and upon analyses of construction of State frontiers as an uncertain and multi-sited perimeter (Mitchell T., Linhardt D.) in order to analyse the politics of wind power visualisation.

The analysis will rely on a case study undertaken in La Beauce, in the Eure-et-Loir, about 100 kilometres South of Paris (Nadai A. & Labussière O.). It will be based a close follow up of the local administration at work in its attempts to visualise future wind power projects (Labussière).

## **The recent politicisation of the underground – is the subsoil also a landscape?**

**Conrad Kunze;** Department of Urban and Environmental Sociology; Helmholtz Centre for Environmental Research GmbH – UFZ; Leipzig; Germany

*Keywords:* subsoil, underground, sociology, risk discourse

The last ten years witnessed the introduction of a number of novel technologies concerning the subsoil: unconventional gas and oil exploitation, carbon capture and storage, and a new generation of deep geothermal utilities. All three caused a wave of environmental justice movements that are often successful in preventing technology implementation. From a sociological point of view, the reason for the career of the three anti-movements is the unifying effect of the accompanying risks. Underground technologies put the whole local population at risk, indiscriminate of social background. Risk knows no class, as Ulrich Beck pointed out.

However the social embedding of the underground in Germany is still referring to administrative and juridical categories of an unlimited and forgiving “benign nature” (Thompson/Wildavsky 1997). As technology application and environmental justice movements unfold, the subsoil becomes increasingly politicised. After the atmosphere, might the subsoil be the next frontier of anthropocentrism?

In contrast to the surface, it is no matter of aesthetic concern and a direct sensual contact is not possible, unless accidents occur. On the other hand, the subsoil represents a common good and raises the same questions of a landscape democracy like the surface. The conflicting views of the subsoil are structured along similar pairs like on the surface: local use vs. supra-local utilisation, risk avoidance vs. risk management, non-commodified goods like stability vs. highly commodified goods like exploitable energy. Even more than landscape, the soil has a very local political character, distinguishing it from environmental goods like the atmosphere.

The presentation will explore a sociological approach to the underground and discuss if the subsoil can be understood as landscape or if it is rather a single category.

## **D2** Power and territory: the politics of landscapes

### **Energy landscape as a political entity: Farmers' practices around wind power in Northern Friesland**

**Edith Chezel; Olivier Labussière;** Laboratoire PACTE Territoires; Geography; Grenoble; France

*Keywords:* wind energy; farmer; Northern Friesland; governance; sociotechnical

Northern Friesland is a rural Kreis of Schleswig-Holstein at the frontier between Germany and Denmark on the coast of the North Sea. From the early 90's until today, 800 windmills have been built among 'wind citizen parks' – Bürgerwindpark in German, which means they belong to Frisian people. This presentation aims at exploring the dimensions of this energy landscape by studying the emergence of a specific wind power governance, its connections to local culture and heritage and its resonance in other governance scales.

We approach energy landscapes through the lens of the uses and the sociotechnical collectives (Callon, Chouquer) as the construction of a taskscape (Ingold). Empirically, we follow the development of wind power projects by farmers and the adjustment of their agricultural activity and practices in this area; we also study the history of wind power technology, its sociotechnical networks and its spatial diffusion between Denmark and Germany. We try to understand how transmission of know-how, technical choices, discourses and debates in the assembly of citizens associated in a Bürgerwindpark influence the perception and the construction of the Frisian energy landscape. This study is based on three fieldwork sessions (2014, 2015) within a PhD work, still ongoing.

We would like to discuss how cultural heritage are possibly updated in the energy projects, in terms of social organization, wield of power and spatial distribution, and by extension, how it may give new existence to the notion of Landscape as a polity used in the Jutland Region in the XVIth (Olwig). With this heritage in mind we should question the different collective dimensions in farmer's solidarities around wind power (investment, technological appropriation, project extension and repowering, local development) and try to understand how decisions are discussed and made in this local and private assemblies parallel to public policy development at Land, national and European levels.

### **Energy landscapes in traditional Alpine mining regions – examples from Austria and Bavaria**

**Oliver Bender; Andreas Haller;** Austrian Academy of Sciences; Institute for Interdisciplinary Mountain Research; Innsbruck; Austria

*Keywords:* traditional energy landscapes; regenerative energies; settlement structure; landscape change; Eastern Alps

Since prehistoric times, and more intensely since the Late Middle Ages, mineral resources, especially salt, iron and silver, have been extracted and processed in large parts of the Eastern Alps. These economic activities ensured great wealth and power for entrepreneurs like the Fugger family in Schwaz and particularly for the sovereigns of the Alpine territories. The increase of mineral extraction was greatly helped by the development of two dedicated areas for the production of (wood) energy and for the supply of agrarian produce for the workers. This kind of spatial planning profoundly influenced land use, settlement and even social structures in the Eastern Alps. Moreover, the balance of interests between the sovereign territories produced cross-border economic (production) areas, especially with the permanent assignment of the Salzburg, later Hapsburg Saalforsten (woodlands) to Bavaria, codified in the first European treaty.

