FRAMING THE ROLE OF SPATIAL PLANNING IN CLIMATE CHANGE

Global
Urban
Research
Unit

Simin Davoudi

October 2009

Electronic Working Paper No. 43

FRAMING THE ROLE OF SPATIAL PLANNING IN CLIMATE CHANGE

Simin Davoudi[1]

Simin.davoudi@ncl.ac.uk

October 2009

Acknowledgment

This Working Paper is based on a literature review paper which the author was commissioned to undertake for the UK Department of Communities and Local Government (CLG) in August 2009. The views expressed in the paper are those of the author and do not necessarily represent the CLG's views or policies.

Abstract

Over the past decade the English national policy expectations from planning to respond to climate change have grown considerably and the role of planning has been elevated from merely *promoting* climate protection to delivering governments' wider climate policy objectives. However, less attention has been paid on how its role can be framed. The aim of this paper is, therefore, to provide a framework for understanding the role of spatial planning in climate change. This is achieved by mapping three aspects of planning interventions against the three critical climate policies: energy supply, energy demand and adaptation.

[1] Simin Davoudi is Professor of Environmental Policy and Planning at the School of Architecture, Planning and Landscape and Co-Director of the Institute for Research on Environment and Sustainability, Newcastle University, UK.

SUMMARY OF THE KEY ISSUES

The evidence gathered from academic literature and policy sources leave little doubt that the planning system has a major part to play in climate change policy agenda. However, the extent to which spatial planning has leverage in tackling climate change depends largely on how broadly it is defined and what level and types of interventions, tools, and resources are available to it. Adopting a broader definition of spatial planning, its place-shaping role can be practiced in three interrelated ways: *pro-active interventions* in the way places are developed; *regulatory interventions* in how others undertake their own activities; and *strategic coordination* which enables participation and policy integration.

Over the past decade national policy expectations from planning to respond to climate change have grown considerably and the role of planning has been elevated from promoting climate protection to ensuring policy delivery. However, less attention has been paid to how its role can be framed. The bewildering array of tasks allocated to planning in both policy documents and academic literature can take away the urgency of the response and the need to focus on critical climate policies in which planning can be most effective. Hence, it is more useful to classify climate policies into the three key areas of *energy supply, energy demand and adaptation,* and for each category, identify policy areas that are most relevant to planning intervention. Based on this approach, the paper provides a conceptual framework by mapping these three policy areas against the three types of planning interventions mentioned above, as presented in Table 1, below.

Energy supply

A distinction can be made between large and small scale renewable energy facilities. The role of planning in the former has been framed largely as a barrier, while it is here that planning can play a particularly proactive role. The reason for such a paradox is the contested nature of planning decisions and the delay in planning processes. Dismissing local opposition as 'NIMBYism' has to some extent led to the establishment of IPC. This however, does not take away the responsibility of the local planning system in playing a

strategic, proactive role in this area. As regards smaller facilities and micro-generators, local planning has demonstrated clear leverage through innovative use of regulatory policies.

Energy demand

Two areas are particularly important in terms of managing demand through spatial planning. One is reducing car travel and the other is increasing the energy efficiency of the built environment. With regard to the former, planning's proactive intervention can steer the location, mix and accessibility of development, which in the long term has substantial implications for the level of demand on transport, modal choice and journey distances. In relation to energy efficiency, planning's regulatory interventions can fill the gap left by Building Regulation to ensure higher environmental standards in new-built as well as existing stock. Planning can also play a proactive role in the framework of urban regeneration schemes.

Adaptation

The role of planning in adaptation of the built environment to climate change impacts is mainly related to: the location of new developments away from risk areas (flood risks and costal erosion), the design and layout of buildings and urban areas which are resilient particularly to heat waves, and the promotion of sustainable water management in new developments. With regard to avoiding risk areas, planning has a clear proactive role to play, but once again, its potential to do so has been hampered by the need for housing supply, especially in places where available land for development is limited. As regards resilience to heat waves, provision of green infrastructure has become critical. This has added to the existing planning rationale for their protection and enhancement.

To capitalise on planning's intervention and coordination capacity at the local level, more needs to be done at the national level with regard to: *policy prioritization* in favour of climate protection, better *departmental coordination* on critical climate change issues,

promotion of climate-focused *training and skills* for planners and provision of *sufficient resources* for planning authorities to enable them to: deliver national policy goals, engage with local communities and offer innovate local responses to climate change.

Table 1: Spatial planning interventions and critical climate change policies

			Types of planning interventions		
			Proactive Through plans, strategies, SPG; resource mobilisation	**Regulatory** Through development control / Sec. 106	**Strategic coordination** Through consultation / collaboration
Key climate change policies	**Energy Supply (mitigation)**	Large renewables	Site allocation / identification	Infrastructure Planning Commission	Renewable energy industry / local communities etc
		Small renewables & micros	Specific requirements (e.g. Merton Rule)	Permitted development	
	Energy Demand (mitigation)	Reducing travel	Settlement size, density, mixed use location and accessibility, parking		Developers / transport authorities Etc
		Energy efficiency		Planning conditions, Code for Sustainable Homes	
	Adaptation	Flood risk	Protecting flood plains from development		Environment Agency / developers
		Heat wave	Protecting & enhancing green infrastructure	Planning conditions, Design standards	

1. INTRODUCTION

There is now little doubt that the planning system has an important part to play in climate change policy agenda. Over the past decade the English national policy expectations from planning to respond to climate change have grown considerably and the role of planning has been elevated from a mere *promotion* of climate protection to *delivery* of the government's wider climate change policy. However, less attention has been paid on how the role of planning can be framed. The bewildering array of tasks allocated to planning in both policy documents and academic literature can be confusing for planners and distracting their attention from what is critical and where the focus should be placed. The aim of this paper is to provide a framework for better understanding of the role of spatial planning in the mitigation of and adaptation to climate change as advocated by the growing national policy expectation and discussed in the literature. The framework will be developed by mapping three aspects of planning interventions against the three critical climate policies in which planning can be most effective; i.e. energy supply, energy demand and adaptation

The remaining part of the paper is structured under five main sections as follows. Section 2 briefly sketches the challenge of climate change and the interface between adaptation and mitigation. Section 3 outlines the global and, more specifically, the UK policy responses to climate change. Section 4 examines the scope of the planning system, its intervention capacity, and the tools and resources available to it. Section 5 attempts to frame the role of spatial planning by focusing on three broad areas of climate policy relevant to planning. It outlines the role of planning in each and discusses how such a role is framed and furthermore, what types of planning interventions are involved. These are then summarised in a table which maps different planning interventions against the key areas of climate change policy. In conclusion, Section 6 suggests four areas in which action at the national level can enhance the capacity of the planning system to deliver.

2. THE CHALLENGE OF CLIMATE CHANGE

When in 1938, British engineer Guy Callendar claimed in his speech at the *Royal Meteorological Association* that the world was warming he was considered to be an eccentric. With the onset of the 'cooling world' in the 1950s-1970s, the idea of global warming was further pushed towards intellectual oblivion[2]. It was not until the 1980s when it was retrieved and turned into one of the most significant arguments of our time. There is now a compelling scientific consensus that the climate is changing and, more importantly, human activity is responsible for it. If current trends in the emission of the green house gases (GHG) continue, it is estimated that by the end of this century global temperatures could rise by up to 6°C. This will lead to an increased risk of extreme weather events such as destructive storms, floods and droughts.[3] Even the projected changes of a 1.5-2.5°C rise in the global average temperature would transform the physical geography of the world, and may lead to millions of people facing starvation, water shortages and homelessness.

To avoid the most dangerous impacts of climate change, the rise in average global temperatures must not be more than 2°C. This means that global GHG emissions must begin to fall before 2020 and then "fall to at least 50% below 1990 levels by 2050"[4]. Mitigating the effects of climate change by reducing GHG and in particular carbon dioxide (CO2) emissions will be one of the defining features of the 21st century policy making. This implies fundamental changes to the ways in which energy is produced and used. Equally challenging will be the adaptation to climate change effects that are now unavoidable[5]. However, as the *Stern Review*[6] has shown, the costs of uncontrolled climate change could be 5% to 20% of global gross domestic product (GDP) per year, averaged over time. On the other hand, if emissions are reduced in an economical manner to a level that avoids the most dangerous risks of climate change, the cost is estimated to

[2] *The Economist*, 2006
[3] IPCC, 2007a
[4] HM Government, 2009a: 5
[5] Ackerman et al, 2008
[6] HM Treasury, 2006

be much less; at around 1% to 2% of global GDP by 2050[7]. The choice made by many countries, including the UK, is to follow the latter.

The Mitigation - Adaptation Interface

> "It is …no longer a question of whether to mitigate climate change or to adapt to it. Both adaptation and mitigation are now essential in reducing the expected impacts of climate change on humans and their environment"[8].

Prior to statements such as the one quoted above, from a new chapter in the IPCC 4th Report, adaptation and mitigation have been dealt with separately in inter-governmental negotiations as well as governmental climate policy[9]. More recently, the literature on climate change and sustainable development has called for considering them as two sides of the same coin[10]. The IPCC[11], for example, contends that, "making development more sustainable can enhance both mitigative and adaptive capacity, and reduce emissions and vulnerability to climate change".

