



Spatial Planning & Energy

A guide for planners

www.special-eu.org

The SPECIAL Project

SPECIAL (Spatial Planning and Energy for Communities in All Landscapes) is a three year project, running from March 2013 to March 2016 and funded by Intelligent Energy Europe (IEE). It consists of a partnership of eight town planning associations (TPAs) in Europe and engages a wider network of planners across Europe through the European Council of Town Planners (ECTP-CEU).

Spatial planners play a key role in developing energy strategies and the SPECIAL project was established with the aim of bridging the gap between energy action planning and spatial and urban planning. This is set in the context of working towards the EU's 2020 climate change targets.

The SPECIAL project has collaborated with the ECTP-CEU to create this practical guide to energy and spatial planning. The ECTP-CEU has a unique and powerful network of town planning institutes across twenty two European countries. Its input has added its expertise and experience to help produce a guide that will help planners in the integration of spatial planning and energy across Europe.



Creating our futures

ECTP-CEU

European Council of Spatial Planners
Conseil européen des urbanistes

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Introduction to the Guide

Planners across Europe are at the forefront of the creation of a low carbon future. As the challenges of climate change increase, the dangers of flooding, extreme heat and drought are experienced more regularly across Europe. Spatial planning is the profession with the most powerful ability to co-ordinate the many things that need to be done to ensure that the physical environment mitigates the effects of climate change. It is often the most vulnerable in society who are most affected by climate change. Spatial planning provides a democratic process to reach decisions which, while not always popular, can help to safeguard the future of the planet and ensure that the well-being of the entire population is considered.

Planners need to have the right skills and knowledge to deal with the challenges presented by climate change. The case studies in this guide illustrate what can be achieved through an integrated and robust approach to spatial planning for energy. This pan-European guide for planners has been created to help planners achieve the skills which they will need to maximise their contribution towards a sustainable and low carbon environment.

SPECIAL partners visit the Nine Elms regeneration site during the London training week



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1.1 The role of planners and planning in delivering sustainable energy solutions

Spatial planning has a fundamental role in the implementation of successful and long term sustainable energy solutions. Across Europe, planning departments have a strategic position within local and regional government which can be used to achieve the European Union's 2020 targets for carbon emissions reduction and energy efficiency, and to increase energy generation from renewables.

Municipal planning departments should be involved in developing, planning for, and implementing sustainable energy solutions at the local and regional level, working in partnership with other municipal agencies and with local stakeholders.

1.2 The challenges for spatial planning and sustainable energy

This guide sets out the challenges and opportunities for spatial planning and energy. The goal when planning for sustainable energy should be for all buildings to be at least self-sufficient in renewable energy production, or even to generate an excess so that they can export some energy. Planners have a role to play in reducing the demand for fossil fuel energy and so reducing carbon emissions. Another key principle when planning for sustainable energy includes encouraging compactly built

cities and urban areas. This means good land utilisation but also requires striking a balance between density and quality. Well-planned, compact urban areas reduce the need for transport – and the energy this requires – and maximises the potential for cycling and walking.

In order to maximise the potential for solar power, individual buildings should be orientated so that they capture as much solar energy as possible. Energy consumption is likely to be improved in future through the use of smart technologies and innovations in architecture.

Strategic spatial planning provides an opportunity to create sustainable economic growth and social cohesion by promoting environmentally friendly and climate-resilient energy solutions.

1.3 Spatial scale

In order for spatial planning to help reduce the use of energy from non-renewable sources an approach has to be taken that is consistent across different spatial scales. Spatial planning policies are relevant to energy at both macro and micro levels. This guide includes recommendations that are relevant at all spatial scales, ranging from national and regional planning policies, to planning at town or local level.

Strategic spatial planning provides an opportunity to create sustainable economic growth and social cohesion

The recommendations should be considered in the context of what could be described as the local 'natural conditions' – the climate, geology, and geography. The effectiveness of each of the recommendations will vary depending on the local situation.

1.4 Objectives of this guide

The main objectives of this guide are to:

- Help planners understand their role in delivering a low carbon future.
- Set out the key principles for achieving renewable energy solutions.
- Make recommendations within each topic area for planners to focus on.
- Inspire planners with the work which has been carried out across Europe, and promoted through the SPECIAL project, to take a holistic approach towards sustainable energy solutions.
- Outline the competencies that planners require to integrate spatial planning and sustainable energy.

1.5 How to use this guide

This guide is a reference document, designed to be used together with other SPECIAL outcomes, including the Knowledge Pool on the website (www.special-eu.org), which presents the learning that has taken place in the project.

Following the introduction in Part 1, Part 2 explains the areas where planners can play the most active role in integrating spatial planning and energy in relation to ten specific themes. Each theme is illustrated by short case studies. The ten themes have been carefully selected as a result of the outcomes of the SPECIAL project and with close consultation with the ECTP.



Source: City of Hagen

One of the key messages of the guide is that energy and spatial planning is relevant at different geographical scales, although different approaches might need to be taken according to the scale.

1.6 Planning systems across Europe

Planning systems across Europe work in different ways, with various regulatory systems and responsibilities for energy. The challenge for the SPECIAL project has been to transfer learning across these different systems, to help each partner to create their own training modules to improve the competencies of town planners in energy.

One output of the project is a series of diagrams demonstrating the points of overlap and integration of spatial planning and energy policies in the different planning systems of partner countries. These diagrams are available as part of the Knowledge Pool on the SPECIAL website (<http://www.special-eu.org/knowledge-pool/module-2-spatial-planning-frameworks/policies-and-objectives/>).

PART 2

Integrating Energy into Spatial Planning

Part 2 of the guide focuses on ten thematic areas where planning and planners are integral to the successful delivery of long term sustainable energy solutions. These relate to the scale and location of development and address specific policy areas where planning policies have the potential to have a major impact in addressing energy issues.

1. Urban Structure
2. Masterplanning
3. Zero Carbon
4. Community
5. Preferred Sites
6. Energy Production
7. District Heating
8. Brownfield
9. Mobility
10. Green and Blue

1. Urban Structure

The structure, form and design of urban areas has a significant influence on both energy demand per person and the way that energy is used. Planning has a fundamental role to play in creating and supporting spatially appropriate energy solutions based on an understanding of settlement areas, land uses and the built environment.

OBJECTIVES:

- To identify opportunities for sustainable energy and energy efficiency linked to specific urban structure or land-use relationships.
- To inform decision-makers about opportunities for renewable energy with a strong evidence base and spatial understanding of energy demand and supply.
- To adopt an integrated approach to city-wide infrastructure that combines waste, energy generation, distribution and reduced energy demand from transport.
- Develop a spatial understanding of energy demand and consumption patterns in different urban structures.
- Develop an 'energy cadastre' to identify the capacity between demand and production.
- Assess the potential for solar and wind to affect temperatures, air quality and noise in parts of the city.
- Seek opportunities for geothermal solutions, such as underground; sewage; 'lost' energy from data centres.
- Recognise the differences between high and low density; commercial areas and administrative buildings; or inner city and rural hinterland.

RECOMMENDATIONS:

- Develop a robust spatial evidence base to identify the energy profile of existing land uses and energy character in the urban area.
- Adopt a compact urban form to achieve higher densities and reduced energy demand.

CASE STUDY

South Dublin Spatial Energy Demand Analysis for urban policy-making, Ireland

The role of planning and of planners

To facilitate the mapping and spatial interpretation of energy and planning information.