Based on the methods of historical geography, especially on the analysis of archival sources and land use remnants in the field, the paper investigates in a historic-genetic perspective how these Eastern Alpine 'energy landscapes' developed – and how they were later profoundly modified in the wake of declining



mining activities and a shift from firewood transported on the waterways to hydroelectric power as a source of energy.

On the basis of a qualitative content analysis of newspaper articles (Tiroler Tageszeitung), this paper explores

- the role of energy production (biomass energy: wood; hydroelectric energy) in this area today,
- which actors are defending their own economic interests,
- and how the relative discourses are conducted.

These analyses should help to better understand the developments mentioned above and support the assumption that while energy production profoundly shaped the Eastern Alpine settlement landscape in former times, nowadays it is the settlement structure which shapes the energy sector in this area.

## **Wind-energy in forests: Power, resistance and the transformation of energy production and landscapes in German regions**

**Ricardo Kaufer**; Georg-August-University Göttingen; Chair of forest and nature conservation policy; Göttingen; Germany

*Keywords:* policy sectors; political economy of wind-energy production; policy integration; power resources; conflicts

Energy production transformation policies in Germany are a consensus mode of public policy making. From a politico-economic perspective those policies aim at reorganizing the energetic basis of the industrial metabolism and are a strategy to reduce energy imports. Additionally these energy production transformation policies shall mitigate climate change effects. These three objectives, especially the climate change mitigation argument, constitute the acceptance of and the consensus on energy production transformation policies in Germany. Nevertheless this consensus, strategically used by certain trade associations, energy companies, environmentalists, is fading away when it comes to implementation. Therefore power relations and conflicts over land use and landscape transformation patterns are central. Looking at the landscape and local level the quantity of conflicts and struggles over the development of wind-energy production in forests is increasing. An analysis shows that increasing conflicts follow from the mode of implementation of the reformed industrial metabolism and its criticism. Regionally action groups fight against the industrialization of landscapes. It is articulated as one of the central arguments against the consensus on the transformation of energy production. The sustainability of the development of wind-energy production in forests is denied due to biodiversity, human health and landscape conservation reasons. The development of wind-energy in forests contrarily is pushed forward in several densely wooded regions by state agencies and consequently is confronted with traditional models of forestry and with landscape and ecosystem conservation objectives. Analysing several regional conflicts on the development of wind-energy in forests in German regions indicates the involvement of actors, their interests toward landscape conservation and energy production transformation and the power resources at the disposal of involved actors.

## **D3 The power of arguments, discourses and societal viewpoints**

### **Reimagining rivers: Restoring American power by dam removals**

**Enrique Lanz Oca**; Hunter College, City University of New York (CUNY); Geography; New York; United States

*Keywords:* dam removals and ecological restoration

In the 1840s, Lowell, Massachusetts became the first industrial concentration in the U.S.A. when its hydropower system was installed. But it was Hoover Dam, built in the 1930s, that signalled the beginning of a massive transformation of the nation's river landscapes. F. D. Roosevelt envisioned Hoover Dam as a modern and nationalist symbol with which America could control nature, overcome its enemies, and propel the economy out of a depression. By the time that the Glen Canyon Dam was built thirty years later, public support of dams had begun to fall. Nowadays, dams are removed in a similar public spirit in which they were once built. 72 dams were demolished in United States just in 2014. The Elwha Project in Washington State is the largest dam removal in history, and may spur other demolitions of big dams such as the Klamath River dams in Oregon state. Although many dams will remain, I demonstrate that dam removals, once unthinkable, are part of a new transformation of the American landscape. Based on interviews, primary and secondary sources, and direct observation, this paper traces the rise of new ways of thinking about nature that accompanies the rise of "ecological restorations" such as the Elwha River. Restoring the river will take decades. Corporatism, however, is a short-term process. I show how federal and corporate discourse surrounding this project is shaped to convince the public that the only requirement needed to restore the river is to implement the short-term project of tearing down the dams, camouflaging the necessity of an increased financial investment in long-term tasks such as the restoration of the habitat and salmon. By making dam removal synonymous with habitat restoration, federal and corporate interests more easily justify spending the majority of the budget on short-term processes that are, not coincidentally, controlled by them.