However, there is an emerging concern about potential tensions between mitigation and adaptation measures. These can raise difficult conundrums for spatial planners and decision-makers. Whilst such conflicts may be "fairly frequent but rarely significant"[12] "truly 'win-win' situations may be few and far between"[13]. Some commentators[14] have challenged the assumed synergies between the two, arguing that, "a development pattern that helps mitigate climate change may not be the best to adapt that settlement to the negative effects of global warming in its geographical location". Others[15] contend that the interrelationships between mitigation and adaptation have been largely neglected in planning literature and that, 'adaptation turn' in planning may be at the cost of paying

[7] HM Government, 2009a
[8] IPCC, 2007a:748
[9] Swart and Raes, 2007; Munasinghe and Swart, 2002; Davoudi et al, 2009
[10] Berke, 1995; Bury, 1998; El-Masri and Tapple, 2002; Janetos, 2007
[11] IPCC, 2007a:22
[12] IPCC, 2007b:760
[13] McEvoy et al, 2006:186; Hamin and Gurran, 2008
[14] See, for example, Pizarro, 2009, on the issue of density in hot and humid locations
[15] For example, Howard, 2009

less attention to measures that reduce GHG emissions. Researchers now advocate an integrated approach, emphasising that "the most desirable form of adaptation is adaptation that is not necessary"[16]. The need for developing an integrated approach, particularly at the regional and local level, to avoid mal-adaptation and promote synergies and complementarities is now widely acknowledged[17]. However, there remain a number of barriers and limitations such as the mismatch in spatial and temporal scales[18], the balance of costs and benefits[19], and the different stakeholders[20] and policy sectors involved[21].

Meanwhile, spatial planning is considered by almost all commentators cited in this paper to be one of the policy areas with leverage in both mitigation of and adaptation to climate change. Indeed, some argue that, spatial planning can be the strategic framework through which both measures are positioned in the broader perspective of sustainable development[22]. In addition, such a role has now been formally recognised by the UK government through a series of national policies. It has also been supported by the European Union (EU)[23]. Moreover, the Stern Review points to the spatial planning as one of the four primary areas for government policy to achieve its climate goals[24]. As will be outlined below, there is now a statutory requirement from the planning system to deliver the UK government's climate change strategies.

[16] Howard, 2009
[17] IPCC, 2007a; EEA, 2007
[18] Goklany, 2007; Howard, 2009
[19] Klein et al, 2005; EEA, 2007; IPCC, 2007a; Wilbanks et al, 2007
[20] Adger, 2001; Klein et al, 2005; Folke et al, 2005
[21] Hall, 2009
[22] Campbell, 2006; Biesbroek, et al, 2009
[23] HM Treasury, 2006; CEC, 2007
[24] HM Treasury, 2006

3. THE CLIMATE POLICY CONTEXT

The global policy context for climate change has been predominantly shaped by the United Nations. The UN *Framework Convention on Climate Change* and Kyoto Protocol have established a global policy framework for climate change that underlies national policies. They have also created an international carbon market. The Protocol has been fully supported by the European Union and reflected in the 2005 European Climate Change Programme which promised to cut the EU's emissions to 20% below 1990 levels by 2020, and by 30% if other countries take part. To take action, it has set up the EU Emission-Trading Scheme (EU ETS) aimed at cutting emission from the EU's major polluting industries.

While progress towards meeting Kyoto targets has varied across the EU, the UK has cut its emissions to 21% below 1990 levels; nearly double what was promised at Kyoto and just above its own target of 20%. The UK is now calling for a global agreement at UN talks in Copenhagen in December 2009 which is considered to be "ambitious, effective and fair"[25]. Meanwhile, the UK *Climate Change Act 2008* has put in place the world's first long-term legally binding framework, setting a statutory target to reduce GHG emissions by 80% below 1990 levels by 2050, hence increasing the current annual rate of fall in emission by 0.4%. The Act also requires a set of five-year carbon budgets to 2022 to keep the country on track. Following UK Budget 2009, the first three statutory carbon budgets were set to cut the UK's GHG emissions, compared to 1990 levels, by 22% in the current period, 28% in the period centred on 2015, and 34% in the period centred on 2020[26]. In June 2009, a new White Paper[27] provided a plan of action for achieving these targets. For the first time, each major government department will have its own carbon budget based on their degree of influence on reducing emissions in each sector of the economy. The sectors themselves cut across departmental jurisdiction to encourage inter-departmental collaboration in carbon saving in each sector (see Box 1).

[25] HM Government, 2009a:22
[26] HM Government, 2009a
[27] HM Government, 2009a

Box 1: Share of 2018-2022 emissions savings by economic sectors[28]	
Power and heavy industry	54%
Homes and communities	13%
Workplaces and jobs	9%
Farming, land and waste	4%

Each department with a carbon budget needs to produce its own carbon reduction plan by spring 2010 to show how savings will be made. Failure to stay within the budget will necessitate the purchase of credits from abroad[29]. As a key delivery department, CLG has been allocated a 5% share of the total allocated carbon budget for up to period 3 (2018-2022). This is calculated on the basis of its policy influence over the following areas: homes and communities, transport, waste, heating workplaces, and farming and land. An important policy lever in the CLG for achieving these targets and tackling climate change is the planning system[30].

[28] Source: HM Government, 2009a
[29] A shortfall of 25 million tonnes of GHG, for example, would mean a £500 million liability Assuming credits are £20/tonne (HM Government, 2009a)
[30] As stated in the CLG Commissioning Requirement

4. THE PLANNING SYSTEM

The extent to which spatial planning can play a role in tackling climate change depends largely on how broadly it is defined, and what level and types of interventions, tools and resources are available to it to pursue the tasks expected from it. These will be briefly outlined in the following two sub-sections.

4.1 The Scope of Planning

The UK planning system has evolved considerably since the introduction of the 1947 *Town and country Planning Act*. As a result the balance between pro-active, strategic and forward-looking dimensions of planning (often represented by the development plan system) and its site-specific, regulatory dimension (often represented by the development control system) has fluctuated over time. In the late 1990s and following the introduction of the plan-led system, the balance shifted towards the former. Similarly, the evolution of the UK planning system over the recent decades has led to changes in the purpose and scope of planning with the most significant shift taking place after the passing of the *Planning and Compulsory Purchase Act* 2004. The Act made the contribution to sustainable development a statutory purpose of the planning system. It also extended the scope of planning from a narrow land use regulation to what is known as spatial planning. Spatial planning is defined as an approach which "goes beyond traditional land use planning to bring together and integrate policies for the development and use of land with other policies and programmes which influence the nature of places and how they can function"[31]. This requires spatial planning to be more developmentally focused and to provide a more holistic and strategic approach to development[32]. Spatial planning is now expected to be 'visionary', 'wide ranging', 'participative', 'integrating', 'responsive', and 'deliverable'[33].

[31] ODPM, 2005a:13
[32] Nadin, 2008
[33] ODPM, 2004

4.2 Planning Interventions, Tools and Resources[34]

In analysing the role of the planning system in climate protection, this paper, in line with the latest government policy and guidance as well as recent academic literature on the nature and purpose of the UK planning system[35], defines planning in its broader sense and refers to spatial planning as place-based, collaborative actions and interventions that are aimed at sustainable development.[36]

Planning interventions

Adopting this broader definition of planning implies that its place-shaping role can be practiced in three interrelated ways: a) pro-active interventions in the way places are developed; b) regulatory interventions in how others undertake their own activities; and c) strategic coordination which enables participation and policy integration.

Planning's *pro-active interventions* use mechanisms such as: identifying spatial opportunities and constraints, land allocation for specific uses, or land assembly for major development projects. Planning's *regulatory interventions*, although often portrayed as negative restriction, have both protective and developmental intent. *Protective* regulation is justified on the basis of safeguarding assets, social opportunities, and environmental resources and reducing vulnerability to climate change risks; all of which would otherwise be squeezed out in the rush to develop. The justification for *developmental* regulation is to: promote better standards of building and area design, enhance quality of life and public realm, introduce a degree of stabilisation in land and property development process, and deliver the required infrastructures for transition to low carbon economy. However, in democratic market economies, such as the UK, planning interventions can succeed in delivering change only if they are undertaken in partnership with the private sector and through public engagement. The need for such partnership and for considering the implications of individual policy sectors for the quality of specific places provides the justification for Planning's *strategic coordination.* This is about

[34] See UN-HABITAT, 2009, chapter 4
[35] Vigar et al, 2000; Davoudi and Strange 2009
[36] Davoudi et al, 2009 **to be added to bibliography as chapter 1**

bringing together multiple policies and other stakeholders, and coordinating and integrating their activities in specific places.