Translate a detailed evidence base into a suitable policy response based on an understanding of the urban structure and local energy profiles.

Make more informed policy decisions relating to energy efficiency and renewable solutions by working in partnership with the City Energy Agency (CODEMA), other local authority departments and local stakeholders.

The skills and competencies involved

Partnership working.

A spatial understanding of the county's settlement hierarchy, land uses and future proposed land uses and development areas.

To develop and understand the county's existing, and future, energy profiles based on spatial understanding of the local area.

To use the improved evidence base to make the case for sustainable energy solutions.

Overview

South Dublin County Council (SDCC) updated its county development plan energy planning policies and objectives based on an improved spatial understanding of the existing and future energy profiles of the urban area. This process can be outlined in three parts:

1. Developing the Spatial Energy Demand Analysis

The spatial energy demand analysis mapped energy information for the county and energy profiles for the commercial, residential and municipal sectors set out by the Covenant of Mayors and the SDCC Sustainable Energy Action Plan. This included energy demand, heat density and costs across the sectors and the county linked with zoned land availability, population-growth data, existing land use and housing targets.

2. Spatial characterisation of local energy issues

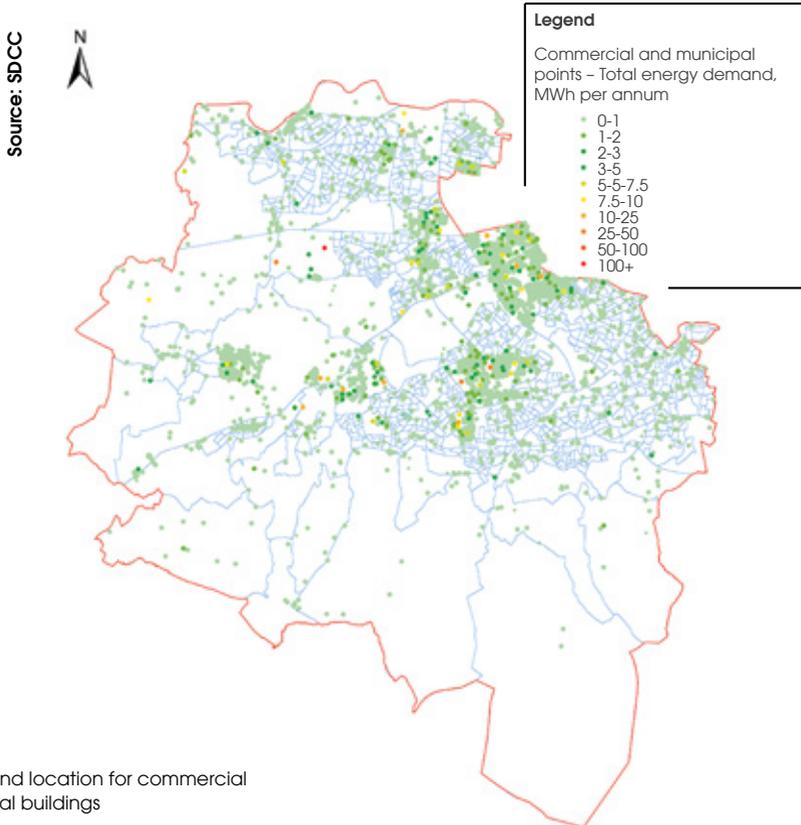
The robust evidence base was used to characterise spatially the energy issues that could be articulated at county development plan level, local area plans, and other locally based strategies. These 'energy character areas' highlight the different 'best-fit' energy solutions which may include energy efficiency, energy generation or retrofit to varying degrees.

Find out more: SPECIAL Expert Paper 2: Advancing evidence-based energy policy in Ireland
www.special-eu.org/assets/uploads/TCPA_SPECIAL_EP2.pdf

SPECIAL Knowledge Pool Module 3.2
www.special-eu.org/knowledge-pool

CASE STUDY

South Dublin Spatial Energy Demand Analysis for urban policy-making, Ireland



Energy use and location for commercial and municipal buildings

3. Integration into local policy documents

The case study demonstrates a spatial understanding of energy needs, energy efficiency opportunities and renewable energy generation potentials related to urban structure and land use which allowed SDCC to make the case for forward-thinking energy and planning policy in their review of the county development plan.

Form of sustainable energy

All technologies.

Mapping energy demand for a plan area can be used to forecast future energy requirements. The methods used by South Dublin provide an evidence base for both existing and future energy demand thereby allowing different spatial scenarios to be tested.

2. Masterplanning

Masterplanning presents a strategic large-scale opportunity to plan comprehensively for a new development, or for the regeneration of part of a city. In relation to sustainable energy, masterplanning is a useful tool to allow the full integration of climate change mitigation and adaptation objectives into the development of an area.

OBJECTIVES:

- To seize opportunities to plan for, design and implement sustainable energy systems at the initial planning phases of a development.
- To reduce the energy demand, and therefore the energy consumption, in the masterplan area.
- To involve the community in order to maximise the delivery of low-energy policies through lifestyle adaptation.
- Develop an energy concept to be integrated within the regional or local spatial development scheme.
- Define (regional) catchment areas for infrastructure and energy provision.
- Work with communities to achieve energy savings at local level.
- Engage the public by using participation techniques such as referenda, public hearings, surveys, negotiated rule-making, consensus conferences, citizens juries, citizen advisory committees, focus groups.

RECOMMENDATIONS:

- Start by setting up, within the municipality or local authority, a working group that ensures a joined-up approach.
- Get different groups of specialists to collaborate as this is crucial to a fully-integrated masterplan.
- Use masterplanning along with local plan policy and standards to secure wider and more joined-up benefits to surrounding areas, neighbourhoods and future development.
- Combine a sophisticated understanding of the local area with maximising the actions taken in the context of benefit to the wider community.
- Encourage getting the maximum benefit from solar power in new buildings by orientating them to achieve this.
- Include the modernisation of existing buildings to make the transition to passive house retrofit standards.

CASE STUDY ONE

Strategic masterplanning for low carbon energy solutions, Geneva, Switzerland

The role of planning and of planners

A strong and integrated planning and energy policy framework at all levels supported by cross-departmental understanding and resources.

Use of regional targets and policy obligations as a 'hook' for municipal masterplanning level.

To develop strong local policies that enable a detailed consideration of energy at the planning stage.

The skills and competencies involved

An understanding and consideration of energy at all scales – from the development plan to site scale.

Understanding of the processes of planning for sustainable energy.

Ability to suggest suitable renewable energy solutions for existing and new developments, or, for future expansion.

Ability to develop and use a robust evidence base to support planning for energy decisions.

Interdepartmental working and collaboration.

Overview

This example demonstrates masterplanning for regeneration and growth supported by spatial planning at all scales.

The Canton of Geneva has developed a method to scale-up energy opportunities, from site scale to area planning, through collaborative working between the energy and planning departments. Masterplans for regeneration and new development are informed by the evidence base for planning from the municipal plan. The masterplans incorporate a range of local energy opportunities, for example sustainable heating, solar potential, storage, and grid connection.

Taking this approach, small-scale energy opportunities highlighted at site level become embedded into a strategic masterplan supported by the expertise of the energy team. In this way the masterplan considers both planning and energy, and opportunities for existing and future residents.