## **Power in energy landscapes: Local discourses in disputes over wind turbines**

**Andrea Bues;** Leibniz-Institute for Regional Development and Structural Planning; Institutional Change and Regional Public Goods; Erkner; Germany

*Keywords:* wind energy; power; discourse; Ontario; Brandenburg

In order to respond to climate change and boost local economies, many countries around the world aim at increasing their share in renewable energies. These are especially visible in rural areas where solar panels, bioenergy plants and wind turbines are installed. In some areas, this development of renewable energy landscapes has, however, met with strong local opposition, and especially wind turbines have spurred protest against changing landscapes in the context of energy transitions. While there has been a lot of research on the reasons and underlying factors of opposition to wind turbines, relatively little research has focused on the power dimension of these disputes. Yet, power is an important determinant of how the decision-making and planning process of wind turbine siting is perceived and thus to which extent renewable energy landscapes meet local opposition or approval. The paper therefore aims at clarifying the role of power in disputes over wind turbines as one important constituent of renewable energy landscapes. The paper will first conceptualise 'power' with recourse to Argumentative Discourse Analysis and Power in Planning. Furthermore, the paper will present preliminary findings from case studies of wind turbine opposition in the Canadian Province of Ontario and the East-German federal state of Brandenburg. Both jurisdictions are frontrunners in wind energy development, but have experienced strong local opposition to further sitings. This comparative study design will contribute to revealing the extent to which power shapes negotiation processes over renewable energy landscapes and the role of discursive framings and strategies therein.

## **Successful processes for determining wind energy priority areas: What are the key factors?**

**Georg Philipp Mueller; Anna M. Hersperger; Felix Kienast;** Swiss Federal Institute for Snow, Forest, and Landscape Research WSL; Landscape Ecology Group; Birmensdorf; Switzerland

*Keywords:* planning evaluation; land use conflicts; energy policy; participation; Switzerland

The new federal energy law requires all Swiss cantons (state level) to evaluate their potential for wind energy and designate so-called priority areas for wind energy within the cantonal comprehensive plans. These priority areas are intended to establish a reliable framework for the planning and construction of wind turbines. The planning processes to designate such priority areas vary considerably among cantons. Differences exist specifically regarding criteria applied to assess technical feasibility and landscape protection values as well as regarding the degree of public participation and stakeholder involvement. Furthermore, processes are influenced by the significance of wind energy in the cantonal energy policy agenda, public opinion and potentials of other renewable energies such as hydropower. The aim of this research is to identify factors that positively or negatively influence the designation of priority areas for wind energy.

The Swiss Federal Research Institute WSL spatially modeled the potential conflicts between the production of energy by wind turbines and various landscape services such as landscape aesthetics, tourism, drinking water production and habitats for Switzerland. With the resulting maps, our paper evaluates the designated priority areas for three cantons. The analysis is conducted for the designated priority areas and areas that during the evaluation process have been taken into account but then have been rejected. The aim of the comparison is a matrix, which summarises which areas are considered suited (or unsuited) by both, the WSL-model and canton (“congruent”) or where the assessments disagree (“divergent”).

To verify the GIS-based assessment and understand the cantonal planning procedure and decision-making, the results are discussed with experts from cantonal planning authorities. The results of this study are expected to improve to identify priority areas on a regional scale.

## **Energy transition – of course, but no side effects, please! The contrariness of society’s relation to renewable energies**

**Stefan Heiland, Bernd Demuth;** TU Berlin; Fachgebiet Landschaftsplanung und Landschaftsentwicklung; Berlin; Germany

**Rainer Luick ; Dimitri Vedel;** Hochschule für Forstwirtschaft Rottenburg; FB Landschaftsmanagement und Regionalwirtschaft; Rottenburg; Germany

*Keywords: energy transition and consumption; landscape changes and conservation; communication strategies; acceptance, perceptions, attitudes and behaviours; public debate*

The relationship of our society to expanding “energy landscapes” and renewable energies is contradictory: On one hand, renewable energies are principally accepted and welcome. On the other hand, they are often being rejected in one’s own neighbourhood, e.g. because they are regarded as impairing the landscape. At the same time, lifestyles causing high energy consumption have not being changed during the last decades, but still seem to be highly attractive. “Energy transition – of course, but not in a way which could affect me personally” seems to be the message. But an ongoing high consumption of energy, the phase-out of fossil energy sources and nuclear power inevitably require an increasing demand for renewable energies, which leads to major landscape changes. Consequently the renunciation of fossil energy sources and nuclear power, the maintenance of familiar sceneries and landscapes as well as energy intensive lifestyles cannot be realised at the same time, but are competing goals. That this fact is barely broached in the public debate reflects the schizophrenia of societal and individual behaviour that hinders the dissolving of these contradictions.

