

Climate Change Energy Shortage Biodiversity Loss



Overview of Global, European
and Local Policies and Practices

Pierre Laconte



European Support Centre
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Author: Pierre Laconte

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I.

The planetary framework of climate change and related energy policies

1. From world-wide awareness to attempted regulatory action - key dates

1968-1972 - The UNESCO "Man and Biosphere" programme

UNESCO's 1968 conference and 1972 programme on "Man and Biosphere", and its Scientific Committee on the Problems of the Environment (SCOPE), aimed at exploring the "Effects of man on the biogeochemical cycle of carbon in terrestrial ecosystems" (www.icsuscope.org/unesco_scope.htm). This scientific programme, which covered the atmosphere, oceans, terrestrial biosphere and fossil carbon reservoirs, showed for the first time the effects of man's activities and of carbon release on the climate and the prospect of artificial global warming of the planet. In 10.000 years temperature variation has been of less than one degree. The industrial age opened the carbon Pandora's box but it took two centuries for this to be noticed by scientists and practitioners alike.

1972 - The Report to the Club of Rome

The Club of Rome, a think tank launched by Aurelio Peccei and Alexander King in 1968, commissioned the seminal report "Limits to Growth" (Meadows et al. 1972), which attempted to model the consequences of a rapidly growing world population and of finite resource supplies. It claimed that the growth rate of population and consumption was unsustainable. A 30-year update version was published in 2004 (Meadows et al. 2004). In 2008 Graham Turner at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia published the paper "A Comparison of 'The Limits to Growth' With Thirty Years of Reality" and found that changes in industrial production, food production and pollution have all been in line with some of the scenarios (Turner 2008).

1987-1988 - The Brundtland Report and the setting up of IPCC

At UN level the Brundtland Report and the World Commission on Environment and Development (1987) were seminal, by linking environment and development - including urban development - with one another ('integrated environmental management'). The Intergovernmental Panel on Climate Change (IPCC), created in 1988, aimed to link scientists and political decision makers and bring them towards a consensus on implementing agreed measures. The IPCC's first assessment report was completed in 1990, and served as the basis of the Rio United Nations Framework

Convention on Climate Change. IPCC has proven a remarkably resilient and flexible institution, working as a network and successfully involving governments without being bound by a unanimity rule (www.ipcc.ch/meetings/session31/doc15.pdf).

1992 - The Rio Earth Summit

The United Nations Conference on Environment and Development (UNCED), known as the Earth Summit, was held in Rio de Janeiro in 1992 and produced the United Nations Framework Convention on Climate Change (UNFCCC). It aimed at stabilising greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. There was no mandatory mechanism (this was vetoed on the last day by President Bush because “the American Way of Life is not negotiable”). The Convention provides, however, for periodic “Conferences of Parties to the Convention” (called COPs) and updates (called “protocols”), which are able to set mandatory emission limits.

1997 - The Kyoto Conference of Parties (COP 3) and Protocol

The 1997 Kyoto Protocol (resulting from COP 3) mandated industrialised countries (listed in Annex I) to reduce greenhouse gas (GHG) emissions by 6 to 8% below 1990 levels between the years 2008 and 2012. But there were no sanctions for non-compliance. An Annex II listed those industrialised countries which were ready to help the rest of the world to meet the reduction objective through an Adaptation Fund. Inventories of guesstimated greenhouse gas emissions and reductions were used to set the 1990 benchmark levels. Initial provisions included:

- Flexible mechanisms including emissions trading, such as the “clean development mechanism” (CDM) which allows industrialized countries to fund emissions-reduction activities in developing countries as an alternative to reducing their domestic emissions (a US initiative). One of the key elements of this agreement was that there would be no quantitative limit on the credit a country could claim from use of these mechanisms. Operational rules for international emissions trading among parties to the Protocol, and for the CDM and “joint implementation”, were set in 2001. The proceeds are to feed an Adaptation Fund. Priority of funding goes to adaptation of countries exposed to climate change. After some ten years’ experience of trial and error an evaluation of how these mechanisms have performed is gradually taking shape.
- Carbon sinks: credit was allowed for a broad range of activities that absorb carbon from the atmosphere or store it, including forest and cropland management and re-vegetation, with no overall cap on the amount of credit that a country could claim for such activities. The definition and quantification of carbon absorption remains a subject of debate.

2006 - The Stern Review

The 2006 “Review of the Economics of Climate Change”, by economist Nicholas Stern (Stern 2006), studied the effect of global warming resulting from climate change on the world economy. Although it was not the first economic report on climate change, it is the largest and most widely known report of its kind. The report showed the effects of each degree of temperature increase by sector and area. Its main conclusion is that the benefits of strong and early action on climate change considerably outweigh the costs. It suggests that investing one percent of global gross domestic product (GDP) per annum is required in order to avoid the worst effects of climate change, and that failure to do so could result in global GDP being up to twenty per cent lower than it might otherwise be. The Stern Review states that climate change is the greatest and widest-ranging market failure ever seen, as there is no effective internalisation of the external costs of greenhouse gas emissions. Those who emit are not those who pay for the effects of emissions.

2009 - The Copenhagen Conference of Parties (COP 15)

The overall goal for COP 15 in Denmark was to establish an ambitious binding global climate protocol and commitment for the period from 2012, when the first commitment period under the Kyoto Protocol (albeit without sanctions) expires. However, President Obama and other world leaders decided in advance to limit the mission of the Copenhagen conference to a “politically binding” agreement that would defer the most difficult issues into the future, notwithstanding the fact that a large part of the diplomatic work for a post-Kyoto protocol had been undertaken. The conference actually produced only a non-binding and non-unanimous “Copenhagen Accord”. This declaration was drafted on 18 December - the last day of the Conference - by 116 heads of state and government in attendance from all continents, on the basis of bilateral talks between USA and China resulting in a non-committal text. COP 15’s lack of commitment reflects the enduring gap between what the rich countries are ready to pay and the expectations of poor countries, together with the general reluctance of governments to accept any international control over the use of funds collected for their benefit.