Form of sustainable energy

All technologies.

An integrated regional network approach to combining energy planning with spatial planning in an urban region. It provides a practical example of planning for sustainable energy as a wider societal issue, rather than predominantly as an infrastructure and economic issue.

CASE STUDY TWO

Solar Masterplanning for new developments, Plymouth, UK

The role of planning and of planners

The planning department sought to find a way of combining measures for carbon emissions reductions with decision making on planning applications at the masterplanning stage.

Using references to low carbon in the National Planning Policy Framework and the local core strategy planning document as key policy drivers to support this work.

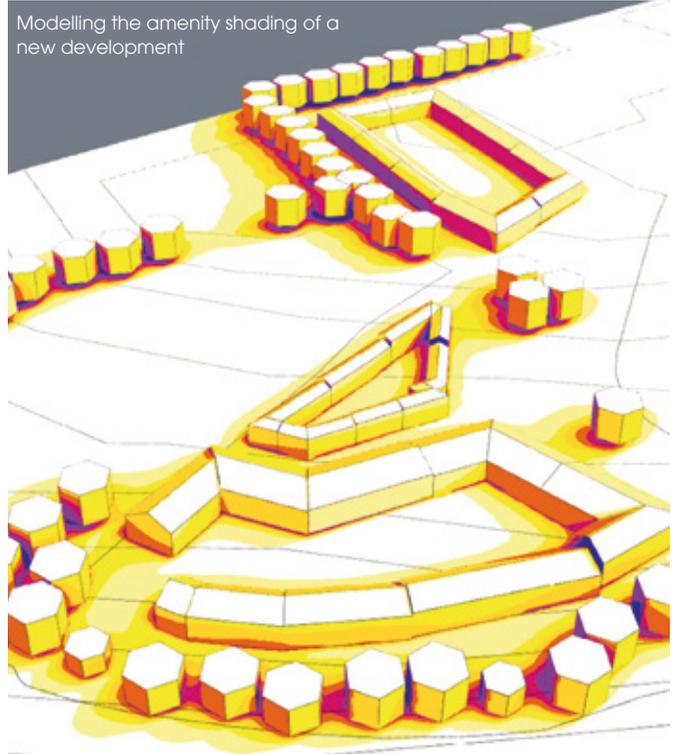
The skills and competencies involved

Using national and strategic policy objectives as 'hooks' to achieve carbon reduction and mitigation measures at the local level.

Understanding how the design, arrangement and orientation of a proposed scheme can affect carbon savings and potential for renewable energy generation.

Understanding that the orientation and layout of buildings for solar energy opportunities is a planning concern.

Modelling the amenity shading of a new development



Source: Brooks Development & Plymouth City Council

Overview

Plymouth City Council have commissioned a project to develop a method of planning for maximum solar optimisation on proposed development sites. Integrating design based measures for solar optimisation at the masterplanning stage can be used to embed carbon emissions reduction measures, or to include solar-power generation into new development proposals.

Form of sustainable energy

Solar thermal, solar PV, passive house design.

This case study highlights how solar optimisation can be maximised in a masterplan.

3. Zero Carbon

Spatial Planning can define standards for ‘low carbon’ and ‘zero carbon’ for both municipal and non-municipal buildings. The enforcement of standards through planning can be achieved through site-specific policy documents or through wider development planning documents.

OBJECTIVES:

- To define of zero and low carbon standards in planning policy documents for residential and non-residential buildings.
- To lead by example through the improvement of the municipal building stock, including social housing, towards zero carbon standards.
- To provide good examples of energy efficient retrofit for existing buildings.

RECOMMENDATIONS:

- Develop a clear, long-term policy narrative from regional, to city, to site scale about the benefits of aiming for zero carbon.
- Develop a strong vision to guide new development.
- Encourage and support active political leadership for low-carbon energy initiatives by understanding and supporting wider civil society groups and the public.

- Adopt ambitious targets supported by political commitment at local level.
- Plan new housing in distinct areas where strict building quality standards can be applied.
- Set standards and principles for ‘good energy design’.
- Plan new development areas with maximum natural ventilation.
- Seek to provide solar panels on all rooftops.
- Reduce the demand for space-heating energy by requiring fewer external walls.
- Use planning to encourage residents in new developments to change their lifestyles, for instance by facilitating low car ownership, or solar energy, heating systems that are in the planning pipeline, the local plan, or related to nearby demand.

CASE STUDY ONE

Hannover zero:e Park, Germany

The role of planning and of planners

When planning for energy the regional planning, climate protection and energy policies are all strongly integrated.

Regional planning works in accordance with the relevant municipalities to plan and grant permission for photovoltaic installations.

City planners work with the Climate Protection Unit on the conditions for solar installations and other energy issues.

Setting standards through an urban planning contract was crucial in setting the specific requirements necessary to achieve the zero-emissions target. The passive house standard sets out a range of requirements, including: a maximum primary heating requirement of 40kWh per square metre per year; usage guidance for home owners; and the obligation that additional energy for heating or household electricity should be supplied through renewable energy generation.

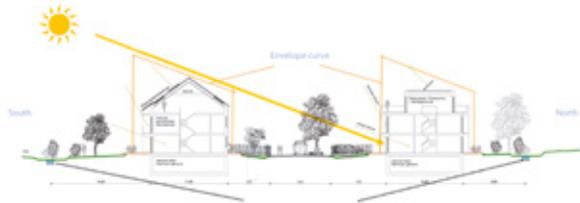
The skills and competencies involved

Expertise in regional planning and energy policy.

Expertise in engineering and architecture to ensure the delivery of the passive house standard.

Stakeholder and partnership working.

Solar optimised development in Hannover



Source: The LEAP Project

Overview

In 2002 it was decided that a zero-emissions housing estate would be developed to support Hannover's aim to reduce carbon emissions by 40 per cent by 2020. The project is part of the work of Climate Alliance Hannover 2020, an alliance of 80 partners. The city of Hannover worked with Meravis and NLG to deliver a long-term strategy in 2010 and these three partners oversee the implementation of the project. More than 300 houses have been built in the suburb of Wettbergen to the passive house standard, a highly efficient design with a significantly lower energy footprint than conventional housing.

Form of sustainable energy

Largely solar, with other sources of renewable energy used to meet additional energy requirements for the houses.

This case study demonstrates the success of Europe's largest zero-emissions housing development, as part of Germany's Energiewende (energy transformation). It is an exemplar for future large-scale passive housing projects and sets the standard for outcomes from urban land use planning.

4. Community

Community based energy production schemes are vital. As community involvement and participative democracy are core concepts in spatial planning, it is important to integrate community participation in all energy policy proposals.

OBJECTIVES:

- To consider the community to be the owner and beneficiary of energy production.
- To seek to increase community based energy production.
- To consult and engage with community stakeholders through a collaborative planning approach.
- The heat island effect results in energy demand for cooling particularly in cities. Good landscape planning can reduce this demand.
- Use some of the following participation techniques to ensure an integrated approach: referenda, public hearings/ inquiries, opinion surveys, negotiated rule making, consensus conference, citizens juries/ panels, citizen/public advisory committees, focus groups.

RECOMMENDATIONS:

- Work with communities to achieve community based energy production schemes.
- Integrate energy performance improvement of existing buildings in all urban regeneration schemes.
- Seek to adopt measures that combine increased energy efficiency with improved quality of the area.
- Work with communities to achieve energy savings at local level.
- Use energy as a theme to embed strong principles for environmental, social and economic drivers.