The talk addresses these contradictions, their causes as well as potential solutions – in particular by means of communication strategies to promote a wider public debate on the issue. It is based on results of the project “Energy transition between policy objectives, societal acceptance and nature conservation needs” funded by the German Federal Agency for Nature Conservation. This project aims to gain higher acceptance of a nature and landscape friendly energy transition and to raise societal awareness for the crucial role that the reduction of energy consumption plays for that aim. The project includes experts of different disciplines (nature conservation, energy supply, communication, psychology, planning) to give consideration to the different features of the matter.

## **D4** The power of socio-materiality: Assemblages and societal relations to nature

### Energy landscaping in Third Modernity

**Cordula Kropp**; Munich University of Applied Sciences (HM); Fakultät für angewandte Sozialwissenschaften; München; Germany

*Keywords:* legitimating patterns; regime of innovation; post-political energy landscaping; Third Modernity

Landscapes have been described for long as hybrid things, as transforming networks aligning agents, materialities and discourses (Cronon 1996, Olwig 1996, Shama 1996, Gailing & Leibenath 2013, Kropp 2005, 2015). Their appearance is partly the result of unplanned but connected everyday actions – routines of the usage of the ways, of cultivation, development and of economical exploitation. Partly it is the result of specific designs, which follow cultural models, technical and scientific standards, societal choices and increasingly ecological criteria. But what if all general points of reference – routines and criteria – erode and institutional mechanisms for legitimate decision making are missing? This is how today's energy landscapes come into existence, to some extent as "politics of unsustainability" (Blühdorn 2014). On the basis of a BMBF-funded survey among decision-makers in the Bavarian multilevel governance system in 2014, the paper analyses legitimating patterns for the current energy landscaping beyond uncontested criteria (Böschen et al 2014): In which ways are changes in energy landscapes established and justified? Which significance have (contradictory) visions, functional constraints of institutional settings and what is the role of the social production of space (Lefebvre 1991)? Sectoral rationalities and the "regime of economics of technoscientific promises" (Joly et al. 2010, cf. Müllers/ Zachmann 2012) will be highlighted as powerful factors in energy landscaping compared to rather marginalised societal viewpoints, which will at least be identified (Hajer 2011, Kost 2013). Thus, the paper moves between the issues of perception and power.

### Societal relations to nature – power structures in planning for sustainable development in the energy transition

**Sebastian Heilmann**; Leuphana University of Lüneburg – Faculty Sustainability; Institute of Sustainability Governance (INSUGO); Lüneburg; Germany

*Keywords:* sustainability; spatial planning; social ecology; political ecology

Even in Germany – which is considered to be a "showcase" for the energy transition – only 25 percent of the electricity mix is being produced by renewable energy sources. Seen in this light the first 25 percent seem to have been a "simple" undertaking. Especially considering the upcoming transformations of the landscape(s) and the infrastructure(s) that the next 75 percent will bring about.

Alongside the emergence of community networks so called "energy regions" appeared and soon dominated the informal political debate in German municipalities. The role of these "new" informal institutions has not been researched a lot thus far. There is even political debate about "energy regions" playing a big role in democratising the energy transition.

While most research on the energy transition focuses on possible technological innovations, there have been studies on governance concerned with the roles of different actors, but with rather limited research perspectives on for example either regional value added or landscape design. The question that is being asked in this paper is what roles which actors play in changing and redistributing power structures that define the future of energy landscapes and energy infrastructures. This question is challenged by the hypothesis that under certain conditions "energy regions" might make major contributions to a more democratised and sustainable regional development.

In order to analyse these conditions a conceptual framework is suggested. The framework combines approaches of societal relations to nature and regulation theory in a political ecology perspective. The methodological approach is a “dynamic spatial model”. The model uses four quadrants that define space and the interactions over time: Using the model it becomes possible to relate divergent interests and objectives to each other: (I) material form, (II) normative regulation, (III) social action, and (IV) cultural expressions.

