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CLIMATE CHANGE AND PLANNING: THE IMPLICATIONS OF THE STERN REPORT

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The significance of the Stern argument on climate change

While there remain those who resist the conclusions of the Intergovernmental Panel on Climate change, the scientific consensus on the scale, importance, consequences and causes of anthropogenic climate change is becoming increasingly strong. Indeed, under the banner of the precautionary principle, this consensus has already provided a sufficient basis for much governmental action on climate change where the political and professional will is present. Norway may indeed be one such country. It's list of climate protection measures is impressive, notably the carbon tax (covering 68% of all CO2 emissions), the domestic carbon emissions trading scheme and the encouragement of local climate plans prepared by the municipalities.

However, the publication of the Stern Report[1] in the UK, together with similar analyses elsewhere[2], has taken the argument for action on climate change to a new level. It has underpinned the scientific case with an economic case by demonstrating the scale of the economic costs of not taking such action and argued that the costs of taking action are dwarfed by the costs of inaction. In 2007 Stern put the costs of the damage due to climate change at a minimum of 5% global GDP per annum and, if a wider range of impacts are taken into account, as much as 20%. By contrast, the costs of a strong mitigation policy are estimated at an average of 1% GDP per annum over the period to 2050.

As with any modelling exercise it is possible to query these figures. The journal *World Economics*, for example, has seen a lively debate on many different aspects of

[1] Stern, N. (2007) *The Economics of Climate Change: the Stern Review* (Cambridge: Cambridge University Press)

[2] Ruth, M., Coelho, D. and Karetnikov, D. (2007) *The US Economic Impacts of Climate Change and the Costs of Inaction* Center for Integrative Environmental Research (CIER), University of Maryland

Carraro, C. and Sgobbi, A. (2008) *Climate Change Impacts and Adaptation Strategies In Italy. An Economic Assessment* Fondazione Eni Enrico Mattei, http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm

Report to Friends of the Earth England, Wales and Northern Ireland

Ackerman, F. and Stanton, E. (2006) *Climate Change – the Costs of Inaction* Global Development and Environment Institute, Tufts University, http://ase.tufts.edu/gdae/Pubs/rp/Climate-CostsofInaction.pdf

Stern's analysis; Dietz et al. provide a review and a final reply[3].However, the relevance of the Stern Report to discussing the role of planning does not lie in its detailed economic calculation. Rather its significance is that it puts climate protection policy at the heart of all policy systems that have an economic rationale as well as an environmental one and planning systems clearly fall into this category. Furthermore it provides a framework for responding to the differing distribution of impacts spatially, socially and sectorally and arguing that the overall impact is detrimental. This is again highly pertinent to planning as an activity which has traditionally sought to balance a variety of costs and benefits.

So what could a planning system do to contribute to mitigation of climate change? In both the UK and Norway, reducing carbon emissions is a major challenge. The UK is one of the top ten polluters accounting for 2% of global carbon dioxide emissions in 2006[4]. While Norway's share is only 0.003%, it still manages to be in the top ten polluters per capita, emitting 5.3 tons of carbon per person, compared to 2.8 tons p.c in the UK; this is due to the cold climate, Norway's industrial structure, transportation needs, changing social expectations and the impact of economic and population growth.

Table 1 The Carbon Top Ten (2006)

Country	Million tons of Carbon	Share of global total	Country	Tons of carbon per person
1. USA	1656	20%	**1.** Qatar	22.4
2. China	1480	18%	**2.** UAE	13.3
3. Russia	437	5%	**3.** Kuwait	10.4
4. India	391	5%	**4.** Singapore	9.2
5. Japan	342	4%	**5.** USA	5.5
6. Germany	221	3%	**6.** Canada	5.4
7. Canada	177	2%	**7.** **Norway**	**5.3**
8. **UK**	**171**	**2%**	**8.** Australia	4.5
9. South Korea	130	2%	**9.** Kazakhstan	4.1
10. Mexico	123	2%	**10.** Saudi Arabia	3.9

Source: Earth Policy Institute

The role of the planning system according to Stern

The Stern Report makes a case for what the role of the planning system should be. In an urban context – specifically in relation to the planning of new development – there are three aspects identified.