CASE STUDY ONE

Gwithian and Gwinear Neighbourhood Plan, Cornwall, UK

The role of planning and of planners

Recognising that neighbourhood planning groups can struggle to find the resources to develop proactive renewable energy policies which maximise the local benefits, the council's planning team developed a high-level toolkit which was made available to all communities across Cornwall. The toolkit consists of:

Advice and guidance on developing community-focused low carbon and renewable energy policies.

Cornwall-wide evidence base on landscape capacity (solar and wind).

Policy and guidance framework to promote community-ownership of renewable energy within planning.

Site allocation toolkit for wind turbines.

The skills and competencies involved

Knowledge of energy policy and ability to link to planning policy and legislation.

Technical knowledge of spatial constraints to renewable energy development.

Understanding of community ownership models and their relationship with the planning system.

Community engagement and consultation.

Think long term and translate into planning framework.

Consensus-building.

Community owned wind turbine in Cornwall, Ladock Parish



Source: Community Energy Plus

Overview

Led by the parish council, with support from Cornwall Council's planning team, the community of Gwithian and Gwinear in Cornwall prepared a neighbourhood plan for their area. Drawing on strong support for appropriately scaled and sited renewable energy projects within the community the plan contains technology-specific policies, including the identification of locations for wind turbines, and an overarching policy which promotes community-ownership of renewable energy projects. The policies build upon evidence and guidance developed for the whole of Cornwall by Cornwall Council.

Form of sustainable energy

Wind, solar and all technologies (community-led).

This represents an innovative example of how a community can plan to provide long term renewable and low-carbon energy generation in a way that maximises the benefits for the community.

CASE STUDY TWO

Gamlingay Eco Hub, Cambridgeshire, UK

The role of planning and of planners

Planning helped foster strong partnerships between delivery agencies, contractors and funders, which were essential for the completion of the Eco Hub.

The skills and competencies involved

Architects were appointed to undertake a feasibility study and consultation process.

The parish council managed the project.

Business management.

Understanding of renewable energy technologies and the benefits of different systems.

Ability to communicate technical expertise to community members.



The newly retrofitted Eco Hub

Overview

In 2003, a resident of the village of Gamlingay set up a community development charity called Forward Gamlingay to develop an energy-efficient building to expand local sport, youth, education and leisure facilities. The project resulted in the Eco Hub, a highly energy efficient community centre, now run profitably by the parish council. Funding was provided from various sources including the regional development agency, the Football Association and Coin Street Community Builders. In addition, £600,000 was borrowed on the basis that the centre would earn income from rentals and from selling power back to the National Grid. (The potential to earn money from selling energy to the National Grid has now greatly reduced a result of a change to national policy.) Construction of the Eco Hug began in November 2010 after the funding package was completed.

Form of sustainable energy

Solar photovoltaic, solar thermal and ground source heat array to provide heating and hot water.

This community led case study represents a good example of the intersection of community energy and community life. It illustrates how such a project can help identify and overcome some of the social problems in an area and provide an educational resource for children, students and members of the public to learn about energy efficiency and renewable energy.

5. Preferred Sites

Energy generation can create conflicts over land use. The challenge for spatial planning systems is to objectively designate specific areas for specific purposes, based on a robust evidence base. While the term ‘zoning’ has become unpopular, it is important to retain the function of spatial planning to identify optimal locations for different categories of land use. This can help to reduce conflicts and maximise synergies.

OBJECTIVES:

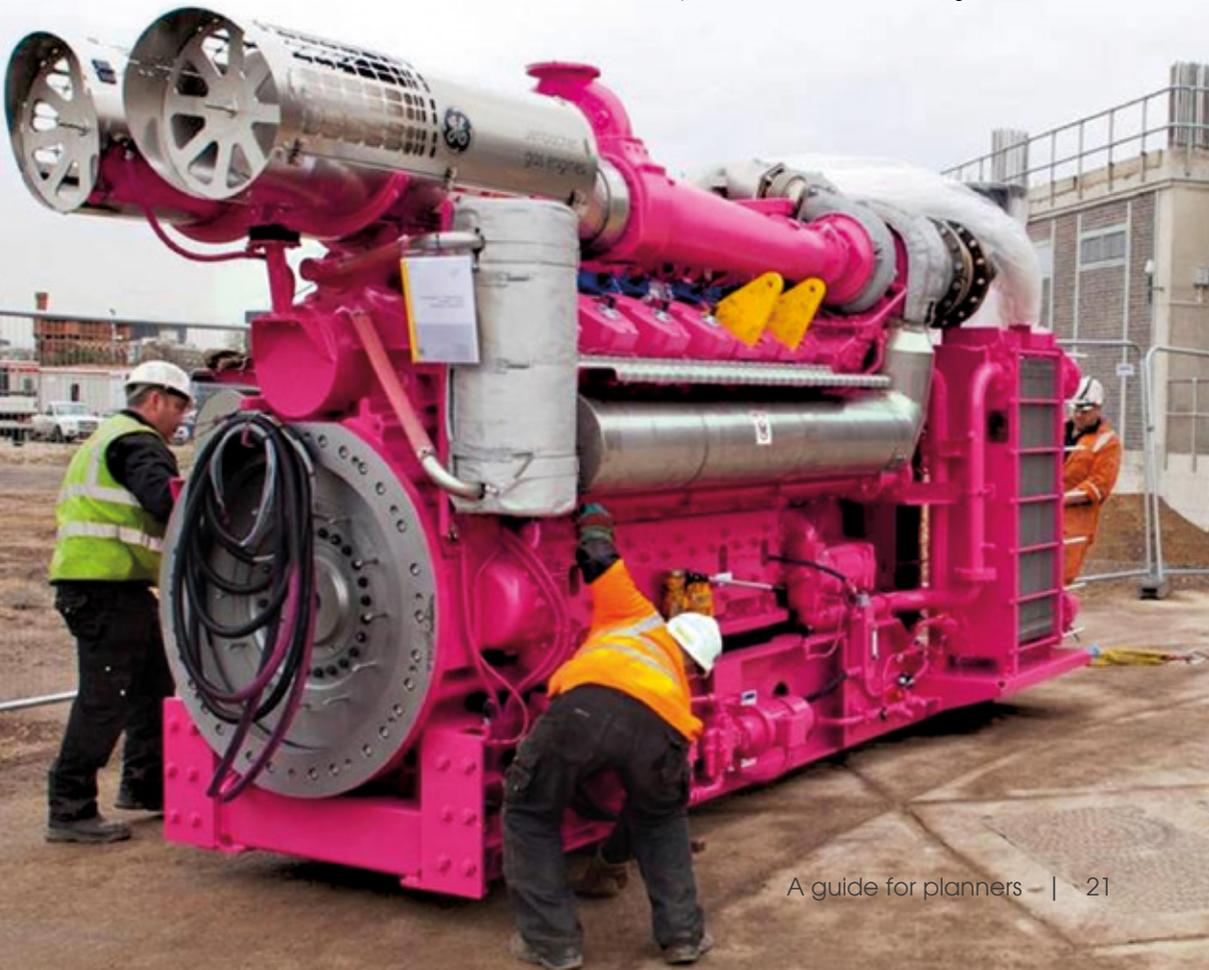
- To locate energy related developments to achieve benefits for society.
- To ensure that sustainable energy technologies are implemented based on the suitability of the location or site (and not just commercial interests).
- To maximise the potential of the location and site, and their assets.
- Distinguish between major energy exporting sources (ie feeding into the national grid) and locally serving developments (ie serving the needs of specific local communities or activities).
- Identify and protect specific opportunities and more generally adopt an enabling rather than prescriptive planning approach (based around concepts as Preferred – Potential – Sensitive Areas) for example for large scale wind or solar farms.