## **The co-production of energy landscapes in urban settings**

**Vanesa Castan Broto**; University College London, UCL; Bartlett Development Planning Unit; London; United Kingdom

*Keywords:* energy landscape; socio-technical perspectives; urban; city

Energy is embedded in the lives of people living in cities around the world. Accounts that look at urban energy systems as easily described in relation to the provision of fuel for different standard uses overlook the wide heterogeneity of spatial and temporal patterns of energy use in cities. Thinking of energy as embedded in specific urban infrastructure landscapes – or energy landscapes – is a strategy to understand how socio-energetic relations materialise in specific urban settings. Urban energy landscapes emerge both in relation to a set of perceptions about what is good energy and how it should be used and in relation to consolidated relationships of power that shape the city's infrastructure provision. Using qualitative research in two cities – Bangalore and Maputo – this paper explores how perceptions of energy landscapes are embedded in material relations, how they interfere with the dynamics of development and how they can be challenged through processes of participatory planning. In Maputo, the paradigm of universal electrification has led to the extension of networks through the city, but the network remains contiguous to a vibrant local economy around charcoal for cooking, which is embedded in particular ways of understanding housing, and community life. The city is thus divided between a modern nucleus that charcoal does not penetrate and a series of peripheral settlements where it remains a key socio-economic element. In Bangalore, the energy landscape is shaped both by its long history as the first Asian city to have electricity and its rapid integration in the global economy with the growth of offshoring and the IT industry. Precarious energy systems co-exist with modern facilities in home-based industries, the multiplication of connections in local markets and the lack of services in informal settlements, but these are invisible to a large amount of the population who emphasises the modernity of the city and its investments on renewable technology.

## **D5 Power resources in landscapes**

### **Energy landscape versus landscape of intensive agriculture – the case of the ‘bioenergy region Südoldenburg’**

**Kim Philip Schumacher**; University of Vechta; ISPA; Vechta; Germany

*Keywords:* biogas; conflicts; development path; agribusiness; Germany

The paper discusses the special case of the ‘bioenergy Region Suedoldenburg’ in north-western Germany. The region is characterised by a high degree of vertical and horizontal integration of the agribusiness and food production and is Germany's centre of livestock farming and meat production. Recently the regional development path has been challenged by the unprecedented development of by now 146 rather large (>500kW) biogas-plants with a capacity of 55 MW in the period 2004-2011. This has far reaching and disputed impacts on the landscape and the regional and extra-regional linkages for the supply of feedstuff as well as a considerable increase in the amount of manure, which has to be exported to avoid over

fertilization. The region successfully applied to become one of the 21 'bioenergy regions' in Germany in 2009 and again in 2012. From the beginning it was not necessary to promote the expansion of biogas production in the region. In contrast the arising conflicts between biogas production and livestock farming and its actors (farmers, associations, agribusiness, administration and politics) soon became evident. The aim of the project 'bioenergy region' was from the beginning to create acceptance and a positive image of biogas production. Nevertheless the focus shifted continuously away from energy production and its regional added value towards technical solutions and political activities to solve the problem of the regional surplus of manure by using the concept and the project of the 'bioenergy region' and its politically renowned (regionally and within the federal state) actors. The paper uses empirical findings and observations from the participation within the project in the period 2012-2015 to depict the interests and power relations of different actors within the project and the region. It discusses the regional struggle about the challenges that the formation of an energy landscapes imposes on the landscape of intensive agriculture.

## **Landscape justice: Land reform, fair and responsible governance, and the historic environment practitioner**

**Chris Dalglish; Kenny Brophy** ; University of Glasgow; Archaeology; Glasgow, United Kingdom  
**Alan Leslie; Gavin MacGregor**; Northlight Heritage; Glasgow; United Kingdom

*Keywords:* land reform; landscape justice; heritage

Energy landscapes are shaped by relationships of power. Power over the landscape takes many forms, and land ownership is a particularly important one. In Scotland, a sense of injustice in relation to the land runs through the public consciousness and is shaping the political agenda. In 2015, the Scottish Government will bring forward a Land Reform Bill, seeking to create a legislative framework which builds on other recent measures to empower communities, transform land ownership and deliver greater landscape justice.

Unsurprisingly, these developments have provoked a range of vociferous and polarised responses. Opponents claim that the reforms are 'a Big Brother-style land grab' and will sweep away centuries of accumulated expertise in landscape management, undermine the contributions large estates make to the economy, and the environmental benefits accruing from their stewardship of 'wild' land.