The strategic role of planning in integrating other policy areas as well as linking development initiatives to investment programmes is increasingly recognised by the government[37] and by other stakeholders[38]. This is clearly reflected in the 2004 and 2008 reforms of the planning system which promote a more integrated, developmentally focused, and spatial approach to planning. However, it is interesting to note that in allocating carbon budget to the CLG, the *Action Plan*[39] seems to have adopted a narrow view of the planning system by putting the emphasis mainly on its regulatory interventions and not on its proactive interventions in shaping places. This is in contrast with its parallel publication- *The UK Renewable Energy Strategy*- which emphasises that, "The planning system plays a central role in delivering the infrastructure we need to reduce our carbon emissions and ensure continued security of energy supply. […] safeguarding our landscape and natural heritage and allowing communities […] shape where they live and work".[40]

Planning tools and resources

Various forms of planning interventions are achieved by drawing on a set of tools[41]. These tools can be consolidated into four types: strategies and plans, regulatory measures, resource mobilisation, and consultation and collaborative practices. Plans for example can perform tasks such as providing: a list of actions to be undertaken (an agenda); principles or rules to guide subsequent actions (a policy statement); an image of what could come about (a vision); a fully-worked out development scheme (a design); and / or guidance on sets of interrelated decisions about current action linked to specific contingencies anticipated in the future (a strategy)[42]. The power of a plan has a lot to do with the authority accorded to it in formal law or through national government policy.

[37] ODPM, 2005a
[38] See Vigar et al, 2000; Albrecht, 2004
[39] HM Government, 2009a
[40] HM Government 2009b:72
[41] Vigar et al, 2000
[42] Adapted from Hopkins, 2001, chapter 3

Hence, in planning systems where the right to develop is enshrined in a zoning ordinance (such as parts of the USA), the plans which express this carry a lot of weight in deciding what can take place on an individual plot. In more discretionary systems (such as in the UK), a plan is more a statement of what the local government wishes to see happen in a place. This, however, can be an important point of reference for those involved in development, shaping their own decisions.

The effectiveness of spatial planning is often dependant on the careful linkage between actions indicated in plans and strategies, the use of regulatory instruments, and the provision and mobilisation of resources (including human resources and collaborations) that are needed to carry a strategy forward. Weakness in such linkages has, in the past, led to problems with implementation. So, for example, although "the concept of sustainable development has been adopted more extensively and more firmly on a statutory basis in the planning systems than in any other field"[43], this has not always been matched by its outcomes in terms of dominant development processes[44]. The emerging discursive shift from sustainability to climate change has once again encouraged planners to re-think their processes, methods, skills and even perception of what constitute 'good places'. Consecutive national policy changes and the introduction of mechanisms such as sustainability appraisal of plans have also helped embedding sustainability, and increasingly climate change, issues into the planning framework[45]. However, the growing range of issues with which planning has to grapple with have not been matched with the level of resource allocated to it. This is particularly the case in terms of insufficient numbers of appropriately trained planners[46]. One area which is reportedly under-resourced is enforcement and monitoring[47], both crucial for implementation.

[43] Owens 1994 :87
[44] Levett, 1999; Davoudi and Layard, 2001
[45] Davoudi, et al, 2009
[46] As reflected in the *Eagan Review* (CLG, 2004)
[47] Rydin, 2009

5. THE ROLE OF SPATIAL PLANNING IN CLIMATE CHANGE

> "Spatial planning might seem to have both everything to do with climate protection…and at the same time little to offer in terms of pragmatic solutions". [48]

One reason for this apparent paradox is that while there have been growing national policy expectations from planning to respond to climate change, less attention has been paid to how the role of planning can be framed, and in which areas of climate policy planning interventions can be most effective. After a brief outline of the growing national policy expectations from planning in sub-section 5.1, the remaining part of this section will provide a framework for better understanding of the role of spatial planning in climate change (5.2).

5.1 Growing national policy expectations from planning

Since the 1990s, spatial planning has been expected to play a significant role in the delivery of sustainable development. Throughout the 1990s, subsequent revisions of the planning policy guidance notes on, for example, housing, transport, and regional planning, have extended the intent and scope of land use planning system to address the wider environmental concerns[49]. Some of the policy principles which were incorporated into planning at national and local levels, such as mixed use development, better design standards, and reducing the need to travel, were justified in terms of their potential for GHG reduction. Such measures were also encouraged by the evolving *UK Climate Change Programme*[50]. However, evidence gathered in the early 2000s show that while some local authorities were seeking to integrate climate change considerations into planning strategies and development control decisions, progress was slow and limited to some specific sites[51]. Hence, there was still "a sense of implementation deficit"[52], partly due to the lack of a clear and explicit national policy line. This in turn was partly as a result of the delay in publication of the *Advice on Better Practice* on climate change, due

[48] Bulkeley, 2006:203
[49] Davoudi, 2000; Healey and Show, 1994; Owens and Cowell, 2002
[50] DETR, 2000a
[51] Bulkeley & Betsill, 2003
[52] Owens and Cowell, 2002; Bulkeley & Betsill, 2005

to institutional changes in central government and the relocation of the environment function of the former DETR to DEFRA[53].

In the mid-2000s, changes to the planning system through the 2004 Act, mentioned above, as well as the development of climate change policy placed climate change more firmly at the centre of the spatial planning agenda. This was reflected in the 2005 UK strategy for sustainable development but, emphasis was put on 'softer' measures of, for example, "promoting or encouraging the use of renewable energy in new developments and reducing the use of non-renewable resources"[54]. This softer language was later strengthened by the more robust vocabulary of the PPS1, which stated that: "development plans should *ensure* that sustainable development is pursued in an integrated manner"[55]; and that, "Regional planning bodies and local planning authorities should *ensure* that development plans contribute to global sustainability by addressing the causes and potential impacts of climate change".[56] The explicit expectation from planning has since been recognised in the *UK Climate Impact Programme 2006*[57] and heightened by the 2007 Supplement to PPS1. This draws on planning's proactive interventions and strategic coordination to stress that, "used positively planning has a pivotal and significant role" in climate change policy.

The above outline of national policy development shows that, not only the expectations from planning have increased, but also its role has been elevated from being a facilitator and promoter of climate protection to one which should ensure policy delivery.

5.2 Framing the role of planning in critical climate change policies

While the expectations from planning have gradually risen over the past decade, a clear framework for better understanding of its role has been lacking. It is true that both PPS1 Supplement and Advice on Better Practice made an attempt to frame the role of planning

[53] See Wilson, 2006 for a detailed account
[54] DEFRA, 2005:88-89
[55] ODPM, 2005a:13, emphasis added
[56] ODPM, 2005a:13
[57] DEFRA, 2006

in climate change. The former considered the role to be five-fold: "secure enduring progress against the UK's emissions targets […]; deliver the Government's ambition of zero carbon development; shape sustainable communities that are resilient […]; create an attractive environment for innovation […] in renewable and low-carbon technologies […]; and, capture local enthusiasm and give local communities real opportunities to influence and take action on climate change."[58] The Advice identified a longer list of actions for planning. These are related to: the built environment (6 actions), infrastructure (5 actions), location (2 actions), and rural environment and land use (8). The actions range from consideration of passive solar gain, through flood risk and water resources as well as local food markets[59].

While this wide range of tasks and actions indicates the breadth of the planning role in the climate change agenda, "there is a real danger that … the urgency of addressing the issue will be diluted and a focus on the ways in which spatial planning can have most impact will be lost"[60]. It is therefore more useful to classify the bewildering array of actions and tasks- which are expected to be delivered or enabled by the planning system - into three broad and critical climate policy areas. These are: energy supply, energy demand and adaptation[61]. Overlaying these on different types of planning interventions will help to frame the role of spatial planning in climate change. These will be elaborated in turn and summarised in Table 1, below.

Before that, it is important to emphasise that, while the policy statements cited above clearly show that planning is considered as an essential delivery mechanism for national climate change policy, there are "limits to the role of planning". As stressed by *Advice on Better Practice*, "planning is only one way to respond to climate change. In the UK a whole range of policy instruments and programmes are being used including: taxation, regulation of markets, subsidies and programmes"[62]. Furthermore, in responding to climate change, planners are faced with a number of challenges which are arising from

[58] CLG, 2007a:7
[59] ODPM, 2004: 29-31
[60] Bulkeley, 2006:206
[61] Bulkeley, 2006
[62] ODPM, 2004: 27

the inherent complexity of dealing with climate change issues, such as: the interaction between energy, transport and settlement pattern; and between energy and building performance (see below, the sub-section on energy demand); transition from current state of the built environment to one which is less dependent on fossil fuel[63]; timescale and dynamics of change (e.g. extended, sometimes millennial, timescale of climate change and the traditional planning timescale of 10-20 years)[64]; interactions of various spatial scales (e.g. mitigation of GHG emissions has aggregate effects at a global level but derives from cumulative actions at smaller spatial scales); evolving policy context (outlined above) and the need for adaptive management[65]; and, potential conflicts between adaptation and mitigation measures (discussed above).[66] These complexities coupled with climate change uncertainties require a portfolio of policy responses and not just planning[67].