1. Performance standards for new developments.
Performance standards exist in the overlap between planning new development areas and controlling the standard of building and construction. Different countries handle this differently but building codes are a common policy tool. These can be prescriptive with regard to the methods of construction and/or the components of buildings, but they can also take the form of performance standards, i.e. outcomes on terms of energy or water efficiency. This gives the designer and builder more

[3] Diets, S., Anderson, D., Stern, N., Taylor, C. & Zenghelis, D. (2007) 'Right for the right reasons: a final rejoinder on the Stern Review' *World Economics* Vol. 8, No. 2, pp. 229 - 258

[4] Data from the Earth Policy Institute www.earth-policy.org/indicators

flexibility in deciding how to meet a given standard in a particular development , potentially making for a more cost-effective form of regulation. In the UK this is the basis both of the Building Regulations and also the new Code for Sustainable Homes[5].

Such standards are judged against modelled building performance and much therefore depends on the quality of the model being used. In the UK there have been doubts expressed as to whether the Standard Assessment Procedure that underpins our Building Regulations is a good measure of actual energy consumption in use. Any discrepancy will become more apparent with the move towards measuring and publicising the post-occupancy energy efficiency of buildings. The EU Energy Performance of Buildings Directive[6] mandates such energy assessments when buildings are let or sold and public buildings also have to display energy certificates advertising their efficiency standards.

2. Design standards for new developments

But planning new developments is about much more than just the methods and materials of construction. Planning offers more comprehensive guidance as what the development should look like, how it should function and what it should comprise. Within this, there is the scope for promoting new energy technologies (or the adoption of old technologies) which would increase the carbon efficiency of the development as a whole. In particular, energy systems at the level of the development can be planned into new development when the scale of the estate, neighbourhood or urban sector is considered. This can encompass combined heat and power plants, district heating, solar panels, photovoltaic cells, wind turbines, anaerobic digestion plants, and so on.

In the UK, the so-called Merton Rule has been influential[7]. Devised by a planner at the London Borough of Merton, this requires a proportion (typically 10% but can be higher) of the energy consumption of a new development to be met by renewable energy generation on the development site. No specific technology is specified leaving the developer to choose the option that is most suitable and cost-effective. Taking this one step further, the UK government has announced that all new housing should be zero-carbon by 2016 and all new commercial developments by 2019. This implies a considerable uplift on the expectations of the Merton Rule.

The zero-carbon targets have raised some debate as to how zero-carbon is to be defined and whether all the energy needs of a development can possibly be met by on-site energy installations. This is not that problematic if one is only considering the thermal energy demand of a building; substantial insulation can reduce this to almost zero. However, with more insulation, a greater proportion of the energy demand relates to the use of appliances within the buildings. It is doubtful whether this can be met from on-site renewables where the land area is limited. Whether this is the most efficient way of providing energy to users can also be questioned. This is a point I shall return to.

[5] http://www.planningportal.gov.uk/england/professionals/en/1115314116927.html
[6] http://europa.eu/scadplus/leg/en/lvb/l27042.htm
[7] www.themertonrule.org

3. Planning for a less energy intensive society

While energy use within buildings is important within total carbon emissions, it is also the case that travel between buildings is a major user of fossil fuels and hence source of carbon emissions. In Norway, transport and the growth of car use is one of the key reasons for the high per capital emissions. Planning has a role to play in devising new developments but also influence overall urban patterns that reduce the need to travel and encourage the use of less energy-consuming modes of travel. It has become a planning orthodoxy that this will be achieved by planning higher density settlements and organising the majority of new development around public transport nodes and interchanges.