The COP’s proceedings also reflected an absence of dialogue between the biggest polluters (US and China), a common disregard by big countries for smaller ones, and a general disregard by governments for NGOs. The Accord confirmed the need to limit global warming to 2°, but without specifying how to get to this result. While reconfirming the need for carbon pricing, it no longer mentioned the Adaptation Fund. It merely expressed an intention to establish a new “Copenhagen Green Climate Fund”, financed “collectively” by developed countries to support action for climate change, with a governance structure providing for “equal representation of developed and developing countries” (a Mexican-Norwegian proposal). Norway suggested financing it by using the proceeds from auctioning carbon emission

allowances. The aim is for a collective contribution from the developed countries of \$100 billion per year by 2020 (Mackenzie 2009).

However the generous award of allowances by governments to some sectors has been a major handicap to emissions trading schemes, as shown by the persistently low market price for CO₂ per ton (see below in EU climate policy). Actions on climate change mentioned in the Accord include “substantial finance for reduced emissions from deforestation and forest degradation (REDD-plus)”. REDD-plus is, however, subject to controversy about its actual applicability as a tool to protect biodiversity (www.redd-monitor.org/redd-an-introduction). The Prince of Wales created his own Rainforests Project in 2007 to find solutions to combating tropical deforestation, which he presented at COP 15 (www.rainforestsos.org). A paradox of the reluctance of developing countries to reach an effective binding world agreement is that many of them will be among the most severely affected areas or “hot spots” (OECD 2009).

2. Copenhagen COP 15: aftermath and perspectives

In the aftermath of the COP 15 Accord, 140 parties confirmed their support of it to the UNFCCC Secretariat. The fact remains that 116 heads of state and government (the highest number in UN history and representing the majority of the world’s population) were unable to reach a binding GHG reduction agreement, thus entailing a loss of political momentum. In any case, no sanctions whatsoever against non-compliant countries are provided in the Kyoto mechanisms. Moreover, well-orchestrated world-wide campaigns about minimal errors found in the IPCC reports further reduced the support of public opinion (“climate scepticism”) and elected officials for combating climate change effectively (Naomi 2010).

Latest findings suggest an acceleration in the rise of sea level (Solomon 2009). Demographic trends will exert further pressure on the world’s natural resources, particularly of energy and water, while production of fossil fuels by existing technologies will peak (Wagner 2009). The likelihood of reaching a peak before 2020 has been reconfirmed by the November 2009 UKERC report on global oil depletion (www.ukerc.ac.uk). Imbalances between energy demand and supply will therefore increase, leading to a structural scarcity and price increase.

The reluctance to agree on collective action may stem from the very nature of the human species and its evolution. Through its hubris, intelligence and greed homo sapiens has conquered the natural universe, its flora and fauna, but has not been able to restrain its own proliferation and overuse of natural resources, threatening its own future. In line with Charles Darwin’s “Origin of Species” and, more recently, Richard Dawkins’ “Selfish Gene” (Dawkins 1976), homo sapiens’ ego is perhaps more important to him or her than the survival of the species. Only when a threat is globally perceived do global rules become acceptable (e.g. liquids in aircraft hand luggage).

So the question must be asked: will the values and behaviours on which the present path of world development is based be able to adapt in time to the tightening of human and environmental limits to growth? The answer requires a common tool for measuring sustainable development. This tool is still far from reality, although there is agreement that gross national product is not satisfactory. As Robert F. Kennedy put it, long before the present concern for sustainability, “gross national product measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country. It measures everything, in short, except that which makes life worthwhile”.

COP 16, held in Cancun in 2010, did not get much closer to achieving a North-South agreement. COP 17 (Durban 2011, in the heart of the developing world) may be able to reduce the North-South financing gap. Publicity around the preparation of the 5th IPCC assessment report, to come out in 2013, may trigger renewed momentum and awareness. In a separate exercise the UN High-Level Advisory Group on Climate Change Financing has produced a report listing a number of practical financial policies and measures, helping set the agenda for future climate negotiations: www.un.org/wcm/content/site/climatechange/pages/financeadvisorygroup/pid/13300.

3. 2010: Year of Biodiversity

The UN proclaimed 2010 as the International Year of Biodiversity (www.cbd.int/2010/welcome/). Alongside climate change (to which biodiversity change is one of the forms of adaptation) stands another mega-risk: species extinction (biodiversity loss), which is no less important and by no means limited to rain forests. An advisory body similar to IPCC – i.e. with full participation of government delegates - could be useful to raise governments’ awareness about the loss of biodiversity. On-going steps in that direction are taking shape.

Planning-related professions can contribute to innovative biodiversity enhancement (not just protection) within urban areas through spatial planning and landscaping, development control, increasing local plant variety and best practice guidance. Cultural diversity should not be forgotten. It includes the enhancement of what makes cities different from each other, in particular their built heritage (see Part III).

To sum up Part I, the climate, energy and biodiversity challenges range from the global to the local level. Awareness and responses should take the same multilevel perspective. At regional level the institutional responses of the European Union have played a pioneering role in providing the foundations for a binding framework for its member state governments, and guidance to the professionals. They are the subject of Part II, the urban level being the subject of Part III of this publication.

II.

The European Union's pioneering policy responses to climate change and related issues - an experience of consequence to other world regions and the developing world

1. The European Union - a reminder of how it works

Main institutions involved in the general framework of the European institutions are:

- The Council of the European Union (“Consilium”). This council of European ministers is not a cabinet composed of ministers in charge of specific portfolios, but an assembly of all national ministers responsible for specific matters, totalling some 300 ministers. It is the only legislative body of the EU. It meets in different configurations, ranging from finance to fisheries. In most configurations its decisions are taken by a qualified majority. One of its configurations is the Council of Ministers of the Environment.
- The “European Summit of heads of state and of government” and the “European Presidency” are the most recently-created top bodies now in place, following the adoption of the Lisbon Treaty in 2009. Decisions are all taken by a unanimous vote, reflecting the move of the EU from supranational to international decision-making. The Summit’s building is under construction in Brussels next to the “Consilium” building, symbolising the autonomy of this new body.
- The European Commission (EC). The EC is the executive body in charge of proposing decisions to the Council and of implementing them. Its structure is similar to those of national government cabinets. It has 27 commissioners, one per member country. The EC is headquartered in the iconic Brussels “Berlaymont” building.
- The European Parliament (EP). The EP is not a real Parliament, as it has no legislative powers, but its co-decision powers (decisions shared with the Council) have been steadily increasing, lately through the 2009 Lisbon Treaty. Its work is mainly done through its committees, based on the Council and EC’s divisions, which are located in Brussels (the monthly plenary sessions being held in Strasbourg). One of these divisions is the Committee on Environment, Public Health and Food Safety.
- Besides these main bodies, which are complemented by the Court of Justice (located in Luxemburg), one should mention the Economic and Social Committee and the Committee of the Regions, which have been set up in an advisory capacity. Other bodies are distributed all over Europe, in particular the European Central Bank (Frankfurt). For more on the European institutional galaxy see Laconte, P. and Hein, C. (eds.) “Brussels: Perspectives on a European Capital” (Laconte 2007).

A special case: the European Environment Agency - EEA (Copenhagen)

Besides the EU's main decision-making bodies, some 30 agencies are fulfilling specialised roles. In the case of the environment, the European Environment Agency is the agency gathering and disseminating national and international information relevant to all environment-related EU policies, including climate change, transport, agriculture and energy (www.eea.europa.eu). In 2010 it published its latest five-yearly "European State of the Environment Report" (SOER), which covers the state of, trends in and prospects for the environment, supplemented by "indicator reports" focusing upon specific issues.

Other bodies contributing to the shaping of policies and strategies

The strategies of the European Commission are elaborated through some 250 specialised expert committees. Their power is not matched by their visibility. A rare source of detailed information about the structure of these expert committees (sometimes called "comitology") was published in 2005 in a German/English three volume limited edition under the title "De Comitatus" (www.bartlebyandco.com/decomitatus.html). External interest groups aimed at influencing EU decisions include the representatives of the private sector (energy, industrial and service sector associations, etc.), those of the regional and local authorities, and those of civil society. In 2009, at the initiative of the EU Commission, a "covenant of mayors" was signed on behalf of more than 1000 municipalities (www.eumayors.eu). The covenant of mayors is a commitment by signatory towns and cities to go beyond the present objectives of EU energy policy in terms of reducing CO₂ emissions by means of enhanced energy efficiency and cleaner energy production and use. A similar mobilisation of cities took place in the US.

The key to success in influencing policies is coalition building. Civil society organisations include citizen groups, which in the case of the environment have created a common structure (www.birdlife.org/eu/pdfs/fr_final.pdf).

2. The EU's climate and energy related policies

To address the climate change challenges, key milestones were defined by the EU Council: a (minimum) 20% reduction in CO₂ emissions by 2020, compared with 1990, in Europe; and a reduction of greenhouse gas emissions by 2050 and after so as to limit the increase in global temperature to within 2°C (Decision 406/2009/EC).

But the actual implementation of this overall commitment will necessarily depend on the strength of the regulatory and taxation tools available (Laurent 2009) and on implementation by sector. The following EU policy areas will be reviewed:

- Regional policy, including EU strategies for spatial development;
- Mobility and transport policies;
- Energy production and distribution policies and EU energy consumption policies;
- Nature and biodiversity policy – EU forestry strategy;
- Inland water resources protection policy.

Estimating CO₂ emissions

In 2002 the EU introduced its emissions trading scheme (ETS). It sets limits on the amount of carbon dioxide firms can produce in energy, steel, cement, glass, brick-making, and paper/cardboard production. The 2008 EU climate change package added aircraft emissions to the ETS as from 2012. It is also called “cap and trade” as it allows firms that exceed their emissions limits to buy extra allowances from firms whose emissions are under target levels.

After COP 15 and notwithstanding the ensuing loss of interest in strong climate change policies (Naomi 2010) the EU decided to appoint a commissioner especially (but not only) responsible for the European emissions trading scheme, seen as a politically acceptable market-based substitute for an EU carbon emissions taxing system or an energy tax. The (now nearly 10-year-old) EU experience remains discouraging. Any emissions trading system requires easy tracing and tight accounting of the emissions, a low level of free allowances, a centralised inventory and strict control of possible fraud. This has been fully achieved in the case of the sulphur trading scheme in the US.

Few people however believe in its easy “replicability” to the EU carbon emission trading scheme because carbon is difficult to trace, free allowances have been generous, the accounting system is as diverse as the 27 EU member states, the inventory is the summing up of national inventories, and frauds have proven difficult to avoid. The EU ETS lessons have been the subject of multi-stakeholder CEPS task forces, held in 2008 and 2011 (www.ceps.eu), and an Egmont paper (d’Oultremont 2010). An academic forecast of the carbon market in 2020 has been attempted (Brinkman 2009). In addition mention should be made of the inherent difficulty of estimating the amount of CO₂ resulting from human activities and natural processes. As an example, the emissions resulting from a transatlantic air trip (12.000 km) are usually estimated at 1 ton, based on a set of specific hypotheses (DGAC 2011).

The estimates of emissions per inhabitant are highly hypothetical. The report of the evaluators for the Green European Capital Award indicates 100 ton per capita per year for US cities and 10 ton for inhabitants of European cities. However there is no agreement on the methods of estimation, the GHG study (GHG Study Report 2009) of emissions per city describes eight methods, which produce extremely different results, among others according to the way “imported” emissions are treated.

EU regional policy, including EU strategies for spatial development

For the period 2007-2013 the regional policy funds represent the second biggest item in the EU budget after the common agricultural policy. The “structural funds” are specified by objectives. Objective 1 areas include the outermost regions and those of low population density. These funds, managed by the EC Directorate General REGIO (regional development), as well as the subsidies from the Directorate TREN (transport and energy), now split between “mobility and transport” and “energy”, have encouraged a dispersal of EU-funded investments into rural areas and peripheral regions, to the detriment of the EU’s urbanised core and of existing cities. The proponents of dispersal (“polycentricism”) include the interest groups representing infrastructure developers looking for subsidies, the oil, concrete and automobile industries looking for more vehicular travel and the 154 peripheral maritime regions (www.crpm.org). This subsidised polycentricism means more urban sprawl, more motorised road transport, more fossil fuel consumption and more GHG emissions, in contradiction to the aim of mitigating global warming.