5.2.1 Planning and Renewable Energy Supply

Mitigating climate change requires a shift in the balance of energy supply from fossil fuels towards other sources, notably the renewable energy sources covering electricity, heat and transport. Under the agreement to drive the uptake of renewable energy across Europe, 15% of energy in the UK must be renewable by 2020. It is in this area of climate policy where the planning system has a particularly pro-active role. But paradoxically, it is also here that the planning system has been framed as 'part of the problem'. For example, *the UK Renewable Energy Strategy* (2009), which sets out the path to meet the legally-binding targets, discusses the role of planning under the heading of "drive delivery and clear away barriers"[68]**.** This echoes previous perceptions of planning as a barrier. *The Energy White Paper*[69], for example, called for planning to be 'streamlined and simplified'. Following this, the revised PPS 22 required that, "regional spatial

[63] See Rotmans et al, 2001
[64] See Lowe et al, 2006
[65] Willows and Connel, 2003
[66] Beisbroek, et al, 2009
[67] Hall and Solomatine, 2008
[68] HM Government, 2009b:9 emphasis added
[69] DTI, 2003

strategies and local development documents should contain policies designed to promote and encourage, rather than *restrict*, the development of renewable energy sources"[70].

Large scale renewable energy supply

The framing of the planning system as a barrier has largely been due to delays in processing and often rejection of planning applications for renewable energy facilities, notably wind farms. This, in turn, has been due to major local opposition and spatial disputes. The success rate for wind farm application in England and Wales is a mere 40% through the normal procedures of the planning systems[71]. While local opposition is often dismissed as 'Nimbyism', numerous academic studies have suggested that the reasons for protest are not straight forward and depend on where, when and how people have been engaged in decision-making processes[72]. Similar conclusions are derived from research on other forms of renewable energies[73] and other major infrastructure developments, notably those related to waste management[74]. They all highlight that framing the role of spatial planning as a top-down delivery system for national policy objectives and targets is inadequate. They argue that in practice local planning is enmeshed in a complex process of negotiation with multiple stakeholders and balancing of multiple and often competing policy interests[75]. Research has shown that "it is impossible to think about the implementation of renewable energy without addressing the involvement and impact of the public in these processes"[76]. The perceived failure of local planning decisions in delivering renewable energy has thus led to the reform of the planning system through the *Planning Act*, 2008. The Act provides for the decisions on major infrastructure, including large renewable energy facilities[77], to be taken centrally by an independent Infrastructure Planning Commission. The Act also puts a statutory duty on regional and local planners to take action on climate change.

[70] ODPM, 2005b: 1.2 emphasis added
[71] Toke, 2003; 2005
[72] Jobert et al, 2007; Wolsink 2007; Soerensen et al, 2001
[73] See Riccie et al, 2007 on hydrogen filling station
[74] Davoudi and Evans, 2005
[75] Bell et al, 2005; Upham and Shackley, 2006; Healey, 1997
[76] Haggete, 2009
[77] This includes renewable electricity generating plants of over 50MW onshore and 100MW offshore in E&W and the adjacent offshore Renewable Energy Zone (REZ) (HM Government, 2009b:73)

To ensure a proactive approach to renewable energy supply, regions are expected to set targets in line with national targets or better. Similarly, local planning authorities are expected to go beyond encouraging the development of renewable energies to meet specific targets for new capacities. These provisions have been strengthened by *the UK Renewable Energy Strategy* [78] which put forward "a number of measures that are designed to help local and regional bodies deliver these challenging expectations". These measures, aimed at "swifter delivery"[79], are mainly focused on providing more flexibility in planning's regulatory interventions. As regards strengthening planning's proactive interventions, the Strategy emphasises that, "effective and proactive strategic planning […] is […] vital if we are to capitalise on the renewable opportunities" (p.78). Mindful of the contested nature of local planning decisions and the continuing conflict of interests over the right balance of local and national priorities as well as costs and benefits of development, the Strategy then goes on to stress that, "key to this will be a transparent, robust and evidence-based process in which individuals, communities, developers and planners can engage" (p.78). This not only shows that strategic planning is a collaborative process, but also reveals the limitation to its proactive capacity, as mentioned above.

Small scale renewable energy supply

At the local level, the strategic coordination and enabling role of spatial planning have been drawn upon more explicitly in emerging local climate policies.[80] It is also at the local level that innovative planning responses have emerged during the 2000s to promote smaller, on-site, renewable energy facilities. Such innovations have challenged the framing of the planning system as a mere delivery mechanism for national policy. These bottom-up initiatives have used the developmental intent of planning's regulatory interventions to generate renewable energy, focusing on specific sites and technologies.

[78] HM Government, 2009b:76
[79] This is the title of chapter 4 of the Strategy which deals with planning issues on p.70
[80] Bulkeley and Kern, 2006

The most notable example is 'The Merton Rule'[81], which requires the incorporation of at least 10% (of estimated energy requirement) in developments over 1000 sqm[82]. The Rule has been implemented by an estimated 100 local authorities[83] with more signing up to its dedicated website[84]. More importantly, the GLA has sought to incorporate into the 2007 amendments to the London Plan a policy for 20% of energy to be met by on-site renewable and/or decentralised sources.[85] These local initiatives went beyond the PPS 22[86] policy which required for an undefined percentage of the energy to be used in new residential, commercial and industrial developments to come from on-site renewable sources, provided it is suitable and does not put "undue burden on developers"[87]. However, national policy has since been widened through the PPS 1 Supplement. Beyond the Merton Rule, there is now a wealth of Supplementary Planning Guidance (SPG) which provides advice on climate change mitigation measures to planning applicants[88]. Developing such guidance is now encouraged by national policy. PPS 1 Supplement, for example, recommends that decentralised, renewable and low carbon energy supplies to be incorporated into new development[89]. Furthermore, review of the permitted development rights for households [90] aims to speed up the take up of small scale renewable installations[91].

To sum up, attempts at tapping into the proactive potential of the planning systems have been hampered by its limited leverage in bringing forward development projects to meet the national or local targets for renewable energy. Regions, for example, "have very little direct control over the energy infrastructures in their territory. At best, they can contribute to favourable contexts, but they do not take the key decisions that have long-

[81] This was devised by planner in the London Borough of Merton as a form of planning condition for new development of over 1000sqm.
[82] FoE, 2005:7
[83] LGA, 2007:34
[84] www.themertonrule.org.uk
[85] GLA, 2007
[86] Which will soon be combined with PPS1 climate change policies if the proposals by the *UK Renewable Energy Strategy* (HM Government, 2009b) are implemented
[87] ODPM, 2005b:8
[88] See Rydin, 2009 for a list
[89] CLG, 2007a
[90] CLG, 2007b
[91] See also HM Government, 2009b: 77-78

term consequences"[92]. Without a strong national and local coalition of values in favour of decarbonising the UK economy, planning's proactive interventions will continue to face (and compromise against) challenges from other competing demands. Already, concerns have been raised about the proposed mapping of areas to identify renewable opportunities and constraints. The *Renewable Energy Association*, for example, has questioned the role of planners and suggested that, "it is project developers rather than planners who know best where to locate a scheme"[93]. Statements such as this tend to misinterpret the role of planners as technical experts in renewable technologies, while in practice their role is to consider the technical issues presented to them along with a whole host of other competing demands on the system, such as provision of housing, economic regeneration, landscape and heritage protection, to mention just a few.

5.2.2 Planning and Efficiency in Energy Demand

Transforming the UK into a low carbon economy requires policies and actions that are aimed at not only increasing the supply of low carbon and renewable energy, but also substantially reducing energy demand. The action plan for transition to a low carbon economy emphasises that, "reducing our demand for energy from the energy system is fundamental to the Government's strategy, particularly because in many cases doing so saves money for households and businesses, whilst maintaining or improving our standards of living"[94]. Managing energy demand through land use policies has been a major part of planning's sustainable development objective since the 1990s, as mentioned earlier. Two areas in particular have been at the centre of attention. One is the need to reduce car travel through policies on the location of new development and accessibility, and the other is to increase energy efficiency of the built environment through design policies and the layout of new developments. These will be discussed in turn.

[92] Smith, 2007:6268
[93] *Planning* 2009: 8
[94] HM Government, 2009a: 171

Reducing car travel

Numerous studies have tried to establish the link between urban form, land use and travel patterns. While socio-economic variables often explain the variation in trip-making more significantly than the land use factors[95], evidence shows that at the regional and city levels three land use characteristics have major impacts on travel behaviour. These are density of development, settlement size, and access to facilities and services [96] with density having a greater impact than settlement size in encouraging walking and cycling. The much cited research by Newman and Kenworthy (1999) which compared 84 cities has shown that density has an important impact on the distances travelled, too. This is confirmed by studies undertaken in the United States[97].

The main conclusions with regard to the impacts of land use factors on travel behaviour can be summarised as follows[98]: a) at the regional and city level, to reduce travel, the size of new development, especially housing, should be substantial (25-50,000 population) and located near to or within existing settlements, with the provision of local facilities and services phased so as to encourage local travel patterns; b) while average journey lengths by car are relatively constant (about 12 km) at densities of 15 persons per hectare, at lower densities, it increases by up to 35%. Similarly, as density increases the number of trips by car decreases from 72% of all journeys to 51%; c) mixed uses reduce trip lengths and car dependence particularly with regard to proximity of jobs to houses[99]; d) as settlement size increases, the trips are shorter with more trips taking place by public transport; e) development which is near pubic transport interchanges and corridors (transit-oriented development) have a higher level of accessibility and are less car dependent[100]; and f) the availability of parking is a key determinant in the level of car use.