In the UK the government has issued an Eco-Towns Prospectus inviting applications from developers and local councils for small new settlements that will be zero-carbon but also car-free. It anticipates that about 15 small new towns of about 5-20,000 homes will be built (although the recent downturn in the housing market is likely to delay the achievement of this goal).

UK Department of Communities and Local Government's EcoTowns Prospectus[8]

"The key features we want to achieve are:
(i) places with a separate and distinct identity but good links to surrounding towns and cities in terms of jobs, transport and services;
(ii) the development as a whole to achieve zero carbon and to be an exemplar in at least one area of environment technology;
(iii) a good range of facilities within the town including a secondary school, shopping, business space and leisure;
(iv) between 30 and 50 per cent affordable housing with a good mix of tenures and size of homes in mixed communities; and
(v) a delivery organisation to manage the town and its development and provide support for people, businesses and community services."

Other priorities for the planning system

Important as these roles are, there are other priorities that the planning system could also consider with regard to climate change. The precise balance within the overall portfolio of activities that planning covers will depend on the circumstances, both in each country and at the locality level.

1. The significance of the existing built stock

In most circumstances the amount of new development represents only a small proportion of the existing built stock. In the UK the turnover in the housing stock is 1-2% p.a., with somewhat higher figures in the non-domestic stock. In some localities where there is considerable growth then the proportion will be higher, but in developed countries, the existing stock will generally continue to dominate the urban landscape. It is said that in the UK at least 75% of current houses will still be standing in 2050.

[8] http://www.communities.gov.uk/publications/housing/ecotownsprospectus

This means that reducing the carbon emissions from the current built stock is at least as important as thinking about the performance standards of new buildings. This is as true of commercial as domestic property. The older office buildings and retail outlets were built some time ago now and many have very poor energy efficiency standards. In many ways, retrofitting existing premises can be more difficult than managing new building. It is not difficult technically but getting very large numbers of building owners, managers, tenants and occupiers to engage in retrofitting can be a challenge. Meeting this challenge could involve both working with individual buildings or developments and looking at the options for upgrading whole neighbourhoods as part of a coherent plan.

2. The use of built environments

The real problem, though, is that even if new developments are designed to be zero-carbon and the existing built fabric is retrofitted to make it more energy and carbon efficient, it is still possible for the users of the built environment – all of us – to undermine the good intentions of the planners. Travel patterns are not determined by the road and transport infrastructure and car use may continue to grow for a number of reasons. Energy efficiencies can "rebound" in increased energy consumption or other consumption of goods and services with carbon implications. Smart energy technology may be used in unexpected ways.

Much of this is inevitable. It require a better understanding of human behaviour and social change to anticipate such outcomes and consider policy options for shaping behaviour into desired paths. It is also helpful if there is not too much of a focus specifically on carbon or energy. These are the key indicators of successful climate protection planning, but they are not the key triggers for human behaviour (outside of keen environmentalists). People want energy services not energy per se; i.e. cooked food, light and warmth not gas and electricity. Hence planning approaches based around service provision can be effective.

In the English municipality of Woking, the Borough Council have led the way in developing an energy services company – Thameswey Energy Ltd. – and integrating this into a comprehensive package of measures impacting on energy use. The ESCO not only provides energy services but does so in a way that enhances energy efficiency and reduces energy consumption. It also raises finance for a range of sustainable and renewable energy projects across the town, including energy savings advice.

3. The role of rural environments

Most planning in the UK is focussed on the urban environment or the built-up parts of the countryside. Rural planning is rather limited to countryside protection, countryside access and rural housing needs, although rural economic development is becoming more of a focus. However, agriculture is also a source of greenhouse gas (GHG) emissions, In the UK there is work being done to reduce emissions from agricultural practices but this tends to fall outside the umbrella of the planning system. The State of Environment report for Norway[9] states that "The only emissions outside the scope of national policy instruments are those from the agricultural sector and the fishing fleet"; however, it states that this amounts to only 10% of GHG emissions.