The “European Spatial Development Perspective” was the first policy framework document adopted in 1999 by the council of ministers in Potsdam, at the end the German presidency. It confirmed the overall policy in favour of “balanced development throughout the EU”, which meant “reducing structural disparities between regions and promoting equal opportunities for all” - in other words, encouraging all activities everywhere rather than specialisation. This aim was translated into a variety of financing devices, principally through the structural funds and the cohesion fund (see www.ceu-ectp.eu). At the margin of the main regional policies and funds, the URBAN I and URBAN II programmes have been able to finance some 200 individual cities’ projects by giving them direct access to Brussels funds.

This programme has led to some remarkable results, mainly in deprived urban areas of southern Europe (Lecce in Puglia or Cosenza in Calabria, for example). The cities’ dispersed lobby proved unable, however, to prevent the scrapping of this successful programme. It has been replaced by URBACT, which is merely a network for exchanging experiences between selected cities, their selection being in effect controlled by central governments. The funding of reports replaced the funding of projects.

A minor shift in the territorial cohesion policy has recently emerged, as a result of the 2007 Leipzig conference of the council of ministers (Lisbon to Leipzig Declaration, www.fona.de). Following this conference, cities are re-emerging conceptually as motors of regional development and actors in combating global warming and resource depletion. The emerging policy shift towards “territorial cohesion” could lead to an emphasis not only on deprived regions but also on deprived urban neighbourhoods. The EU Stockholm cities and climate change conference report “Cities – Part of the Solution” is indicative of this new EU emphasis (www.se2009.eu).

The EEA, on the other hand, is proposing a complete policy reversal in favour of encouraging territorial specialisation rather than the dispersal of infrastructure investments all over the EU, placing priority on “central cities”. This would reduce the need for transport and would better preserve the natural environment.

EU mobility and transport policies

The regional funds have prioritised heavy infrastructure, mainly highways, airports, dams, etc. The total direct transport subsidy in the EU amounts to €280 billion (milliard) per year, around half of this amount being for roads. This figure has been fully documented by the EEA 3/2007 Report “Size, structure and distribution of transport subsidies in Europe” (www.eea.europa.eu). High-speed rail trans-European networks could have been achieved from the ‘60s, on the model of the Japanese Shinkansen, which has operated since 1964 and made profits since 1967 (www.japanrail.com). Instead, a trans-European road network was financed, as the result of joint lobbying by road, oil and automobile interests, while rail’s case was dispersed among countries, the sectors involved and rival rail transport associations. Meanwhile, annual deaths on the world’s road rose quietly to 1.3 million, confirmed in November 2009 by the latest findings of the International Transport Forum (OECD, www.internationaltransportforum).

EU energy production and distribution policies, including policies in favour of energy efficiency and alternative sources of energy

- Energy production: confronted with the prospect of fossil fuel depletion, all energy suppliers look for alternatives. The EU policy is to encourage them (Dir. 2009/28/EC). According to the EEA’s reports, namely the “Energy and environment” report (EEA Report 6/2008), and MacKay (MacKay 2009), at present the most promising alternative energy sources seem to be the photovoltaic concentration, wind farms and, at a later stage, the tapping of coastal energy resources. As to emissions reductions and energy savings, different EEA reports suggest that the main area of concern is transport (road freight, aviation and shipping) – see EEA Report 2/2010 “Towards a resource-efficient transport system”. Biofuels are considered unfavourably by the EEA as well as by the 2007 OECD-ITF Report “Bio fuels: Linking support to performance.” The OECD conclusion is that “US biofuel tax subsidies are to grow and grow”, resulting from coalition building between industrial agriculture and oil producers seeking alternatives. Side-effects on food for humans and feed for animals, and on deforestation, are emphasized by both reports, including “indirect land-use change”. Brazil is strongly supporting bio-fuels (Joint letter from developing countries on implementation of sustainability criteria for biofuels 15/12/2009). Nuclear energy remains a contentious issue. Producers have stressed its low emissions but rely on future technical progress to find solutions for safe nuclear waste storage, for recycling of old installations and for the lower exposure of nuclear plants to large-scale incidents (see Brand 2009).

- Energy distribution: “super-grids” and “smart-grids”: Access to a distribution grid at all times and at a fair price is essential for alternative energy suppliers (huge storage facilities not being available with present technologies). This objective can be achieved at the regional scale through “supergrids” and at a local level through “smart-grids”. The “super-grids” covering large regions are a European as well a world issue. China, for example, is now investing massively in four huge wind energy complexes, requiring a supergrid to serve the areas of consumer demand. In the EU “solar concentration power” plants are sprouting now in southern Europe (e.g. Spain’s Andasol plant, serving a population of 200.000). In the longer-term, EU-originated projects will include the ambitious Desertec project (www.desertec.com). The EU white paper “Energy for the future - renewable sources of energy” (Com (97) 599 final) describes a scenario of electricity demand and supply opportunities for renewable energy in the integrated EU/MENA region up to 2050, and stresses the need for international cooperation to achieve economic and environmental sustainability. The Desertec project includes an energy cable connection to Europe, taking advantage of the diminishing cost of long distance energy transport.

The local level “smart-grids” are meant, on the contrary, as incentives to the local production of alternative energy by optimising access to electricity networks and to real-time user information, using IT tools. In the US, the “Pacific Northwest smart grid demonstration project” illustrates the “smart-grid” movement, as opposed to the nation-wide “super grid” proposed by President Obama (H.R. 1774: Smart Grid Advancement Act), which may instead increase the long-distance transport of coal based energy.

Optimising the network of distribution grids probably lies in the correct regional and local modelling of the peaks in electricity production compared with the peaks in demand for electricity in their respective localities. It should include the links required to maintain a regionally balanced supply in face of diverse and changing climatic conditions, and to maximise user information. See the proposed Greenpeace “North Sea electricity grid” aimed at providing links between wind farms (www.greenpeace.org).