[95] Stead, 2001; Hickman, and Banister, 2005
[96] Banister and Anable, 2009
[97] Ewing, 1997; Holtzclaw, 1994; Litman, 2007
[98] Hickman and Banister, 2005; Banister and Anable, 2009
[99] Cervero, 2006
[100] CTODRA, 2004

At the local neighbourhood level, the New Urbanism debate has highlighted a number of design factors which can reduce short distance car travel and can be incorporated in new development using SPGs and other planning regulatory interventions. These include: direct routing for slow modes of travel, quieter and narrower streets[101], accessible neighbourhoods, street connectivity, thriving town centres and high streets, pedestrianisation, parking management, higher density of dwellings, and using brown field sites for infill[102].

In all these areas spatial planning can use its proactive and regulatory interventions to make a difference. While planning may have a limited role in the short term, compared with fiscal measures for example, it certainly has a more significant role in the longer term[103] by fostering sustainable location choices, facilitating other policy areas, and acting as a complementary policy for technologically-driven and demand-management policies so that their benefits are 'locked-in'[104]. Furthermore, given the unequal distribution of GHG emissions from personal travel in the UK[105], the role of planning in providing for local services and access to them by sustainable modes of transport is pivotal to ensure accessibility for lower income groups. Overall, there is now compelling evidence which shows that the location of new housing and other developments in the UK has "substantial implications for: the level of demand on transport systems, journey distances, and the use of different modes of transport over the next 20-30 years"[106].

Increasing energy efficiency of the built environment

Here, the role of spatial planning relates to three areas: firstly, the location, layout, landscaping and site design for new development[107], secondly, the design of individual

[101] Calthorpe, 1993
[102] Banister, 2007
[103] Grazi and van den Bergh, 2008
[104] CfIT, 2007
[105] As evidenced by Brand and Boardman, 2008
[106] Banister and Anable, 2009
[107] Ideas about news sustainable settlements have been brought together in the New Urbanism (in the US) and compact city (Europe and UK) literature, mentioned earlier. See for example: Calthorpe, 1993; Duany et al, 2001

buildings, and more recently, the environmental standards of larger developments such as the eco-towns.

Planning provisions for increasing the efficiency of new buildings date back to the late 1990s when pioneering local councils (such as Newcastle) incorporated energy efficiency measures in their development plans[108]. Such practices, particularly through SPG, became more wide spread across the UK following publication of the PPG3 on housing. This suggested that planning authorities should "promote the energy efficiency of new housing where possible"[109]. However, the scope for planning intervention in this area remained limited, as the standards of design in new buildings are controlled by the Building Regulations. While steps have been taken to revise the Regulations to achieve more sustainable design and construction, until recently progress has been limited[110]. Hence, this has left a regulatory gap into which the planning system has gradually moved.

The main shift came in 2006 when the government introduced a package of measures, labelled *Towards Greener Building*[111]. These are aimed at achieving zero-carbon homes by 2016. Part of this package was *Code for Sustainable Homes*[112]. Although achieving specific rating of the Code is voluntary, all new buildings have to be assessed against the Code as part of the planning permission process. This has signalled the recognition of the regulatory potential of spatial planning which can go beyond the provisions of the Building Regulations and can also be extended to issues such as connection to Combined Heat and Power schemes. Furthermore, the critical role of the planning system in strategic coordination and "in bringing together interested parties and facilitating the establishment of decentralized energy systems" has also been emphasised in *Building a Greener Future*[113].

[108] Bulkeley, 2006
[109] DETR, 2000b:3
[110] A new version with more stringent energy efficiency measures in Part L took effect in 2006. These increase the efficiency standards by 40% over 2002 levels
[111] CLG, 2006a
[112] A government-endorsed rating system for new housing with the sixth star of rating awarded to zero-carbon development (CLG, 2006b).
[113] CLG 2007c:15

New developments with major planning inputs are also being piloted to meet the highest environmental standards on a large scale notably: the eco-towns, the Thames Gateway eco-region, and the London Olympic Park. Eco-towns are new settlements[114], promoted primarily as part of meeting government target to build 240,000 new homes per annum by 2016. However, in doing so they are required to "be exemplar projects that encourage and enable residents to live within managed environmental limits and in communities that are resilient to climate change"[115]. One of the most ambitious targets for eco-towns is the achievement of zero-carbon emission so that, "over a year the net carbon dioxide emissions from all energy use within the buildings on the eco-town development as a whole are zero or below"[116]. Whilst there are some concerns over the proposed location of eco-towns, they will provide learning for planners and others involved about new ways of decarbonising existing communities[117].

The preceding account shows that attentions so far have been put largely on new development. It may be true that, "if we build the houses we need, then by 2050 as much as one-third of the total housing stock will have been built between now and then"[118] but, this means that two-thirds of the dwellings in 2050 have already been built. Some commentators have argued that 75% have already been built.[119] Improving the energy efficiency of the existing building stock is therefore paramount. As the CLG statistics show[120], there is a long way to go in making progress to 2020 and beyond. Planning's regulatory intervention can be drawn upon to move this agenda forward. This is already taking place at the local level, using SPG to "require cost-effective energy efficiency measures to be carried out for the existing building as a condition of planning consent for

[114] For pros and cons of new settlement versus other forms of accommodating growth (such as urban infill and urban extension) see Breheny et al (1993) and Green and Handley, 2009.
[115] CLG, 2009:2
[116] CLG, 2009: 6
[117] HM Government, 2009a:92
[118] CLG, 2007a: 5
[119] Power, 2008
[120] Almost two-thirds of cavity walls are filled in the UK and only 35% of lofts are insulated to at least 150mm with the figures in private rented sector as low as 21%. Warm Front fits or repairs a central heating system every minute of every working day in vulnerable households across England (HM Government. 2009a: 83)

a home extension"[121]. Others have suggested more drastic measures, arguing that meeting the national target for GHG emissions in the housing sector requires demolition of 80,000 dwellings per year[122]. While demolition was firmly on the agenda of the Housing Market Renewal, government is putting more emphasis on refurbishment, as reflected in the ambitious *Great British Refab* initiatives, announced in February 2009. Its aim is that by 2030 all homes will have undergone a 'whole house' package[123] including all cost-effective energy saving measures plus renewable and low-carbon heat and electricity measures as appropriate[124]. The role of spatial planning in this area is not limited to regulatory measures deployed at the point of planning consents. It also extends to more strategic interventions within the framework of urban regeneration. In fact, "there may be scope for returning to some of the ideas of the 1970s concerned with housing improvement and bringing together housing and planning policy in new ways"[125]. Similar place-making endeavours can be sought in commercial areas in the context of town centre management. This is already taking place in the form of Energy Action Areas where low carbon technology is being showcased[126].

However, there is a strong line of argument in academic literature that the potential for spatial planning to reduce emissions, or indeed achieve other sustainability objectives, has been persistently undermined by an overriding expectation from the planning system to provide for predicted demand for growth of: housing, economic activity, traffic volume, waste generation, construction activity, out of town shopping, and so on[127]. Such potential may be further hampered as a result of the current economic recession as the emphasis is not just on providing for but also stimulating demand.

[121] LGA, 2007:34
[122] Boardman, 2007
[123] A 'whole house' approach means considering a household's energy needs and carbon dioxide impacts as a whole, and establishing a comprehensive package of measures to address them.
[124] HM Government, 2009a:84
[125] Rydin, 2009
[126] Pilot areas are New Wembley, Barking Town Centre, Merton and Southwark
[127] See the contributions in Davoudi et al, 2009

5.2.3 Planning and Adaptation to Climate Change

Developing resilience to the inevitable impacts of climate change is another area in which spatial planning has a significant role to play. Evidence on the extent to which planning has become engaged with adaptation is mixed. While some criticise planners for being fixated on mitigation to the near exclusion of adaptation[128], others disapprove of them for not paying enough attention to mitigation policies[129]. However, as mentioned in Section 2 of this paper, the emerging consensus is that emphasis should be placed on integrating both measures and ensuring that adaptation policies do not jeopardise, in the long term, the efforts for mitigating the causes of climate change. To this aim, integrated scenarios and models are being developed to assist complex decisions on the right course of action[130]. There is now a clear governmental expectation from the planning system with regard to adaptation. It is expected that, "national policy statements on nationally significant infrastructure projects, regional strategies and local development documents must all take account of a changing climate […] to deliver planning strategies that secure new development in ways that minimise vulnerability and provide resilience to climate change." [131]

Four areas of climate risk have been at the centre of adaptation efforts. These are related to risks of: flooding, coastal erosion, heat waves, and drought (particularly in the south of England). The role of spatial planning has been mainly related to: a) the location of new development away from the areas of risk, b) the design and layout of buildings and urban areas which are resilient, and c) the promotion of sustainable water management in new developments. The focus here will be on issues around flood risks and heat waves which have attracted substantial attention.