RECOMMENDATIONS:

- Establish typologies of energy sources and their relative contribution to the total energy needs of the area.
- Prepare separate policies for small-scale local energy production and large scale commercial generation (eg community wind power versus multiple megawatt windfarms).

- Try to link energy demand land uses with energy supply land uses to minimise transmission needs.
- Identify areas where potential for energy saving is greatest based on local assets.
- Consider the potential to cluster activities with similar perceived impacts (eg waste-to-energy plants) to minimise widespread environmental intrusion.
- Cluster linear infrastructure in spatial corridors (e.g. electricity transmission lines with underground pipes).
- Reserve suitable locations and or safeguard opportunities against conflicting developments, for specific longer term infrastructure (eg wave technology or hydro-electricity schemes).

Implementation of district heating in London



CASE STUDY

Setting up local development orders to facilitate the delivery of renewable energy in Swindon, UK

The role of planning and of planners

The introduction of LDOs required full community consultation on potential sites, following an open call.

The creation of the LDOs was separate to the usual development management planning system and formed part of a permitted development scheme.

Planners were involved in setting up LDOs to align with renewable energy solutions and local targets.

The skills and competencies involved

Communication: this is key for planners in engaging with the community and potential landowners/ developers using the LDO system.

Using an evidence base: planners were required to use the information available to carry out an assessment of sites put forward.

Designating specific sites for solar energy



Source: Peter Wood

Overview

The process of applying for planning permission in the UK can be time-consuming, even where the principle for renewable energy has already been established in an area.

To streamline this system, 'local development orders' were introduced to facilitate the granting of permission for renewable energy. Swindon Council has provided upfront planning permission in certain areas for solar photovoltaics and other renewable energy forms, via the creation of three low-carbon LDOs in 2015. The process requires landowners, developers and the community to submit potential sites for inclusion in their LDO. A consultation then takes place with full engagement of the community.

Form of sustainable energy

District heating, hydrogen and electric car fuelling, solar PV.

This case study demonstrates how a streamlining of the system for granting permission for renewable sites has enabled a democratic and more efficient delivery of renewable energy in Swindon. This has been achieved through the use of 'local development orders' (LDOs). LDOs require sites to be submitted upfront and then permission can be granted at the right time when the sites are ready to be developed.

6. Energy Production

Maximising the renewable energy potential of an area requires the integrated approach offered by spatial planning. For example, the use of wind energy needs a plan-led identification of suitable sites. Waste incinerators should be located in such a way that the energy produced can be used within the local area and linked to district heating and cooling.

OBJECTIVES:

- To include within the spatial plan policies which maximise all opportunities for renewable energy generation in a local and or regional area.
- To minimise unnecessary restrictions on energy generation caused by infrastructure or land use.
- To maximise the potential for biogas production from urban waste products as raw materials.
- Use new developments as a 'hook' for proposing renewable energy solutions that could benefit the existing and future community of an area.
- Use other land uses where possible as energy generating facilities (eg rooftops for solar energy, public open spaces for solar energy facilities, agricultural grazing land for solar parks).
- Include the provision of waste-to-energy plants in municipal plans as part of an integrated, ecological system for the management of waste, energy and local resources.

RECOMMENDATIONS:

- Establish a robust evidence base that demonstrates the potential generating capacity for renewable energy in the local area.
- Identify urban waste products that can be used for energy production, including: agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste.

CASE STUDY ONE

Grenoble Presqu'île, France

The role of planning and of planners

Planning was central to the development of the Presqu'île program, as it is part of the wider ÉcoCité urban planning program vision.

The ÉcoCité program takes a systematic approach with the thermal improvement of buildings and mobility also being addressed as part of the integrated urban design.

The skills and competencies involved

Facilitation of stakeholder involvement: a vast array of partners were involved in the delivery of the project, including GreenLys, the city of Grenoble, Gaz Electricité de Grenoble (GEG), Atos Worldgrid, Schneider Electric, the National Polytechnic Institute of Grenoble (Grenoble INP), the National Institute of solar energy (CEA) and the CNRS laboratory LEPII-Edden.

Balancing different expertise in planning and energy and intense collaboration was required.



The Grenoble Presqu'île vision

Source: SEM Innovia

Overview

The project aims to respond to four major challenges of the energy transition: economic, technological, environmental and social. To enable effective energy management, a 'smart grid' is being developed. The aim of this is to provide stakeholders with the information required to tailor energy production and consumption to their needs. One of the most important requirements of the project is the implementation of a multi-fluid and multi-energy platform that can centralise, process, cross-check, and restore data for the various networks. Smart Grid ÉcoCité will equip 500 new homes with smart meters and data displays, and provide 50 energy boxes to residents in a pilot group in existing buildings. Data shall be displayed publicly in the city and an internet portal created for access to information.

Form of sustainable energy

Smart grid, mobility, retrofit, energy efficiency.

The Grenoble Presqu'île is an ÉcoCité project, consisting of a 250 hectare site at the heart of the city. It is one of the largest public-private investments in France, with €1.3 billion invested over 15 years. This urban program aims to turn an innovation campus into an integrated area of the city. A key aspect is the development of a smart grid with data generated communicated via displays in residents' homes and in public places.

CASE STUDY TWO

Hannover Solar Cadastre, Germany

The role of planning and of planners

Planners have ensured that all the information needed for photovoltaic adoption is available to property owners.

Partnership working with the Climate Protection Agency, offering free, impartial advice to those considering investing in solar installation. These advisors check the suitability of a roof for solar energy and explain all possible options to the owner, including the rental of their roof to a third party investor.

The skills and competencies involved

Expertise in solar mapping.

Financial expertise in relation to solar energy.

Integrated working between planners and energy experts.

Communications skills for public campaigns and assistance with inquiries from the public.

Overview

The Hannover 'solar cadastre' is a free online tool to help private homeowners and companies identify how suitable their roof surface is for the installation of photovoltaics. The website (www.solaratlas-hannover.de) indicates the suitability of roof surfaces using a scale of colours, with the most suitable shown in red and the least suitable in grey. The campaign aims to spread awareness of the potential financial benefits of the program, encouraging as many people as possible to install solar photovoltaics on their property.

Form of sustainable energy

Solar photovoltaics.

This case study represents an ambitious project aiming to establish one million square metres of photovoltaic renewable energy across Hannover by 2020, meeting the needs of more than 70,000 people and representing a saving of 77,000 tonnes of carbon.



Source: Hannover Stadt

The online solar cadastre

7. District Heating

Spatial planning is crucial to implementing successful district heating systems because of the need to link the demand and supply of heat to existing and future development. Increasingly, district heating principles are also used to achieve cooling and to mitigate the urban heat island effect.