EU energy consumption policies favouring energy efficiency and consumption of alternative energies

The best alternative kilowatts are the ones not used, through increased energy efficiency and thriftier consumption in buildings and cities:

- Buildings are perhaps the powerhouses of tomorrow (J. Rifkin. www.foet.org). This can happen through lowering consumption (mainly by better thermal insulation) and use of sunlight and other features. Today’s roofs can include photovoltaic panels. Windows can be PV captors and micro energy savings (e.g. LEDs) may add up to a positive energy balance. However, these innovations in energy supply and demand

can only be achieved if strong regulation gives them a market justification. That is how Germany has become a pioneer in energy savings. Particularly promising energy-saving projects are the so-called cross-sector technologies supplying heat, mechanical energy and light. According to the study "Potential and Economic Effects of an Ambitious Energy-Efficiency Strategy for Germany", conducted by the Federal Ministry for the Environment, these technologies account for 65 percent of total end energy consumption in German industry (summarised in Schroeter 2009). Japan, the US and China are now happily embarked on the same track. Apart from energy saving in new buildings, the scope for saving the energy stored in existing structures and neighbourhoods, in addition to heritage considerations, is making a case for the restoration and adaptive reuse of existing buildings instead of their massive replacement with "low energy" materials, buildings or groups of buildings (eco-enclaves).

- The energy efficiency of cities is more than the combined energy efficiency of buildings. It involves urban efficiency strategies. These are part of the European R&D strategic energy technology plan (SET). The SET is aimed at "developing future green technologies", as part of the world-wide race for global technological leadership – see EU Commission 2010 SET-Plan brochure "Towards a low-carbon future" (ISBN 978-92-79-15667-0). It includes bioenergy, carbon capture, fuel cells, nuclear energy, solar and wind. It also includes a specific "European initiative on smart cities", involving cities and regions through incentives for programmes in the buildings, energy networks and transport sectors in accordance with indicative key performance indicators. This initiative could become part of a more urban oriented regional policy (see above)

EU nature and biodiversity policy – Natura 2000 directive and programme - Integration with the EU common agriculture policy

The "Natura 2000" 92/43/CEE directive is the centrepiece of EU nature and biodiversity policy. It creates an EU-wide network of nature protection areas. The aim of the network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats. It comprises special areas of conservation (SAC) designated by member states under the Habitats directive (Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora). It also incorporates special protection areas (SPAs) which they designate under the 1979 Birds directive. Natura 2000 is not a system of strict nature reserves from which all human activities are excluded. While the network does include nature reserves, most of the land is to continue to be privately owned. The emphasis is on ensuring that future management is sustainable, both ecologically and economically. The establishment of this network of protected areas also fulfils a Community obligation under the UN Convention on Biological Diversity (www.cbd.int). An example of the implementation of the Natura 2000 directive has been the nature reserve created by the port of Antwerp to replace the loss of open land resulting from the extension of its docks.

Natura 2000 applies to bird sites and to habitat sites, which are divided into biogeographical regions. It also applies also to the marine environment. Resilient biodiversity and climate change are, indeed, closely linked. Measures to enhance respect for natural environments are increasingly part of the debates around the common agricultural policy (CAP). The “rural development policy”, part of the CAP, aims to stimulate the economic, social and environmental development of the countryside, along three axes. The first axis focuses on improving the competitiveness of the farm and forestry sector through support for restructuring, development and innovation (see next section). The second concerns the improvement of the environment and the countryside through support for land management as well as helping to fight climate change. Such projects could, for example, concern preserving water quality, sustainable land management, and planting trees to prevent erosion and floods. The third axis concerns improving the quality of life in rural areas and encouraging diversification of economic activity. The policy also provides support to the European "Leader programme", implemented at national level, under which local action groups design and carry out local development strategies for their areas.

European forestry strategy as climate change mitigation tool

Forest policy falls within the sphere of competence of the member states, not of the EU (the result of concerted lobbying by the paper industry common lobbying versus the dispersed forestry interests). This may be regretted, considering the importance of forests as carbon reserves, but the EU nevertheless contributes to the implementation of forest management through common strategies based on the voluntary sharing of responsibilities.

The EEA has published several technical reports about forestry inventories in Europe and the potential for biomass production (www.eea.europa.eu). At national level, forestry policy is implemented through the national forest programmes (NFPs). The NFPs address issues such as the productive function of forests and their contribution to rural development, their role in the protection and enhancement of biodiversity, and the related social, recreational and cultural aspects. With a view to improving cross-sector cooperation, the NFPs need to be fully embedded in the national sustainable development strategies. Community action in support of forest management covers several areas of activity, in particular:

- “Rural development policy” (see above): this has been the main instrument for the implementation of EU forestry strategy at Community level;
- Protection against fires and air pollution: community measures have generated a considerable amount of information and operational developments, but air pollution and forest fires continue to be major problems;
- Bio-diversity conservation: the "Natura 2000" network (see above) includes forests but the need to map, study and monitor forest biodiversity both inside and outside protected areas remains;

- Climate change: forests can make a major contribution to reducing emissions caused by fossil fuels, but the use of biomass for energy purposes has not yet been developed to its full potential in the EU. It is also necessary to consider measures relating to the adaptation of forests to changed climate conditions;
- Competitiveness of forest-based and related industries: European consumers need to be better informed about the advantages of using wood from sustainably managed forests. There is also a need to create an enabling environment within which the forest-based industries can enhance their competitiveness and foster timber use;
- Research: the Community research framework programmes and European cooperation in the field of scientific and technical research (COST) support and further develop the competitiveness of the forest sector.

EU inland water resources protection policy

Directive 2000/60/EC establishes a framework for Community action in the field of water policy. By means of this framework directive, the EU provides for the management of inland surface waters, groundwater, tidal waters and inland coastal waters, in order to prevent and reduce pollution, promote sustainable water use, protect the aquatic environment, improve the status of aquatic ecosystems and mitigate the effects of floods and droughts (EEA Report 8/2009). The member states have to identify the river basins lying within their national territory and assign them to individual river basin districts. River basins covering the territory of more than one member state will be assigned to an international river basin district.