[128] For example, LGA, 2007
[129] For example, FoE, 2005; Howard, 2009
[130] See for example, the UKRC-funded research programmes
[131] HM Government, 2009a:110

Flood risks

In England and Wales, planning policy on flood risk was first introduced in 1992. Its subsequent revision in 2001 made it clear that, "the susceptibility to flooding is material planning consideration" and planners should "consider how a changing climate is expected to affect the risk of flooding over the lifetime of developments"[132]. This was issued well before the Foresight Future Flooding study [133] which led to a major reframing of government's long term strategy for flood risks and coastal erosion. Instead of focusing only on building flood defences, attentions were placed on recognising the need for *Making Space for Water* [134] and protecting flood plains from development. Spatial planning decisions can influence both the probability of flooding and its consequences. As regards the former, the most recent revision of PPS 25 [135] requires planners to adopt a 'risk-based' approach "to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk". Development plans have to conduct a sequential test to steer new development towards the lowest probability flood zones, identified by the Environment Agency (EA), and to undertake flood risk assessment. By 2004, almost all development plans had flood risk statements or policies[136]. Despite this, nearly a quarter of the applications to which the EA has objected on the grounds of flood risks have been built in 'at risk' areas. Furthermore, 62% of the EA objections to applications in English flood zones made on flood risk grounds in 2006/07 were because of the lack of adequate flood risk assessment[137].

While some criticise local planning decisions for allowing development to go head on floodplains, others (for example in the consultation responses to PPS 1 Supplement) criticise national planning policy for being too "restrictive" and inflexible in "areas that

[132] DETR, 2001:4
[133] DTI, 2004
[134] DEFRA, 2005
[135] CLG, 2008
[136] EA, 2004: 3; Colman, 2009
[137] Colman, 2009. As of July 2009, the Government is consulting on making it a legal requirement to prepare flood risk assessments taking account of the latest climate projections (HM Government, 2009a:110).

have limited land available for development"[138] particularly for the provision of much-needed housing. This clearly shows the context within which planning decisions have to be made. It also shows that planning can not only use its regulatory tools to protect 'at risk' areas, but also its collaborative practices to provide arenas for discussing different sides of the arguments, and negotiating the terms upon which trade-offs need to be made.

Heat waves

As regards the risk of heat waves, the headline for spatial planning is the urban heat islands. This refers to the several degrees warmer air temperature in urban areas compared with the countryside; due partly to the surface cover[139]. The urban heat island effect in turn has a major impact on human health, energy use and biodiversity. According to the *Urban Environment Report*[140], urban heat islands can be classed as 'systemic' rather than 'cumulative' issues; the distinction being centred on whether the issues apply to all settlements or mainly to towns and cities. As a systemic issue, tackling urban heat islands "requires significant local powers in terms of planning and design"[141]. This reinforces the *Urban Task Force's* (1999) recommendations that called for an integrated approach to planning, urban design, and management with a view to enhance the potential amenity value of pubic realm. Multi-functional green networks or 'green infrastructure'[142] can provide cooler microclimates, reduce surface water runoffs, and help urban areas better adapt to climate change. Protecting local amenities, notably green areas, has been an integral part of the planning system. However, the rationale for it has changed over time[143]. Broadly speaking, the perception of the value of green spaces has shifted from a focus on aesthetic / functional (1950s-60s), to environmental stewardship (the 1970s), to market commodity (the 1980s), and to ecological (1990s). Today, the need to adapt to climate change has renewed the functional rationale for protection of green spaces. It has also extended their functional values from aesthetic to biodiversity and

[138] CLG, 2006c:14
[139] Whitford et al, 2001
[140] RCEP, 2007
[141] RCEP, 2007:83
[142] Handley et al, 2007
[143] Healey and Shaw, 1994; Davoudi, 2000

ecosystem. The green infrastructure resources[144] need to be strategically planned, at both regional and local planning levels, and designed and managed to maximise their climate-related functionality[145]. Planning's proactive and regulatory interventions provide critical means for achieving this. However, even here, some academics have raised the potential conflict between the environmental and the social dimension of place making[146].

Overall, the role of spatial planning in adapting to climate change is still at the developmental stage. Some even argue that it is taking place "on the fringes of the spatial planning system"[147]. Institutionally, this is because the growing stakeholder-based *Climate Change Partnerships* that have been set up across the UK to pursue local adaptation strategies are operating largely outside the formal arenas of the planning system. Some are drawing on alternative rationalities to encourage resilience. In London, for example, they are encouraging "businesses to consider re-locating flood-sensitive IT equipment and archives out of London to areas with negligible flood risks[148]. However, the situation is very dynamic and a whole host of new climate protection policies (such as surface water management plans) are on the horizon whereby the planning system has been earmarked to deliver. Moreover, the need for adaptation to climate change is raising important conceptual issues for planners. It highlights the need for understanding space and place in relational, rather than absolute terms, and taking into account the ubiquity of change and uncertainty[149].

5.3 Summary

To sum up, Table 1, below, maps the three forms of planning interventions, discussed in section 4.2, on the three areas of climate change policy, discussed in section 5.2. It provides a framework for understanding the role of spatial planning in tackling climate change impacts.

[144] This includes street trees, private gardens and city parks
[145] Gill et al, 2009
[146] See for example Hebbert, 2009
[147] Bulkeley, 2009
[148] CLC, 2007:ii
[149] See Davoudi and Strange, 2009, for a more detailed discussion of relational versus absolute space.

Table 1: Spatial planning interventions and critical climate change policies

			Types of planning interventions		
			Proactive Through plans, strategies, SPG; resource mobilisation	**Regulatory** Through development control / Sec. 106	**Strategic coordination** Through consultation / collaboration
Key climate change policies	**Energy Supply (mitigation)**	Large renewables	Site allocation / identification	Infrastructure Planning Commission	Renewable energy industry / local communities etc
		Small renewables & micros	Specific requirements (e.g. Merton Rule)	Permitted development	
	Energy Demand (mitigation)	Reducing travel	Settlement size, density, mixed use location and accessibility, parking		Developers / transport authorities Etc
		Energy efficiency		Planning conditions, Code for Sustainable Homes	
	Adaptation	Flood risk	Protecting flood plains from development		Environment Agency / developers
		Heat wave	Protecting & enhancing green infrastructure	Planning conditions, Design standards	

6. CONLCLUDING REMARKS

Responding to climate change is a challenge not just for the planning system but also across the policy sectors. There has been a proliferation of governmental reports, national planning policy statements, emerging legislation at both national and international levels, as well as academic literature which demonstrate a wide-spread recognition of the pivotal role of spatial planning in delivering climate change mitigation and adaptation policies. Much has already been delivered through the planning system in relation to environmental and climate protection. However, most of the progress has been made in a long period of unprecedented economic growth fuelled by an incredibly buoyant property, and particularly housing, market. This period has now come to a halt. We are in a recession, the likes of which have not been experienced since the Great Depression of the 1930s. Thus, the critical question is how the downturn will affect the balance of priorities in spatial planning decisions. If history is anything to go by the answer may not be promising. That is why planners are increasingly concerned that sustainability goals may be perceived as "luxurious embellishments to developments rather than forming an integral and vital part of their success."[150] However, as Sir Nicholas Stern has argued, "with strong, deliberate policy choices it is possible to 'decarbonise' both developed and developing economies on the scale required for climate stabilisation, while maintaining economic growth in both"[151]. Indeed, there are synergies to be made between the economic and ecological concerns if a long term perspective is developed. It is in this context that spatial planning can play a pivotal role not just as a technical means by which climate change policies can be delivered, but also as a democratic arena through which negotiations over seemingly conflicting goals can take place, diverse voices can be heard, and place-based synergies can be aimed for. This is a kind of planning that is not just about technical matters, but also about the "critical appreciation and appropriation of ideas"[152].

[150] Hartley, 2009:16
[151] quoted in *The Times*, 2006:7
[152] Friedmann, 1998:250

Furthermore, to capitalise on planning's proactive and regulatory interventions and its strategic coordination capacity at the local level, more needs to be done at the national level on a number of fronts, including:

- Policy prioritization in favour of environmental sustainability and climate protection instead of an overriding presumption in favour of development;
- Better institutional coordination between and within central government departments on critical climate change issues;
- Enhancement of the quality and quantity of skilled human resources through, for example, making the existing bursaries for planning education more climate focused; and,
- Allocating more resources to planning authorities (commensurate with their growing responsibilities) to enable them to deliver national policy goals and also offer innovate local responses to climate change.

The latter is particularly important in the context of adaptation responses because they need to be tailored-made and fine-tuned to suit the specific socio-economic and geophysical circumstances of localities. Hence, the local and regional planning bodies with their local knowledge are in a better position to deliver them.