OBJECTIVES:

- To consider district heating for all new residential areas of sufficient scale.
 - To apply the concept at the right scale, at the right time and with full community participation.
 - To use district heating to address fuel poverty and social justice.
- opportunities and constraints (eg fuel poverty, carbon savings, resilience, generating local income, replacement of public assets).
- Early and continued engagement between energy specialists, planners, engineers, local planning processes and local plan policy will help to support and achieve district heating objectives for an area.

RECOMMENDATIONS:

- Develop a robust energy strategy which identifies objectives for the district energy scheme.
 - Consider the timing between the development of the new heating network and the completion of buildings to be connected to ensure the scheme is safeguarded against short-term decisions.
 - Ensure the viability of a new district heating scheme through planning by adopting policies which are strong enough to safeguard the potential opportunities for district heating (eg resisting competing land uses).
 - Establish a strong and continually maintained evidence base that includes an understanding of the key drivers and mapping
- Identify which areas are most suitable for district heating through a heat-demand map identifying key constraints and network development opportunities.
 - Ensure that all areas of potential development are adequately mapped for the key features which will affect project feasibility and viability.
 - Achieve the development of district heating and micro-scale CHP.
 - Where possible co-locate heat generating land uses (eg power stations, waste incinerators) in conjunction with new residential development areas to maximise potential for district heating.
 - Design developments so that they are ready to be connected to district heating systems that are in the planning pipeline, the local plan, or related to nearby demand.

CASE STUDY ONE

Taking the lead on a low carbon future, Southampton UK

The role of planning and of planners

Realising the potential for energy planning in helping to meet the city's carbon reduction target of a 34% 2020 (1990 baseline).

Undertaking assessments of housing areas to enable phased investment in district heating energy networks, in parallel with a city wide social housing retrofit programme.

Have a holistic perspective and overview of how energy links with social planning.

The skills and competencies involved

Long term collaborative working across different municipal departments and local stakeholders. over the long term.

Ability to make the business case for a low-carbon future and sustainable energy planning in a way that integrates various municipal objectives.

An ability to identify where district heating schemes would be best suited in the city relation to growth areas and city regeneration.

Regeneration of existing district heating infrastructure and schemes.



District heating in Southampton

Overview

Integrating district heating schemes into making the business case for a low carbon future for the city of Southampton.

When a geothermal heating network was discussed, 25 years ago, it was seen as a pioneering and brave move for Southampton. Since then, Southampton City Council has led the UK in the delivery of sustainable supplies of heat, chilled water and power.

Now, the City Council is using the energy supply challenge facing municipalities across the country as an opportunity to put itself at the forefront of the drive to address the city's energy needs, with district heating at the centre of this. This is also enabling the Council to address other strategic priorities, including tackling the causes of fuel poverty and consequent social deprivation, creating much needed new local jobs and businesses and generating new sources of revenue to sustain local public services.

Form of sustainable energy

Geothermal heat, district heating and cooling, combined heat and power.

This case study demonstrates the systematic application of district heating and could be used as a useful benchmark for assessing the potential of similar projects elsewhere.

CASE STUDY TWO

Brescia district heating network, Italy

The role of planning and of planners

Aligning urban planning with the development of the district heating network.

Implementing strategies to incentivise the connections to the network.

Co-ordinating the different sectors involved in the process.

The skills and competencies involved

Planners have to understand energy issues and the requirements of a district heating network in order to plan urban forms that allow the system to work.

Integrating district heating and considerations for future connections into land-use decisions.

Overview

Since 1972, there has been a continuous development of the network. New production plants always use the latest technology with particular attention paid to systems for combating, and the control of, polluting emissions. An important step forward was taken in 2004 with the completion of the plant with biomass-powered design. Heat produced by energy from waste covers over 40 per cent of the heating requirements of district-heated places. The district-heating network of Brescia goes beyond the municipal boundaries to serve parts of the adjoining municipalities of Bovezzo and Concesio. By the end of 2009 over 40 million cubic meters of buildings were connected, and Brescia anticipates reaching its ambitious target of 45 million cubic meters by 2020.

By 2015 the district heating network had almost reached its maximum size and the main challenge was to make the system more efficient in terms of heat sources. An example of this, co-funded by the European Commission PITAGORAS project, is the collaboration between A2A and Ori Martin to recover waste heat from the Brescia steel industry by using the heat of smoke from blast-furnaces to produce both electricity and heat for the district heating network.

Form of sustainable energy

District heating, energy from waste.

Brescia introduced district heating in the 1970s and it has made an important contribution to reducing pollution in the city. To date, over 70 per cent of the population of the Brescia Municipality live or work in areas supplied by the district heating network.

8. Brownfield

Increasingly, spatial planning is used to find new uses for land that has become redundant. Such land may need remedial action, such as cleaning contaminated soil, before it can be used for new purposes. Re-using a redundant site for energy production can be a win-win solution.

OBJECTIVES:

- To find large sites that can be used for energy production.
- To consider the potential for energy production on contaminated land.
- To use high-profile brownfield sites as a catalyst for community engagement.

RECOMMENDATIONS:

- Include energy production and energy distribution as key objectives in urban regeneration policies.
 - For each site, examine the full range of potential renewable energy sources including wind, solar, geothermal, landfill gas and combined heat and power.
 - Achieve trade-offs between the highest possible profitable use of the area and the lowest possible impairment of the landscape, as well as taking into account nature conservation issues.
- Consult with local communities using collaborative planning and engagement techniques.
 - Use three-dimensional model building as a technique to work with communities.
 - Find underused sites within an urban region for potential energy use.
 - Integrate energy distribution networks in the infrastructure planning of a city.
 - Co-locate industries so that waste heat can be re-used for industrial production nearby.
 - Consider using energy opportunities in a new development or regeneration project to kick-start other sustainable energy projects, for instance by providing anchor loads for district heating.

CASE STUDY ONE

Hamburg Energy Hill and Energy Bunker, Germany

The role of planning and of planners

Working in partnership with other stakeholders to develop innovative solutions to overcome the constraints of the site.

Identifying suitable locations for local energy infrastructure based on an understanding of the city's energy demand and the city's structure.

Ensuring the new energy infrastructure was developed to meet the energy needs of the local community.

The skills and competencies involved

Site selection based on an understanding of existing land uses and the potential for local renewable energy generation.

The ability to make the case for using a contaminated site for energy generation.

Working in partnership with other experts.



The Georgswerder Energy Hill in Hamburg

Source: IBA Hamburg/
Aufwind Luftbilder

This case study is a useful example of how brownfield land in, or near, a city can be used for energy production purposes and how such use can also improve the economic value and image of a previously underused site.

Overview

The 'Renewable Wilhelmsberg Climate Protection Concept' set out the ambition to supply the Elbe islands with 100 per cent renewable energy and deliver a sustainable approach to energy across the district. To achieve this a range of energy projects were introduced, including local renewable energy production and distribution, and energy efficiency.

Potential sites for local renewable energy production were assessed and a former land-fill site was selected. This 45 hectare area of contaminated land had been used for toxic industrial waste. Local people had not been allowed on the site for decades.

The site, now known as the Georgswerder Energy Hill, has been transformed. It is an important source of renewable energy and supplies around 4,000 households with electricity using wind and solar generation. The energy from land-fill generated gas is also being used.

Form of sustainable energy

Wind energy, solar photovoltaic, biomass, geothermal, landfill gas.