Supporters of change have attacked the status quo, citing the statistic that half of Scotland is owned by only 432 landowners (= 0.00008% of the population) in, it has been argued, the most concentrated, inequitable, unreformed and undemocratic ownership system in the developed world. This situation has deep historical roots; it has been sustained by the political and economic dominance of a small landed elite. Scotland's landscapes – not least its energy landscapes – are still being shaped by this inheritance, but we are also witnessing unprecedented action to transform deeply-rooted imbalances of power.

Historic environment practitioners have a potentially significant role in the debate, in drawing out the historical roots of the situation, assessing the basis of historic claims of right and analyzing the baseline conditions which will support the design of a fair and responsible model for future landscape governance. This paper will explore the challenges and opportunities presented by this momentous time of change for historic environment practice.

## **Agrofuels on their way to displacing alternative rural livelihoods: Case studies from Brazil**

**Martina Neuburger; Rafaela Rau; Sarah Dittmer; Marcel Langer**; University of Hamburg; Institute of Geography; Hamburg; Germany

*Keywords:* energy crops; land grabbing; small holder families; quilombos; Brazil

The increasing global energy consumption as well as the worldwide discourse on renewable energy encourages the Brazilian government to promote the expansion of sugar cane and ethanol production in the country. The cultivation of sugar cane has a long tradition in Brazil with its introduction in colonial times.

Since then it is characterised by large scale plantations and precarious working conditions. While in the 1970s the Brazilian government subsidised the ethanol production to substitute increasingly expensive oil imports, the so called ProÁlcool Program from these years was revitalised to reduce CO<sub>2</sub> emissions and to cover the increasing demand of agrofuels on the world market. Furthermore, eucalyptus plantations expand with financial support via the CDM mechanism of the Kyoto Protocol. Thus, energy crops such as sugar cane and eucalyptus hold great shares of agro-industrial production in Brazil. Within the last two decades sugar cane and eucalyptus plantations have been expanding in the South Eastern region. They occupy the ecologically most suitable farm land with plane surfaces for mechanization, fertile soils and access to water courses. In this process land grabbing practices displace traditional communities such as indigenous people and quilombos (ancient slave communities) or small holder families from their territories and deprive them of their livelihoods.

In our case studies we analyse the processes of displacement of alternative rural livelihoods by sugar cane expansion in the region of Pompéu (Minas Gerais) by working out underlying power relations – which are mostly embedded in Brazil’s colonial history – between the relevant actors as well as shifting property rights on land and water. Furthermore we demonstrate the dominance of development and climate change discourses that legitimise the violation of traditional property rights and negate alternative development models.

## **Poverty-induced energy landscapes and their ecological and socio-economic consequences: Case study Burundi**

**Heidi Elisabeth Megerle;** Hochschule für Forstwirtschaft Rottenburg am Neckar; Angewandte Geographie und Planung; Rottenburg am Neckar; Germany

*Keywords: poverty-induced energy landscape Burundi; deforestation; soil erosion; water scarcity; vulnerability*

Burundi, one of the least developed countries, shows serious development problems despite generally favorable environmental conditions. They are attributed to historical events (long lasting civil war), a very high population growth (over 3%) and a very low level of education. Furthermore the uneven distribution of wealth as well as political power and influence plays a decisive role concerning the development deficits, but also the emergence of a type of energy landscape typical for the poorest and most fragile states.

Initially almost entirely covered by a dense mountain rain forest, Burundi has now a remnant forest share of just over 4% and was characterized as “World Champion of deforestation” by FAO. The largely deforested hills form today a typical example of a poverty-induced energy landscape, as wood is virtually the only energy source, especially for nearly 70% of the population living below the poverty line.

The ecological consequences of this deforestation in a country with steep slopes (Rift Valley) and heavy tropical rainfall are soil erosion up to total degradation of the bedrock horizon in combination with landslides and flood damages in the lowlands. As groundwater recharge is reduced, water scarcity increases and the situation will worsen in the context of climate change. Water scarcity and the loss of much needed farmland aggravate the living conditions of the poor and intensify their vulnerability against natural disasters as well as economic turbulences (socio-economic consequences). In combination with the rapidly growing population the share of poverty induced energy landscapes increases uninterrupted.

The interplay between this form of energy landscape and the political and economic power in a fragile country like Burundi will be discussed, based on an on-going field-research. Emphasis will be placed on the situation of the most vulnerable population groups as well as on national and international power structures influencing the further development.