REFERENCES

Ackerman, F., Stanton, E.A., Hope, C., Alberth, S., Fisher, J. and Biewald, B. (2008) *The Cost of Climate Change: What We'll Pay if Global Warming Continues Unchecked*, Natural Resources Defence Council, New York

Adger, W.N. (2001) Scales of governance and environmental justice for adaptation and mitigation of climate change. *Journal of International Development*, vol 13 no 7, pp 921-931

Albrechts, L. (2004) 'Strategic (spatial) planning re-examined ', *Environment and Planning B: Planning and Design* 31(5): 743-758

Banister, D and Anable, J. (2009) Transport Policies and Climate Change, in Davoudi, et al (eds), *Planning for Climate Change*, Earthscan, London; pp. 55-70

Banister, D. (2005) *Unsustainable Transport: City Transport in the New Century*, Routledge, London

Bell, D., Gray, T. and Haggett, C. (2005) 'Policy, participation and the social gap in wind farm siting decisions', *Environmental Politics*, vol 14, no 4, pp460-477

Berke, P. (1995) *Natural Hazards Reduction and Sustainable Development: A Global Assessment.* Working Paper Number S95-02. Centre for Urban and Regional Studies, University of North Carolina at Chapel Hill, Chapel Hill, NC

Biesbroek, R.G, Swart, R.J. & van der Knapp, W.G.M. (2009) The mitigation-adaptation dichotomy and the role of spatial planning, *Habitat International*, vol. 33, pp. 230-237

Boardman, B. (2007) 'Examining the carbon agenda via the 40% house scenario', *Building Research and Information*, vol 35, no 94, pp363-378

Brand, C. and Boardman, B. (2008) 'Taming the few – The unequal distribution of greenhouse gas emissions from personal travel in the UK', *Energy Policy*, vol 36, no 2, pp224-238

Breheny, M., Gent, T., and Lock, D. (1993) *Alternative Development Patterns: New Settlements*, HMSO, London

Bulkeley, H. (2006) 'A changing climate for spatial planning?', *Planning Theory and Practice*, vol 7, no 2. pp.203-214

Bulkeley, H. and Betsill, M. (2003) *Cities and Climate Change: Urban sustainability and global environmental governance*, Routledge, London

Bulkeley, H. and Betsill, M. (2005) *Cities and Climate Change: urban Sustainability and Global Environmental Governance.* Routledge, London

Bulkeley, H. and Kern, K. (2006) 'Local government and climate change governance in the UK and Germany', *Urban Studies*, vol 43, no 12, pp2237-2259

Bury, R. (ed) (1998) *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*, R.J. Joseph Henry Press, Washington DC

Calthorpe, P. (1993) *The Next American Metropolis – Ecology, Community and the American Dream*, Princeton Architectural Press, New York

Campbell, H. (2006) Is the issue of climate change too big for spatial planning? *Planning Theory and Practice*, vol 7, no. 2, pp 201-203

CEC (2007) *Green Paper Adapting to climate change in Europe: options for EU action, COM (2007) 354 Final*, Office of Official Publications of the European Communities, Luxembourg

Cervero, R. and Duncan, M. (2006) 'Which reduces vehicle travel more: Jobs-housing balance or retail-housing mixing?', *Journal of the American Planning Association*, vol 74, no 4, pp475-490

CLC (2007) *Rising to the Challenge: The City of London Corporation's Climate Adaptation Strategy*, City of London Corporation, London

CLG (2004) *The Eagan Review: Skills for Sustainable Communities*, CLG, London

CLG (2006a) *Towards Greener Building*, CLG, www.communities.gov.uk/archived/publications/planningandbuilding/buildinggreener, accessed July 2009

CLG (2006b) *Code for Sustainable Homes: a step-change in sustainable home building practice*, CLG, www.planningportal.gov.uk/uploads/code_for_sust_homes.pdf, accessed July 2009

CLG (2006c) *Consultation - Planning Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1*, HMSO, London

CLG (2007a) *Planning Policy Statement: Planning and Climate Change, Supplement to PPS1*, HMSO, London

CLG (2007b) *Changes to Permitted Development: Consultation Paper 1: Permitted Development Rights for Householders* CLG, www.communities.gov.uk/archived/publications/planningandbuilding/changespermitted, accessed July 2009

CLG (2007c) *Building a Greener Future: Policy Statement*, www.communities.gov.uk/publications/planningandbuilding/building-a-greener, accessed July 2009

CLG (2008), *Planning Policy Statement 25 Development and Flood Risk Practice Guide*, Department for Communities and Local Government, London

CLG, 2009, *Planning Policy Statement Eco-towns, A Supplement to PPS 1*, CLG, London

Commission for Integrated Transport (DfIT), 2007, *Transport and Climate Change; Advice to Government from the CfIT*, London, October

CTODRA (2004) *Hidden in Plain Sight: Capturing the Demand for Housing Near Transit*, Centre or Transit Oriented Development and Reconnecting America, www.reconnectingamerica.org, accessed July 2009

Davoudi, S. (2000) 'Sustainability: A New 'Vision' For the British Planning System', *Planning Perspectives*, vol 15, no 2, pp123-137

Davoudi, S., Crawford, J. and Mehmood, A. (eds) (2009) *Planning for Climate Change, Strategies for mitigation and adaptation for spatial planners*, Earthscan, London

Davoudi, S. and Evans, N. (2005) The challenge of governance in regional waste planning, *Environment and Planning C: Government and Policy*, vol 23, pp493-517

Davoudi, S. and Layard, A. (2001) 'Sustainable Development and Planning: An Introduction to Concepts and Contradictions', in A. Layard, S. Davoudi and S. Batty (eds.), *Planning for a Sustainable Future*, London: Spon, pp.7-19

Davoudi, S. and Strange, I. (eds.) (2009) *Space and Place in Strategic Spatial Planning*, London: Routledge (RTPI Library Series)

Davoudi, S. Hull, A. and Healey, P. (1996) 'Environmental Concerns and Economic Imperatives in Strategic Plan-making', *Town Planning Review*, vol 64, no 4, pp421-436

DEFRA (2005) *Securing the Future: Delivering UK sustainable development strategy* www.sustainable-development.gov.uk/publications/uk-strategy/index.htm, accessed July 2009

DEFRA (2005) *Making space for water. Taking forward a new Government strategy for flood and coastal erosion risk management in England - First Government response to the autumn 2004 Making space for water consultation exercise* at: www.defra.gov.uk/environ/fcd/policy/strategy/firstresponse.pdf , accessed July 2009

DEFRA (2006) *Climate Change: The UK Programme 2006*, Department for the Environment, Food and Rural Affairs (DEFRA), HMSO, London

DETR (2000a) *Climate Change, the UK Programme*, HMSO, London

DETR (2001) *Planning Policy Guidance 25: Development and flood risk*, HMSO, London

DTI (2003) *Our Energy Future - creating a low carbon economy*, *Energy White Paper*, HMSO, London

DTI (2004) *The Foresight Future Flooding Project*, Department for Trade and Industry, www.foresight.gov.uk/OurWork/CompletedProjects/Flood/index.asp, accessed July 2009

Duany, A, Plater-Zybrek, E. and Speck, J. (2001), *Suburban Nation: The Rise of Sprawl and the Decline of the American Dream*. New York: North Point Press

El-Masri, S. and Tapple G. (2002) 'Natural disasters, mitigation and sustainability: The case of developing countries', *International Planning Studies*, vol 7, no 2, pp157-175

Environment Agency (2007) *High Level Target 5 Development and Flood Risk in England 2006/7* at www.environment-agency.gov.uk/aboutus/512398/908812/1351053/1449570/?version=1&lang=_e accessed July 2009

European Environment Agency (EEA), 2007, *Climate change: The cost of inaction and the cost of adaptation, EEA Technical Report No 13/2007*, Office for Official Publications of the European Communities, Luxembourg

Ewing, R. (1997) Is Los Angeles style sprawl desirable? *Journal of the American Planning Association*, vol 63, no 1, pp107-126

FoE (Friends of the Earth), 2005, *Tackling Climate Change at the local level: The role of local development frameworks in reducing the emissions of new developments*, www.foe.co.uk/resource/briefings/ldf_climate_briefing.pdf, accessed July 2009

Folke, C, Hahn, T., Olsson, P. & Norberg, J. (2005) Adaptive governance of social-ecological systems, *Annual review of Environment and Resources*, vol 30, pp441-473

Friedman, J. (1998) Planning Theory Revisited, *European Planning Studies*, vol. 6, no.3, pp245-250

Gill, S., Handley, J. Ennos, R., Nolan, P. (2009) Planning for Green Infrastructure: Adapting to Climate Change, in: Davoudi, et al (eds), *Planning for Climate Change*, Earthscan, London; pp. 249-262

Goklany, I.M. (2007) integrated strategies to reduce vulnerability and advance adaptation, mitigation, and sustainable development, *Mitigation and Adaptation Strategies for Global Change*, vol 12 no. 5, pp755-786

Grazi, F. and van den Bergh, C.J.M., (2008), Spatial organization, transport, and climate change: Comparing instruments of spatial planning and policy, *Ecological Economics*, 67, pp. 630-639

Green, N and Handley, J., (2009) Patterns of settlement compared, in**:** Davoudi, et al (eds), *Planning for Climate Change*, Earthscan, London, pp. 46-55

Haggett, C. (2009) Public engagement in planning for renewable energy, in Davoudi, et al (eds), *Planning for Climate Change*, Earthscan, London

Hall, J. (2009) Integrated assessment to support regional and local decision making, in Davoudi, et al (eds), *Planning for Climate Change*, Earthscan, London

Hall, J. W. and Solomatine, D. (2008) 'A framework for uncertainty analysis in flood risk management decisions', *Journal of River Basin Management*, vol. 6, no 2, pp85-98.