CASE STUDY TWO

Identifying sites for renewable energy through planning, Derbyshire, UK

The role of planning and of planners

Planners played a key role in identifying the sites that would be suitable for development.

The skills and competencies involved

A cross-departmental working group was established by Derbyshire County Council to help deliver the project. Within this, there was a wide range of competencies, including finance, law, procurement, countryside services and planning policy. The project also relied on councillors, senior council executives, experts from APSE Energy, and other planning and grid consultants. Feedback from the community and residents was also essential. The core competencies were concerned with gaining:

- Expertise from the distribution network operator concerning grid connection of sites.
- Understanding financial subsidies and government policy concerning renewable energy.
- Understanding the technological aspects of renewable energy storage.



SPECIAL study visit to district heating system

This case study represents the re-municipalisation of energy in England and the importance of knowledge sharing, with the project being inspired by the Hamburg Energy Hill.

Overview

This project aimed to create renewable energy sites by using land that was not suitable for other types of development, for example old industrial land or landfill. As this land is owned by the county council, permission for these projects to take place was granted easily. The council identified 23 possible sites for development and prioritised three of them.

Form of sustainable energy

Solar photovoltaics.

9. Mobility

Much of the demand for energy is caused by transport. By reducing the need for travel and improving the integration of urban public transport with new development areas spatial planning can help to reduce this energy demand. However, minimising the energy demand for transport requires not only reducing the need for travel, but also reducing the energy requirements per km travelled.

OBJECTIVES:

- To reduce the total demand for travel by good spatial planning.
- To provide maximum opportunities for cycling, walking and public transport.
- To maximise the viability of collective transport both for passengers and freight.
- Encourage the multi-directional use of public transport by avoiding concentrating employment and commercial activity in a small number of places.
- Locate green energy resources throughout cities or areas.
- Co-ordinate and link all modes of transport to create opportunities for multi-modal travel and use optimum efficiencies of all modes.

RECOMMENDATIONS:

- Improve accessibility instead of mobility (this includes 'virtual' access as well as physical access).
- Promote development that is close to public transport.
- Provide enough space in streets and roads for cyclists and pedestrians.
- Achieve co-location or proximity of related land uses to reduce the demand for travel.
- Provide large-capacity bicycle parking facilities close to public transport nodes (eg directly under the platforms or bike rental schemes).
- Maximise car sharing; increase energy efficiency measures in carparks (green roofs, electricity recharge points etc).

CASE STUDY ONE

Sustainable Urban Mobility Plan, City of Judenburg, Austria

The role of planning and of planners

Setting up and participating in the ADVANCE working group.

Identifying urban mobility problems, findings and proposed solutions by filling in the self-assessment questionnaire.

Discussion of different solutions to boost sustainable urban mobility.

Setting up the final action plan.

Building the basis for a new sustainable urban mobility plan (SUMP).

The skills and competencies involved

Expertise in mobility planning for all road users (SUMP addresses public transport, walking, cycling, freight transport, car transport etc.)

Communication skills.

Knowledge about other fields of spatial planning (eg environment, land use etc.)

Collaboration and ability to facilitate inter-municipal working.

Overview

From April to September 2013, the City of Judenburg applied the ADVANCE Audit. Eight representatives of the City of Judenburg and surrounding municipalities, together with two external auditors, formed the ADVANCE working group. This group met a couple of times to assess the quality of mobility planning in Judenburg, using a self-assessment questionnaire.

Key milestones of the ADVANCE Audit process in Judenburg were:

- Analysing the status: analysis of the mobility concept; media articles; structural data and mobility data from Judenburg.
- Assessment: self-assessment by city representatives of Judenburg using a standardised questionnaire.
- Prioritisation: summary of results of the questionnaire; discussion of results in the working group; consensus and prioritisation of action and missing fields.
- Final action plan: creating a list of improvement measures; prioritising them; developing an action plan, including specific recommendations.
- Audit report and certification: presenting the action plan to political committees; certification.

Form of sustainable energy

Urban mobility solutions.

The improvement of a sustainable urban mobility plan through the implementation of the 'ADVANCE Audit': a process of analysis and assessment prior to the production of the improved action plan.

CASE STUDY TWO

The first bus rapid transit (BRT) route in Catania, Italy

The role of planning and of planners

Planners from the University of Catania provided scientific and technical assistance to the Municipality of Catania for the planning and implementation of the BRT.

Municipality planners implemented guidelines for the preparation of the urban traffic plan, addressing new transport policy for sustainable mobility.

Implementation of an urban traffic plan by the city council.

The skills and competencies involved

Engagement with local university and other experts to develop a transport strategy.

Interdepartmental and partnership working.

Collaboration between transport planners from University of Catania, officers, engineers and architects from the municipality, and officers, financial and economic consultants from the municipal transit company.

Municipal planners in Catania have helped facilitate the preparation of an urban traffic plan, addressing a new transport policy for sustainable mobility related to Bus Rapid Transit (BRT). A BRT is a transport system with a high percentage of protected routes that predominantly operates as light rail transit away from existing road and tram systems to avoid busy intersections.

Overview

In April 2013 the first BRT line began operating in the city of Catania. AMT is the Catania municipal public transport company, operating 50 bus lines, and covering approximately 40 per cent of the city road network. It covers 11 million kilometres and transports 30 million passengers. The mixed-traffic operation and the high level of car traffic strongly affect the capability of AMT to supply a competitive and sustainable energy public transport service with respect to car use. In view of the long time needed to build rail systems, in 2011 the Municipality of Catania collaborated with the University of Catania on the preparation of a short-term transport plan.

An urban traffic plan was then implemented and it included BRT among other pilot projects to promote a change in the transport choice of citizens, saving energy and reducing carbon emissions.

Form of sustainable energy

BRT showed that public transport can compete with car usage and that modal shift can be increased in order to save energy and reduce carbon emissions.

10.Green & Blue

Green and blue infrastructure affects microclimatic conditions in towns and cities considerably, as well as delivering major social and economic benefits. Urban planning can address heat island effects by providing open and green spaces to promote urban cooling.

OBJECTIVES:

- To protect and manage the natural resources in urban areas including habitats and species.
- To provide blue (water) and green spaces as a means to maintain a correct urban microclimate.
- To reduce energy consumption, such as reducing the need for air conditioning in summer and heating in winter.
- Promote urban forestry programmes.
- Bring the countryside into the heart of the city eg through concepts such as 'urban national parks'. Identify opportunities to link existing green and blue infrastructure and create new habitats.
- Encourage urban farming to: reduce water runoff; reduce the heat island effect; reduce the need to transport food; and strengthen communities.

RECOMMENDATIONS:

- Avoid 'sealing' ground surfaces to minimise urban heat islands and facilitate drainage.
- Identifying flood plains to be protected in order to minimise flood risk.
- Use water availability and natural conditions in a given area as a planning tool to guide functions, types and sizes of developments.
- Develop green and blue infrastructure as an integral element to the city's development strategy.
- Adopt policies for roof gardens in existing and future buildings.
- Explore opportunities for 'floating land' uses to maximise the use of water bodies in the city.
- Try to re-open former natural watercourses and seek to naturalise them.
- Plan green corridors along main traffic roads to reduce emission levels (recharge points etc).

CASE STUDY ONE

Integrating multiple climate change policies in regeneration, Fornebu, Norway

The role of planning and of planners

Managing the masterplan.

Organising the process of involvement of stakeholders and citizens.