[9] http://www.environment.no/Tema/Klima/Klima/Nasjonale-virkemidler/

4. The role of infrastructure planning: transport and energy

Focussing on the planning of new developments or even exiting urban areas can limit the spatial scope of analysis and strategy. This is important because the infrastructures that deliver key services such as transport and energy are typically planned on a regional, national or even international scale. These infrastructures are possibly the main factor influencing the carbon emissions associated with transport and energy.

In the case of transport, good quality public transport is vital for reducing the reliance on cars and, increasingly, planes for domestic travel. The Norwegian State of the Environment review makes it clear that growth in both these forms of travel is problematic in Norway[10]. Only 8% of journeys were by public transport in Norway in 2005 and transportation of goods is a major road user. But tackling this requires planning at regional and national levels. One of the most cogent criticisms of the UK ecotowns concept is that, while they are supposed to be car-free, the actual proposals that have been put forward have been deficient in public transport provision largely because they do not derive from regional or national land use and planning strategies.

In the case of energy, it can be argued that the most effective and efficient way of reducing carbon emissions associated with energy consumption is to decarbonise centralised energy supply. This can require major investment in new infrastructure, certainly in the case of the UK. A major shift towards renewable energy sources at national levels may render more decentralised forms of energy generation, including microgeneration from renewable sources, less relevant.

5. The importance of adaptation

Finally, it is clear that whatever climate protection policies are put in place, societies will not be able to avoid the costs of climate change already in process and will need to adapt and learn how to become resilient in the face of changing temperature and rainfall patterns and more frequent extreme weather events. Table 2 summarises how the Stern Report sees likely climate change impacts across Europe.

In response to this planning for adaptation can encompass:

- Anticipating flood risks
- Planning for water scarcity
- Building resilience for storm damage
- Considering the impacts on soil stability.

But many studies across different countries suggest that planning for adaptation is not well advanced[11].

[10] http://www.environment.no/Tema/Klima/Klima/Norge-bidrar-til-klimaproblemet/

[11] Norwegian references include:
Lis, K.R., Aandahl, G. Eriksen, S. and Alfsen, K. (2003) 'Preparing for climate change impacts in Norway's built environment' *Building Research and Information* Vol. 31 No. 3&4 pp. 200-9
Naess, L., Bang, G. Eriksen, S and Vevatne, J. (2005) 'Institutional adaptation to climate change: flood responses at the municipal level in Norway' *Global Environmental Change* Vol. 15 No. 2 pp. 125-138
O'Brien, K., Eriksen, S., Synga, L., and Naess, L.O. (2006) 'Questionning complacency: climate change impacts, vulnerability and adaptation in Norway' *Ambio* Vol. 35 No. 2 pp. 50-56

Table 2 Stern's Summary on European Climate Change Impacts (2007)

Region or country	Likely positive climate change impacts	Likely negative climate change impacts
Northern Europe: Scandinavia	Higher agricultural yields Lower winter mortality Lower heating requirements Potential tourism boost	Most rapid warming Loss of biodiversity Impact on local livelihoods Melting snow and ice Flooding
Northern Europe: UK	Higher agricultural yields Lower winter mortality Lower heating requirements Potential tourism boost	Land loss from sea level rise Flooding and storm damage Water scarcity in South East Heat waves in cities Increased cooling costs
Southern Europe		Water scarcity Reduced crop yields Heat waves Increased cooling costs Forest fires Loss of biodiversity Tourism at risk

In Norway, increased temperatures of 2.5-3.5^{o}C are forecast by 2100 with milder winters, earlier springs and wetter autumns. Iit appears that changed rainfall patterns are particularly significant. Table 3 highlights the significant increases in rainfall patterns that are expected for Norway. They need to read in the light of the impact of changed temperature patterns that will alter snowmelt. Together they suggest the need to plan for flood risks.