# Special Session COST Action RELY

## Special Session COST Action TU1401: Renewable energy and landscape quality (RELY)

**Michael Roth;** Nuertingen-Geislingen University; School of Landscape Architecture, Environmental and Urban Planning; Nuertingen; Germany

*Keywords:* *European research network, landscape impacts, participation; COST Action TU 1401; RELY*

In this special session, we will present the pan-European research network from the COST Action TU1401 entitled “Renewable Energy and Landscape Quality” (RELY). This COST action, which runs from 2014 to 2018 currently has more than 100 individual participants from more than 30 countries. The Action investigates the inter-relationships between renewable energy production and landscape quality, and the role of public participation for the acceptance of renewable energy systems. The Action aims at developing a better understanding of how landscape protection and management, and renewable energy deployment can be reconciled to contribute socio-environmentally to the sustainable transformation of energy systems. This Action will consolidate and extend knowledge from a pan-European perspective using a modular methodological framework. This Action will enhance the science base for decision-making, and develop guidelines for public participation in planning renewable energy systems. The potential of sustainable landscape development, with innovative land uses producing synergies for landscape quality and renewable energy, will be revealed.

In the special session, the COST Action chair and the four Working Group chairs will present their approach and initial findings. The COST networking instrument of Short Term Scientific Missions (STSM) will also be presented. After the initial presentations, a roundtable will take place to answer the session’s participants’ questions and further discuss the COST Action approach in the context of the conference theme. As COST Actions are open frameworks, and additional participants are welcome to join, an outlook on future activities within the COST Action will be given.

## Renewable energy development and landscape quality change in Europe

**Marina Frolova;** University of Granada; Physical and Regional Geography; Granada; Spain

**Csaba Centeri;** Szent Istvan University; Geography; Godollo; Hungary

*Keywords:* *renewable energy development; landscape; landscape change; landscape quality; Europe; COST Action TU 1401; RELY*

Over last two decades many European countries have adopted and implemented policy frameworks in order to initiate a transition towards more sustainable energy systems. At the same time, renewable energy infrastructures have spread through rural areas of European countries, transforming their landscapes. The energy transition is based on different kinds of renewable energy such as wind power, hydropower, solar PV and thermoelectric power, biomass, biogas, geothermal energy etc. Each form of energy transforms the landscape in its own specific ways. In addition to the type of renewable energy, the impact on landscape quality also varies depending on the national context and scale of development and the methods used. Our paper presents the first results of on-going research of the Working Group One of the COST Action TU1401 Renewable Energy and Landscape Quality (RELY). The research presented in this paper is

exploratory in nature and based on review of empirical research of different European countries on impacts of different kinds of renewables on landscape quality. By analysing this newly generated, extensive, international and interdisciplinary database and knowledge pool, a new level of understanding can be generated. The general scope of landscape change, quality and dynamics will be taken into account, allowing the research approach to provide “future-proof” findings, by presenting a systematic review of the nexus between renewable energy production systems and Europe’s landscapes and by providing a pan-European documentation and synopsis of landscape quality and character assessment methods. Landscape is considered in this paper not only a living, economic, ecological, social, cultural and recreation space, but also a cultural heritage which includes the different dimensions of local identity and memory.

## **Assessing the potential and sensitivity of landscape functions and qualities for development of specific renewable energy production systems**

**Bohumil Frantál**; Institute of Geonics, Academy of Sciences of the Czech Republic; Department of Environmental Geography; Brno; Czech Republic

**Dan van der Horst**; University of Edinburgh; Geography; Edinburgh; United Kingdom

*Keywords:* landscape sensitivity; landscape quality; best practices; COST Action TU 1401; RELY

The general aim of the ongoing COST Action ‘Renewable Energy and Landscape Quality (RELY) is to investigate the inter-relationships between renewable energy production and landscape quality, and the role of public participation for the acceptance of renewable energy systems. The aim of the Working Group 2 (WG2) is to conduct an analysis of risks and potentials for landscape functions and qualities affected by renewable energies, and an analysis of the specific landscape functions’ and qualities’ vulnerability to specific renewable energy production systems. As a basis for the development and later validation of the participation toolkit, strategic case studies in nationally funded projects will be used, with external observation, analysis and documentation and charrette-like participation workshops. Based on the work of WG2, three outcomes are expected, including: (i) a typology of best practices of sustainable, landscape compatible renewable energy production systems, (ii) guidance for assessing the potential of areas for specific renewable energy systems in terms of effects on landscape quality/character, (iii) a catalogue of relevant criteria, indicators and respective GIS-available proxy-data for assessing the suitability of landscapes for renewable energy systems. Taking into account current policy developments such as the European Commission’s proposal for the revisions of the Environmental Impact Assessment (EIA) Directive, the suitability for EIA, Strategic Environmental Assessment (SEA) and other planning instruments, commonly used in European Union countries will be the focus of this research activity.