3. European coastal protection strategies

Issues and overall EU coastal protection adaptation strategies

Coastal communities have often responded to erosion with so-called "hard" engineering solutions - for example, by constructing various types of marine protection structures and breakwaters. While reducing coastal erosion locally, these structures tend to interfere with the natural transport of sand and cause erosion further down the coast. Of the 875 km of European coastlines that have started to erode within the past 20 years, 63% are located less than 30 km from coastal areas altered by recent engineering works. However, "soft" protection techniques, such as sand nourishment - when sand is taken from somewhere else to reinforce eroding dune systems and beaches - can also backfire. In some cases sand was taken away from sea grass areas, which are ironically a most effective tool in limiting coastal erosion.

An EU-wide study "Living with coastal erosion in Europe: sand and space for sustainability" (www.euroseion.org/project/euroseion_en.pdf) was commissioned in 2001 by the DG Environment of the European Commission on an initiative of the European Parliament. Its aim was to evaluate the social, economic and ecological

impact of coastal erosion on European coasts and assess the needs for action. It recommended:

- Strengthening coastal resilience by restoring the sediment balance. This will require identifying areas where essential sediment processes occur, and "strategic sediment reservoirs" from which sediment can be taken without endangering the natural balance;
- Taking the cost of coastal erosion into account in planning and investment decisions. Public responsibility for possible risks and damage restoration should be transferred to the direct beneficiaries and investors. This would result in a higher degree of care;
- Making responses to coastal erosion pro-active and planned. Instead of the current piecemeal approach to "fix" coastal erosion when it happens, a long-term and more planned approach is needed. It should be based on regional coastal sediment management plans aimed at restoring coastal resilience. The plans should comprehensively assess what is at stake and the costs and consequences of different policy options (protect/do nothing/abandon the area);
- Strengthening the knowledge base of coastal erosion management and planning to ensure well-informed decisions and the application of best practice.

Administrative, legislative, societal and political factors impede adoption of practical coastal management. The conflicting interests of coastal protection and of nature conservation often generate political conflicts around projects for dyke reinforcement. Major changes in the perception of 'coastal protection', coupled with changes in attitudes to property, will be required if nature conservation is to become an integral part of coastal protection strategies (Seavy 2009). Adaptation strategies vary from country to country. In the UK, the Thames flood barrier has proven useful but could have been combined with a bridge. The integrated Dutch approach is an example of possible relevance to typhoon-exposed places such as Hong Kong, Singapore and Taiwan.

The case of Holland's integrated process of adaptation to climate change

The Zuiderzee works (Dutch: Zuiderzeewerken) are a man-made system of dams, land reclamation and water drainage works, and the largest hydraulic engineering project undertaken by the Netherlands during the twentieth century. The project involved the damming-off of the Zuiderzee, a large, shallow inlet of the North Sea, and the reclamation of land from the newly enclosed water body by means of polders. Its main purpose was to improve flood protection and create additional land for agriculture. The single biggest structure in the project was a 32 km long dam, the "Afsluitdijk", protecting the Dutch from the North Sea. When the Afsluitdijk was completed in 1932, the Zuiderzee became completely dammed off, and from then on it would be called Lake IJsselmeer. The total cost of the dam was equivalent to 700 million (2004) US dollars. The "Delta works" are a series of structures built between

1950 and 1997 in the south west of the Netherlands to protect a large area of land around the Rhine-Meuse-Scheldt delta from the sea. The works consist of dams, sluices, locks, dykes, and storm surge barriers. The aim of the dams, sluices, and storm surge barriers was to shorten the Dutch coastline, thus reducing the number of dykes that had to be raised. Along with the Zuiderzee works, they have been declared one of the seven wonders of the modern world by the American Society of Civil Engineers.

The case of Belgium's coastal policy

The 64 km long, highly urbanised sea coast has been the subject of a coastal management study called "Vlaamse Baaie 2100", by a consortium of consultants and firms (Baaie 2009). It aims at creating a string of barriers and islands on sand banks off the coast, some for wind farms (Thornton Bank) and others for housing. It also considers the creation of offshore barriers supporting wind farms. In the case of Antwerp, the quays of the Schelde have been the subject of a special protection study called "Stad aan de Schelde", which recommends heightening the protective walls to 2.25 m (Van de Put 2007) followed by municipal awareness campaigns about the issue.

III.

Sustainable city-regions - challenges, trends and practices

1. The challenge of Megalopolis/Ecumenopolis

Urban demography

Urbanisation has reached the level anticipated by Doxiadis 40 years ago (Ecumenopolis: Tomorrow's City, Constantinos Doxiadis, Britannica book of the year, 1968) but is still far from having reached its summit. Another estimated 1.8 billion inhabitants will need housing by 2030. The majority of this growth will be in urban areas. To keep pace with this projection, we need to be building a new city for a million inhabitants every week, year after year. Meanwhile the peak in oil production will reduce fossil fuel energy supply. Climate change will generate additional constraints. These issues are intrinsically linked to spatial development patterns. City and regional planners need to be poised to help address them. Traditional models serving as time-tested examples for future developments, allied to new technologies, may help find innovative planning tools for sustainable urbanisation and low energy cities. But governance is the prerequisite for their implementation.

The governance of Megalopolis

The "Urban Age" 2009 research paper "Istanbul, city of intersection" (www.urban-age.net) presents comparative studies of the size and population of some of the world's largest conurbations like Istanbul, New York, London, Mexico and Shanghai. They all indicate the unfulfilled quest for a blueprint for governance, illustrated by a set of maps at the same scale. The Berlin case is a unique example of a city's adaptation to highly challenging institutional changes following Germany's reunification. An ongoing pilot study "Governance Analysis" aims at suggesting an ideal framework for adaptation to climate change (Research News November 2009, Federal Institute on Building, Urban Affairs and Spatial Development). The oversupply of built space is a specific challenge in areas of old industrialisation world-wide and of related urban sprawl, combined with shrinking population. The German research project "Shrinking Cities" (www.shrinkingcities.com) has developed a body of international knowledge of the field. It includes a world map of shrinking urban areas. Germany's efforts to integrate the new Laender (provinces) has produced a number of initiatives on the part of some of these Laender. The IBA Sachsen-Anhalt and the renovation of historic Koethen can be cited as example (www.iba-stadtumbau.de). The energy inertia of existing buildings is often overlooked, as well as the contribution of built heritage to urban cultural diversity.