Hamin, E. M. and Gurran N. (2008) 'Addressing climate change: Australian and U.S. planning responses', paper presented at *Association of Collegiate Schools of Planning conference*, Chicago, 6-11 July

Handley, J., Pauleit, S. and Gill, S. (2007) 'Landscape, Sustainability and the City', in J.F. Benson and M. Roe (eds) *Landscape and Sustainability*, second ed, Routledge, London, pp167-195

Hartley, L. (2009) 'Rocks and Hard Places', *Planning*, no 1800, 9 January, pp16-17

Healey, P. (1997) *Collaborative Planning: Shaping Places in Fragmented Societies*, MacMillan, Basingstoke

Healey, P. and Shaw, T. (1994) changing meanings of the 'environment' in the British planning system, Transactions of the British Institute of Geographers, vol 19, pp425-438

Hebbert, M. (2009) The three Ps of place making for climate change, *Town Planning Review*, vol 80(4): 359-370

Hickman, R. and Banister, D. (2005) 'Reducing Travel by Design', in K. Williams (ed) *Spatial Planning, Urban Form and Sustainable Transport*, Ashgate, Aldershot, pp102-122

HM Government (2009a), *The UK Low Carbon Transition Plan; National Strategy for Climate and Energy*; HM Government, London

HM Government (2009b), *The UK Renewable Energy Strategy*, HM Government, London

HM Treasury (2006) *The Stern Review: The Economics of Climate Change*. London: HM Treasury and Cabinet Office

Holtzclaw, J. (1994) *Using Residential Patterns and Transit to Decrease Auto Dependence and Costs*, National Resources Defence Council, Washington

Hopkins, L. (2001). *Urban development: the logic of making plans*, Washington DC, Island Press.

Howard, J. (2009), Climate change mitigation and adaptation in developed nations: A critical perspective on the adaptation turn in urban climate planning, in Davoudi, et al (eds), *Planning for Climate Change*, Earthscan, London

Intergovernmental Panel on Climate Change (IPCC), 2007a, *Climate Change 2007: Synthesis Report, Summary for Policymakers*, Cambridge University Press, Cambridge

Intergovernmental Panel on Climate Change (IPCC), 2007b, *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Cambridge University Press, Cambridge.

Janetos, T. (2007) 'Reporting and comments', presentation at Coping With Climate Change, National Summit, Ann Arbor, Michigan, 8-10 May, http://www.snre.umich.edu/files/janetoscopingpresentation_pdf, accessed July 2009

Jobert, A., Laborgne, P. and Mimler, S. (2007) Local acceptance of wind energy: Factors of success identified in French and German case studies, *Energy Policy*, vol 35, pp2751-2760

Klein, R. J. T., Schipper, L.E., Dessai, S. (2005) Integrating mitigation and adaptation into climate and development policy: Three research questions, *Environmental Science and Policy*, vol 8, no 6, pp579-588

Levett, R. (1999) 'Planning for a change', *Town and Country Planning*, September

LGA (2007) *A Climate of Change: Final report of the LGA Climate Change Commission*, LGA, London

Litman, T.A. (2007) *Land use impacts on transport: How land use factors affect travel behaviour*, Victoria Transport Policy Institute, Canada

Lowe, J. A., Gregory, J. M., Ridley, J., Huybrechts, P., Nicholls, R.J. and Collins, M. (2006) 'The role of sea-level rise and the Greenland ice sheet in dangerous climate change: implications for the stabilisation of climate', in Schellnhuber et al, (eds) *Avoiding Dangerous Climate Change*, Cambridge University Press, Cambridge, pp29-36.

McEvoy, D., Lindley, S., and Handley, J. (2006) 'Adaptation and mitigation in urban areas: Synergies and conflicts', *Municipal Engineer*, vol 159, no 4, pp185-91

Munasinghe, M. and Swart, R. (2004) *Primer on Climate Change and Sustainable Development: Facts, Policy Analysis and Applications*, Cambridge University Press, Cambridge

Newman, P.W.G. and Kenworthy, J.R. (1999) *Sustainability and Cities: Overcoming Automobile Dependence*, Island Press, Washington DC

ODPM (2004) *The Planning Response to Climate Change: Advice on better practice*, London, ODPM.

ODPM (2005a) *Planning Policy Statement 1: Delivering Sustainable Development*, www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps1/, accessed July 2009

ODPM (2005b) *Planning Policy Statement 22: Renewable Energy*, www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps22/, accessed July 2009

Owens, S and Cowell, R. (2002) *Land and Limits: Interpreting sustainability in the planning process*, London: Routledge.

Owens, S. (1994) 'Land, limits and sustainability: A conceptual framework and some dilemmas for the planning system', *Transactions of the Institute of British Geographers*, 19: 439-456

Pizarro, R., (2009) Urban form and climate change: towards appropriate development patterns to mitigate and adapt to global warming, in Davoudi, et al (eds), *Planning for Climate Change*, Earthscan, London, pp.33-46

Planning, (2009) Planners set green goals, 24 July, P.8

Power, A. (2008) *Does demolition or refurbishment of old and inefficient homes help to increase our environmental, social and economic viability?* State of Science Review undertaken for the Government Office of Science's Foresight project on Sustainable Energy Management and the Built Environment

Ricci, M., Newsholme, G., Bellaby, P. and Flynn, R. (2007) 'The transition to hydrogen-based energy: Combining technology & risk assessments and lay perspectives', *International Journal of Energy Sector Management*, vol 1, no 1, pp34-50

Rotmans, J. and van Asselt, M. B. A. (2000) 'Towards an integrated approach for sustainable city planning', *Journal of Multi-Criteria Decision Analysis*, vol 9, no 1-3, pp110-124

Royal Commission on Environmental Pollution (RCEP) (2007) *The Urban Environment*, TSO, Norwich

Rydin, Y., (2009), Sustainable construction and design in UK planning, in Davoudi, et al (eds), *Planning for Climate Change*, Earthscan, London, pp181-191

Smith, A. (2007) 'Emerging in between: The multi-level governance of renewable energy in the English regions', *Energy Policy*, vol 35, no 12, pp6266-6280

Soerensen, H.C., Hansen, L.K., Hammarlund, K. and Larsen, J.H. (2001) 'Experience with strategies for public involvement in offshore wind projects' *International Journal of Environmental and Sustainable Development*, vol 1, no 4, pp327-336

Stead, D. (2001) 'Relationships between land use, socio-economic factors, and travel patterns in Britain', *Environment and Planning B*, vol 28, no 4, pp499–528

Swart, R. and Raes, F. (2007) 'Making integration of adaptation and mitigation work: Mainstreaming into sustainable development policies?', *Climate Policy*, 7:288-303

The Economist, 2006, 'The heat is on', 9 September, p3, survey

The Times (2006) 'Stern Report: If We Act Now, We Can Avoid the Very Worst', 31 *December, pp6-7*

Toke, D. (2003) 'Wind power in the UK: How planning conditions and financial arrangements affect outcomes', *International Journal of Sustainable Energy*, vol 23, no 4, pp207-216

UN-Habitat (2009) *Global Report On Human Settlements 2009: Planning Sustainable Cities*, Earthscan, London (Chapter 4: The institutional and regulatory framework for planning; 72-93)

Upham, P. and Shackley, S. (2006) 'Stakeholder opinion of a proposed 21.5 MWe Biomass gasifier in: Winkleigh, Devon: Implications for Bioenergy Planning and Policy', *Journal of Environmental Policy and Planning*, vol 8, no 1, pp45-66

Urban Task Force (1999) *Towards an Urban Renaissance*, final report of the Urban Task Force chaired by Lord Rogers of Riverside, Department of the Environment, Transport and the Regions, E & FN Spon, London

Vigar, G., Healey, P. Hull, A. and Davoudi, S. (2000) *Planning, Governance and Spatial Strategy in Britain: An Institutionalist Analysis*, Macmillan, London

Whitford, V., Ennos, A.R. and Handley, J.F. (2001) 'City form and natural process - indicators for the ecological performance of urban areas and their application to Merseyside, UK', *Landscape and Urban Planning*, vol 57, no 2**,** pp91-103

Wilbanks, T.J., Leiby, P., Perlack, R., Ensminger, J.T., & Wright, S.B. (2007) Towards and integrated analysis of mitigation and adaptation: some preliminary findings, *Mitigation and Adaptation Strategies for Global Change*, Vol 12, no. 5, pp.713-725

Willows, R. I. and Connell R. K. (2003) 'Climate adaptation: Risk, uncertainty and decision-making', *UKCIP Technical Report*, UKCIP, Oxford

Wilson, E. (2006) Developing UK spatial planning policy to respond to climate change, *Journal of Environmental Policy and Planning*, vol. 8, no. 1, pp. 9-25

Wolsink, M. (2007) 'Wind power implementation: The nature of public attitudes: Equity and fairness instead of "backyard motives"', *Renewable and Sustainable Energy Reviews*, vol. 11, pp1188-1207