## **How to meet landscape-related concerns towards local renewable energy projects?**

**Matthias Buchecker**; Swiss Federal Research Institute WSL; Department of Economics and Social Sciences; Birmensdorf; Switzerland

**Dina Stober**; University of Josip Juraj Strossmayer; Faculty of Civil Engineering, Department of Architecture and Urban Planning; Osijek; Croatia

*Keywords:* Landscape, renewable energy, public participation, public support for renewable energy, place-based landscape concerns

Recent research literature clearly shows that there is a general support in the European public for renewable energies, but that the local implementation of renewable energy systems increasingly meets local opposition. Thereby, concerns regarding landscape impacts play a key role. In our working group of the COST Action RELY, we focus on local and place-based mechanisms of these concerns. In particular, we aim to increase the understanding of socio-cultural factors for these landscape related concerns and to suggest participatory tools that help to address and meet these concerns. To achieve this goal, we plan to

a) explore the reasons for landscape-related concerns towards renewable energy systems in different socio-cultural contexts in Europe using shared methodological approaches, and b) conduct an inventory of innovative practices of involving the local public in the planning of renewable energy systems. In the paper, the conceptual framework of our approach and first ideas of the planned procedure will be presented and discussed.

## **Short presentation of Working Group 4's synthesis of findings and dissemination**

**Malgorzata Kowalczyk**; Institute of Spatial Management and Housing; Urban Development; Warsaw; Poland

**Alexandra Kruse**; Institute for Research on European Agricultural Landscapes; EUCALAND; Overath; Germany

*Keywords: multilingual landscape glossary; transborder scientific-public participation; research dissemination; COST Action TU 1401; RELY*

The Working Group 4 (WG4) provides an input to the research carried out by the other three WG by preparing and providing communication channels within RELY project.

The goals of WG 4 are: 1) to set up and maintain RELY's website and assure communication among members, 2) to establish and constantly maintain a multilingual glossary for scientific collaboration and trans-border public participation, and 3) to synthesise findings and disseminate results of the project to the target groups.

WG 4 has started work at the kick-off meeting in Brussels (Oct. 2014), where WG 4 has set the general tasks which are related to the first main goal of the WG4, which are: i) to set up the A4 form for the V-card, and ii) to collect V - Cards: Photo, ESR, MC-member/substitutes, WG, logos and links of the participating institutions. Then WG 4 with the Chair of the RELY Action, has opened a competition for a project logo (RELY). The logo combines different types of renewable energies and landscape. The milestone of this task was to set up the homepage with a databank behind – with a public and an internal part, a database for several purposes, and other content. The site is open to all partners to contribute, always with date, location, author, copyright, explanation if possible, possibly with translation, an interactive map with the partner countries, where the projects, best practice examples, case studies can be added in the project's lifetime. Last but not least the homepage will also contain short personal presentations of each partner. Regarding the second and third main goals WG 4 will continue and complete the Multilingual Glossary on Landscapes which is one result out of the EUCALAND project (Kruse A., et al). The glossary will provide a basis for the collaboration across multiple disciplines, nationalities and knowledge levels. WG4 will also provide an English template for posters and presentations. The final point of WG4 work is to prepare final book of RELY project's findings.

## **RELY – short term scientific missions**

**Serge Schmitz**; University of Liege; Geography; Liège; Belgium

*Keywords: landscape; renewable energy; participation; COST Action TU 1401; RELY*

The COST Action TU1401 'Renewable Energy and Landscape Quality' ('RELY') encourages Short Term Scientific Missions (STSMs). This Action investigates "the inter-relationships between renewable energy production and landscape quality, and the role of public participation for the acceptance of renewable energy systems". STSMs are exchange visits from five working days until three months that are aiming to strengthen the existing networks by allowing individual scientists to go to an institution or laboratory in other COST country to foster collaboration and contribute to the scientific objectives of the COST Action. Each year of the COST Action TU1401, there are up to six STSMs to be awarded. The financial support is a contribution to the costs of a STSM. A grant (maximum 2500€ depending on the duration of the stay) covers

travel and subsistence. We invite researchers, especially early stage researchers, to participate in a STSM. The selection of STSM applicants is based on the scientific scope of the STSM application that must be in line with the Cost Action TU1401 objectives. This short communication aims to inform of the next calls and presents the result of the 2015 call.