2. Climate change and fossil energy shortage - cities as part of the response

The latest OECD report “Cities, Climate Change and Multilevel Governance” confirms the related aims and shared benefits of policies to reduce GHGs at the urban scale (OECD 2009). The benchmarking of cities according to their GHG emissions remains a daunting technical challenge for those who want to engage in emissions trading (GHG Study Report 2009). More generally, the measurement of economic, social and environmental performance according to “Beyond GDP” indicators will require new professional inputs, in addition to economics. Climate change poses specific threats to cities located in hot spots for global warming. Mediterranean cities, for example, must mitigate the effects of very hot summers by investing in cooling amenities (trees, fountains, ponds). Paris’s hot summer of 2003 may well become the norm.

From urban sprawl to sustainable urban development through land-use and transport policies

A forecast of automobile growth - the main contributor to GHG emissions - has been made by OECD. Its figures indicate that in the last ten years the population increased by 13%, the number of cars by 50% and the number of vehicle-km by 65%. The latest projections suggest unabated further growth in developing countries.

While the 19th century was the great age of the railways and of trams, the 20th century was clearly the age of the automobile. Henry Ford’s mass production of his model T and his ability to convince the government to pay for road construction and maintenance, while tramways had to pay for both and enjoyed no right of way on the street, brought about the end of self-supporting public rail transport in US cities. Views of Chicago in the ‘30s show streetcars locked in traffic. The automobile-based American way of life became the motor of development, linked to highways built in response to traffic forecasts (“predict and provide”). The effect of the automobile on cities is mainly the need to provide parking space during the 90% of its life that it is not running. Space-consumption graphs show the area x time space use by mode ranging from 1 in the case of a pedestrian using public transport to 90 in the case of an automobile parked at a work place (Laconte 2009).

The limits to road construction were shown by the UK government’s 1995 SACTRA report (www.dft.gov.uk/pgr/economics/sactra). This report shows the effects of new roads in terms of traffic generation, and that the need for space generated by new roads is greater than the additional space provided. New roads thus increase congestion, after an initial relief period, and encourage further urban sprawl. “Urban sprawl” was the theme of – inter alia - an EEA technical report (10/2006) and of the 44th ISOCARP congress (Dalian 2008) and review 04 (www.isocarp.org). The side effects of traffic in terms of personal safety, air pollution, stress and obesity have been shown again and again. The WHO warned that people walking or cycling less

than a half hour per day were putting their health at risk. Bike rental experiments have proved successful in cities like Paris, Lyons and Barcelona (Guet 2009).

3. "Best practice" in sustainable cities worldwide

Case histories illustrate successful attempts by a few cities and urban regions to achieve sustainability. Some of them are mentioned below. In terms of the national sustainability of a city-state, Singapore's integrated approach to urban development covers transportation, land use, pollution and water management (Mah 2009). In terms of regional sustainability, Portland (Oregon), which has limited its spatial urban extension, is clearly a case of best practice (Bragdon 2009). Vienna's links between the city and its hinterland (e.g. for the provision of spring water), as well as that of Zurich (city and region) can also be considered as best practice. Among large cities Chicago is credited with having adopted a systematic greening policy with decentralised budgets for its implementation. A spectacular facet of it is the "green roofs" initiative (www.greenroofs.com/projects).

New York City has recently developed a growing awareness of its urban environment. In mid-town Broadway there are five times more pedestrians than cars but pedestrians get only 10% of the street space, while space taken on the street by a moving car is about 20 times that taken by a pedestrian. The city has now started to give some street sections to pedestrians (NYCDOT "Green Light for Midtown" 2009).

Curitiba, which developed highly innovative urban development tools (transfers of development rights, central boulevards, new parks and selective garbage collection) (www.ippuc.org.br) can also be considered a case of top-down best practice, which has influenced other cities in its region and elsewhere (Kunming). Medellin has achieved successful urban regeneration, making full use of citizen participation. High density urban regeneration in Tokyo, Seoul and Vancouver should also be mentioned. Vancouver's planning tools such as the Vancouver City Planning Commission have been adopted by the Abu Dhabi Urban Planning Council (www.upc.gov.ae/en/Home.aspx).

European cities have been the subject of many "green" rankings: the Siemens "European green cities index" ranked the first ten cities as Copenhagen, Stockholm, Oslo, Vienna, Amsterdam, Zurich, Helsinki, Berlin, Brussels and Paris (www.siemens.com/entry/cc/de/greencityindex.htm). In the case of Copenhagen, one could also point out its integration, through a fast rail link, with Malmo (Sweden), a "green city" in its own right (Building and Social Housing Foundation Award 2010 – www.bshf.org). Siemens has developed a similar index for Asia, in cooperation with the Singapore Centre for Liveable Cities (www.clc.org.sg).

Hamburg has developed ambitious renewal plans and will be in 2011, after Stockholm, the European green capital (www.europeangreencapital.eu). Vitoria

Gasteiz and Nantes will follow, in 2012 and 2013. Berlin has taken advantage of its reunification to put in place strong urban design rules for new buildings in the areas formerly occupied by the wall, such as Friedrichstrasse, taking inspiration from the traditional apartment blocks with their inner open space. Lisbon has redeveloped a large waterfront area around the site of the former World Fair 1988 through the state-run ParqueExpo '98 SA (www.parqueexpo.pt). This development specifically takes into account the future rise in sea level.

Among medium-sized cities, Bilbao has been recognized as a successful example of revitalisation through cultural projects (Vegara 2005). It won the Lee Kuan Yew world cities award in 2010 - (www.leekuaneyew.worldcityprize.com.sg). Bordeaux's riverside rehabilitation and new tramway lines have revitalised the city (Guet 2008). Manchester has brought 20.000 new residents alongside its derelict canals through cleaning, access improvements, cultural attractions and public-private partnerships with developers capable of creating vibrant public spaces, such as Urban Splash (www.urbansplash.co.uk, Douglas 2009). The same path has been followed by Birmingham and Liverpool (e.g. the rehabilitation of Albert Dock).