Table 3 Average climate change in Norway: scenarios for the period 2030 – 2050 compared to the period 1980 – 2000

% increase precipitation				
	Norway	**Northern Norway**	**Western Norway**	**Eastern Norway**
Yearly average	9.6	7.8	13.5	4.3
Spring	0.1	5.0	1.2	-4.1
Summer	9.5	1.5	**18.2**	1.7
Fall	**17.1**	**18.2**	**23.5**	6.9
Winter	9.4	5.2	9.3	13.1

Source: http://www.nilu.no/regclim

The Norwegian situation compares interestingly with that in the UK, where we are expecting wetter winters and dryer summers but a significant fall in overall rainfall for all parts of the UK[12]. Summer rainfall may fall by up to 50% in southern England by the 2080s under high emission scenarios; (2080s refers to the period 2071-2100). In the winter rainfall may increase by up to 33% in parts of the country by the 2080s, particularly in the north and west. The combination of heavy winter rainfall and

[12] http://www.uckcip.org.uk/scenarios

occasional intense summer rain episodes on open soil that has experienced periods of drought and on paved urban surfaces is also likely to lead to considerable flood risks.

The planning system: power and impact

The above discussion makes it clear that planning systems (in Norway and in the UK) have an important role to play in the context of climate change. paper concludes with a discussion of the extent to which planning systems have the resources and are able to make an impact in response to these expectations. This discussion is deliberately generic, drawing a wide picture of what a planning system may do and how it may operate.

On this basis ten different policy tools may be identified within a planning system. Not all planning systems will use all of these; each country will have its own policy package arising from a distinctive public administrative culture.

- Using landownership
- Taxation measures
- Financial subsidies
- Regulating the location of new development
- Regulating the type and details of new development
- Negotiating planning gain
- Negotiating infrastructure investment
- Generating collective action within partnerships, etc.
- Suggesting spatial layouts, etc. in design briefs
- Providing information.

The list above is not randomly ordered. Broadly speaking (again!) it would seem that these measures are ordered in terms of the power as a policy tool. Clearly the power of a policy tool depends on its specific design and the context in which it is operating. But it also depends on what it is being asked to achieve. A tool may seem to offer considerable leverage but may actually not be able to have much impact when a particular goal is considered.

Taking three goals arising out of the above discussion of planning and climate change illustrates this point. First, it has been suggested that influencing transport systems and travel behaviour is an important way of combating climate change. Second, the planning of new developments was highlighted by the Stern Report as a role for planning systems. And third, the way that the built environment is used was emphasised to be central to determining carbon outcomes. Table 4 suggests an ordering of these policy tools in terms of their ability to have an impact in relation to these three goals.

Table 4 Assessing the impact of different planning policy tools

	Transport systems and travel behaviour	**New developments**	**Use of the built environment**
Greatest impact	Negotiating infrastructure investment	Using landownership	Taxation measures
	Using landownership	Regulating the type and details of new development	Regulating the type and details of new development
	Taxation measures	Regulating the location of new development	Negotiating planning gain
	Regulating the location of new development	Negotiating planning gain	Negotiating infrastructure investment
	Generating collective action	Financial subsidies	Financial subsidies
	Financial subsidies	Taxation measures	Suggesting spatial layouts, etc.
	Suggesting spatial layouts, etc.	Negotiating infrastructure investment	Generating collective action
	Providing information.	Generating collective action	Providing information.
	Negotiating planning gain	Suggesting spatial layouts, etc.	Regulating the location of new development
Least impact	Regulating the type and details of new development	Providing information.	Using landownership

The analysis is offered as a basis for discussion rather than a definitive judgement. The key point to take from this is that the impact of tools varies depending on what the policy goal is. Given the wide range of possible roles that the planning system can play in relation to climate change, this suggests a final conclusion to the paper: that each planning system needs to consider carefully which functions it wishes to prioritise in relation to climate change and, having done so, it needs to give careful consideration to which of its available planning tools are best suited to deliver on these priorities. This will produce very different packages of planning activity across different systems and even within the same system over time, as priorities change.