Putting policies into practice during the design and development planning stages.

The skills and competencies involved

Combining international expertise in planning from the USA, Denmark, Sweden, Norway and Finland.

Engineers delivering renewable energy sources and energy monitoring.

Integrating multiple policies into a masterplan and understanding how to balance the multiple benefits of each policy area or strategy.

Overview

Following the relocation of Oslo international airport, the decision was made to redevelop the old airport site into 6,000 housing units, social and commercial infrastructure, 20,000 offices and extensive recreational and wild life spaces. The underlying philosophy was that the area should be a showcase for modern environmental thinking, emphasizing sustainability in terms of energy, environmental standards and adaptation to climate change. The visions and strategies were incorporated into the masterplan, a statutory instrument, adopted by the Bærum Municipality in 1999. The entire development process is expected to be complete by 2025.

The project emphasises the combination of renewable energy sources such as heat from sea water and solar energy with passive house standards, the use of appropriate building materials, energy efficient lighting, local recycling and handling of waste and a strong emphasis on public transport.

Green and blue infrastructure is used in a comprehensive way in the Fornebu example to combine:

- Biodiversity
- Energy production
- Recycling of waste
- Refreshing the city
- Agricultural production
- Pedestrian and bicycle links

Form of sustainable energy

Geothermal, solar thermal and photovoltaic, wind turbines, district heating and cooling.

Multiple energy saving policies can be adopted in one development. Fornebu includes a combination of renewable energy sources, such as heat from sea water and the provision of extensive recreational and wild life spaces into a newly planned community on brownfield land (a former airport).

CASE STUDY TWO

Courtyards in the city, Graz, Austria

The role of planning and of planners

Planners were heavily involved in this project, working closely with local property owners. The participative planning process was carried out in seven courtyards, which involved the owners and tenants drafting designs for the use of their courtyards and the implementation of these designs after the planning phase. A strategy document entitled 'Revitalizing the inner courtyards of Graz' was a key result of this process and will serve as a guideline for any future developments.

The skills and competencies involved

The skills involved were diverse, with the project drawing upon expertise in:

- urban planning,
- children and families,
- green spaces and water bodies,
- housing.

An Inner Courtyards Advisory Centre also now exists, which will be significant in the continuation of this work.

Understanding how to balance the multiple benefits of each policy area or strategy.



Greening internal courtyards in Graz

Overview

The project started with a concept phase, followed by a participative planning process and the delivery of a pilot project and community involvement (including press releases, a logo and a drawing competition for pupils). Increasing awareness of the significance of green spaces was important in helping ensure the participation of owners and private users of these courtyards. A strategy was developed to encourage active participation of owners in decision making, including incentivising owner participation in the initiative and overcoming legal issues to improve access to inner courtyards.

This case study demonstrates the importance of revitalising public and private spaces in city centres in improving the quality of life for resident populations. This is particularly significant for Graz, which has many shared courtyards and front gardens. By increasing its green infrastructure, Graz's reputation as a garden city has also been boosted.

PART 3

The SPECIAL Project Objectives

SPECIAL has three key objectives:

1. To build the capacity of partner TPAs to integrate sustainable energy solutions into spatial planning, training and delivery.
2. To foster the exchange of experience and competence-building among national and regional TPAs in demonstrating the integration of sustainable energy into spatial planning strategies at local and regional levels.
3. To stimulate the improved energy related competence of town planners working within local authorities, leading to good practice examples of integrated spatial planning strategies for low-carbon towns and regions.

About the SPECIAL Partners

The Town and Country Planning Association (TCPA) is the lead partner for the SPECIAL project. The partner planning associations are:



Austria

Provincial Government of Styria, Department of Spatial Planning Law

www.verwaltung.steiermark.at



Germany

German Institute of Urban Affairs

www.difu.de



Greece

Ministry of Environment and Energy

www.orth.gr



Hungary

Hungarian Urban Knowledge Centre

www.mu-tk.hu



Ireland

Irish Planning Institute

www.irishplanninginstitute.ie



Italy

National Centre for Town Planning Studies

www.censu.it



Sweden

Swedish Society for Town and Country Planning

www.planering.org



UK

Town and Country Planning Association

www.tcpa.org.uk

About the ECTP-CEU

Creating our futures

ECTP-CEU

European Council of Spatial Planners
Conseil européen des urbanistes

www.ectp-ceu.eu

**Founded in 1985, ECTP-CEU
(European Council of Spatial Planners
- Conseil Européen des Urbanistes)
brings together 30 professional town
planning associations and institutes
from 27 European countries as well as
corresponding members.**

It is an umbrella association providing its members with a common framework to promote the visibility, recognition of the important societal role, and practice of planning and urban development in Europe and its teaching, continuing professional development and the definition of professional responsibilities.

ECTP-CEU sets standards of education and conduct for the planning profession; engages in dialogue with local, national and European government; identifies, and rewards examples of good planning all over Europe. The vision and the standards for planning are set out in the Charter of European Planning approved in April 2013, in Barcelona GA. The Charter of European Planning was developed in different documents and this document created in collaboration with the TCPA and SPECIAL project is a result. It is also developing the European Charter on Participatory Democracy in Spatial Planning Processes approved in October 2015 in Dublin GA.

About the Town and Country Planning Association



www.tcpa.org.uk

The TCPA is the UK's oldest charity concerned with planning and the environment. It was set up in 1899 by Ebenezer Howard, the inventor of the garden city model of development and was originally called the Garden Cities Association.

Today, the TCPA is a small but highly influential organisation with more than 1,000 members. The TCPA works with planners, developers, local authorities, academics, landscape architects, urban designers and other professionals and community organisations.

It has strong links with both the public and private sectors, and campaigns for a planning system that is responsive to people's needs. Throughout its history, the TCPA has promoted the need for high quality environments where people can have good, affordable housing and today it is at the forefront of campaigning for a new generation of garden cities in the UK. In addition to our work in energy and climate change, other key areas of current work include: 'Reuniting Health with Planning', a project that has successfully brought together planners and public health officials across England to help them create places in which it is easier to live a healthy life; and #planning4people, an education and awareness campaign to put people's needs at the heart of planning.

The TCPA runs more than 80 events each year, including many events in the Houses of Parliament; it publishes a wide range of reports and a highly regarded journal, Town & Country Planning; and manages a wide range of projects. These include the New Communities Group, a learning network of 11 English local authorities that are working to deliver new large-scale developments to high environmental standards (see www.communitiesgroup.org.uk).

Useful links:

For more information on linking spatial planning and sustainable energy, the following links are also helpful.



LEAP: Leadership for Energy Action and Planning
www.leap-eu.org

COOPENERGY: Cooperating in sustainable energy planning
www.coopenergy.eu

SUSREG: Empowering sustainable urban planning
www.susreg.eu

Community Power: For people's ownership of renewable energy
www.communitypower.eu

Managenergy: Supporting local and regional sustainable energy actions
www.managenergy.net

The Covenant of Mayors: the "world's biggest urban climate and energy initiative" (Commissioner Miguel Arias Cañete)
www.covenantofmayors.eu

Mayors Adapt: The Covenant of Mayors Initiative on adaptation to climate change
www.mayors-adapt.eu

Intelligent Energy Europe
www.ec.europa.eu/energy/intelligent

DG Energy (ENER) – European Commission
www.ec.europa.eu/energy/

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