Freiburg is widely considered as the prototype of low carbon medium/small sustainable cities (www.freiburg.de). Bruges and the new university town of Louvain-la-Neuve in Belgium are in the same league and are attracting residents and tourists alike. They were presented together at UN-Habitat I in 1976. The Louvain-la-Neuve eco-features were the subject of a specific publication (Laconte 2009). The multiplicity of "best practices" and supporting certifications at all spatial levels, from single buildings up to cities and conurbations, suggests the need for an "assessment of the assessments". This will be the subject of a forthcoming publication (Laconte 2012).

Conclusion

New kinds of multilevel challenges and opportunities arise from the effects of climate change, the energy and resources crunch, and the loss of biodiversity. These challenges affect citizens and decision makers at international, regional, national and local level. All planning related decision makers and professions have a proactive role to play in developing practices at each spatial level.

At world level, the spread of awareness of climate change has been remarkably fast, but agreement on collective commitments towards effective mitigation of climate change at planetary level is far from being reached, as evidenced by the Copenhagen and Cancun Conference results. This has led to increasing attention being given to climate change adaptation, and to decentralised actions - by national, regional and local decision makers, while coalition-building efforts towards a North-South agreement on adaptation funding are being pursued. Addressing the looming energy shortage has become a priority step to take in the immediate future, through energy consumption savings, investment in the production of renewable energy and its long-distance transportation, and designing land-use patterns requiring less transportation.

At regional level, Europe has delivered a pioneering policy response to climate change (including its biodiversity consequences) and the energy shortage challenge. This experience is replicable in other world regions and in the developing world through North-South and South-South exchange of practices. Taken as a region, Europe opens an array of potential actions by countries, regions and cities, and opportunities for good practices by decision makers and planning related professions, such as:

- Definition and measurement of climate change, energy shortage and loss of biodiversity: mastering the technicalities of GHG emissions accounting and of energy efficiency measurement are a prerequisite for carbon taxation and/or trading measurement tools. As an example, the benchmarking of cities by their GHG emissions per inhabitant remains a daunting technical challenge (GHG Study Report 2009). Indicators of the loss/gain of biodiversity are raising similar challenges.
- Territorial development and transport: the need for new forms of spatial development is being recognised, through more sustainability-oriented regional funds and other EU programmes such as the trans European networks, gradually switching from road to rail.
- Energy: the EU commitment to reduce emissions and increase energy efficiency, as well as to develop alternatives to fossil fuels and the related distribution networks (“smart grids”), opens new fields to policy-makers and the related professions.

- Nature conservation: the Natura 2000 scheme and the “rural development policy”. The creation of nature reserves, as encouraged by the EU, is an opportunity for land-use planners in the broadest sense.
- Inland water resources: water resources issues include the protection of existing catchment areas, design and implementation of new ones, efficient fresh water production and distribution, incentives to thrifty use of fresh water (“smart metering”) and public or public-private water management.
- Coastal protection: protecting coastal areas against rising sea levels will be a priority in Europe and world-wide, requiring investment in dikes, related earth movements, sand nourishment and extraction, space adaptation schemes and urban/rural design enhancing the territorial complementarities.

At city and regional level urbanisation and the resulting endless high energy-consuming conurbations raise governance and professional challenges of an unprecedented nature, at the interface of land-use planning, mobility planning and environmental planning. High density low-rise timeless ways of building and contiguous building forms are saving energy and reducing motorised transport.

New skills should include the effective achievement of low energy urban development, meeting the demographic requirements of a growing world population and the declining population of old industrial areas. Adaptive reuse of existing buildings, rich in energy inertia, rehabilitation and greening of urban brown-fields and reconversion of surplus former industrial sites to new nature-friendly and bio-diverse uses require, among others, a combination of landscape architecture, ecological engineering and restoration, synergies between urban infrastructure and water management, and phyto-remediation of polluted soils. In short, maintaining urban and rural quality of life, urban cultural diversity and individual cultural heritage will require new forms of planning with nature and with the existing building stock, as well as techniques for measuring economic, social and environmental planning performance which go beyond gross development product. International, regional and national planning-related public and private institutions, schools, training programmes and associations may find new fields for their activity here.

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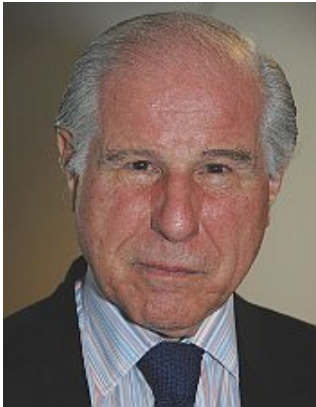
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Abbreviations

CDM	Clean development mechanism
CO ₂	Carbon dioxide
COP	Conference of parties to the convention
COST	Committee on Science and Technology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EEA	European Environment Agency
ETS	Emissions Trading Scheme
GDP	Gross domestic product
GHG	Greenhouse gas
IBA	Internationale Bauausstellung
IPCC	Intergovernmental Panel on Climate Change
ISOCARP	International Society of City and Regional Planners
LED	Light emitting diode
NFP	National forest programme
NYCDOT	New York City Department of Transportation
OECD	Organisation for Economic Co-operation and Development
REDD	Reduced emissions from deforestation and forest degradation
SAC	Special areas of conservation
SACTRA	Standing Advisory Committee on Trunk Road Assessment
SCOPE	Scientific Committee on the Problems of the Environment
SET	Strategic energy technology plan
SOER	State of the Environment Report
SPA	Special protection area
UKERC	UK Energy Research Centre
UNCED	UN Conference on Environment and Development
UNFCCC	UN Framework Convention on Climate Change

About the Author



Pierre Laconte is President of the Foundation for the Urban Environment, President of the International Society of City and Regional Planners, and Vice-president, of the Scientific Committee of the European Environment Agency. He is a Board Member of the EU Chapter of the Club of Rome.



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