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**CONSIDERATION OF THE OUTCOMES
OF THE SEMINAR ON “CLIMATE NEUTRAL CITIES”**

TOWARDS CLIMATE NEUTRAL CITIES: A REGIONAL PERSPECTIVE

Note by the secretariat

Summary

At its meeting in April, the Bureau of the Committee of Housing and Land Management agreed to proceed with the organization of the seminar “Climate Neutral Cities” to be held the first day of the Committee session (23 September 2009). It also agreed that a background paper should be prepared to guide discussions during the seminar, in particular under agenda item 4 (see ECE/HBP/2009/3).

The present note argues that improved energy efficiency and reduced greenhouse gas emissions in cities are vital to meeting the commitments of the Kyoto Protocol, any post-Kyoto agreements and related tools such as the Clean Development Mechanism. Climate neutrality can simultaneously improve the sustainability of urban areas, extend numerous benefits to residents, and allow us to address environmental, economic and social challenges.

This note outlines how certain actions taken at the city level can reduce greenhouse gas emissions as part of the framework of intervention needed to enhance the overall urban sustainability. Related policies such as “smart growth”, increased green spaces and energy efficiency in buildings are elements of urban development strategies that predate the international quest for climate neutrality. The need to reduce greenhouse gas emissions and the related international commitments strengthens the need for these policies’ application.

The Committee may wish to discuss how areas and activities of its programme of work can indirectly address the reduction of greenhouse gas emissions, and how these activities can

contribute to climate change mitigation. Possible goals include: (a) Providing member States with adequate tools to face the challenges posed by climate change in urban areas; (b) Emphasizing the relevance of Committee activities in the climate change debate; (c) Reinforcing the validity of those policy areas and increase the attention of policymakers; (d) Increasing the overall performance of the sector.

I. INTRODUCTION

1. Initiatives to address the impacts of climate change and climate variability are numerous, and actions related to energy efficiency in buildings are often part of these initiatives. However, few consider that urban planning and land use zoning need to be integrated into climate change action plans. It is not only the technological attributes of buildings that contribute to the reduction of energy use, but also the spatial and density attributes of communities and cities at large. Realizing the need to include all the aspects of city planning in a broader approach to combat climate change in urban areas, the Committee on Housing and Land Management is taking the step forward of focusing on climate neutral cities.
2. This note argues that enhancing energy efficiency and reducing greenhouse gas (GHG) emissions in cities are key steps to achieving the Kyoto Protocol and any post-Kyoto commitments as well as for the proper use of related mechanisms such as the Clean Development Mechanism (CDM). These steps also present an opportunity to enhance the sustainability of urban areas and to increase benefits to individuals, inter alia, reduced costs, increased living comfort and improved health.
3. In the United Nations Economic Commission for Europe (UNECE) region, over 60 per cent of member States are listed in annex B of the Kyoto Protocol. They thus have agreed to limit their emissions according to the set targets. As a matter of fact, of the 38 countries of annex B of the Protocol, 35 are UNECE member States. This makes UNECE a unique region vis-à-vis the Kyoto commitments and most likely the post-Kyoto framework. Other UNECE countries outside annex B could also benefit from the CDM and other assistance programmes mentioned in the Protocol.
4. GHG emission reductions will have to be made in key sectors, including building and spatial planning, transport planning and infrastructure. The sectors that could most contribute to the reduction of GHG emissions are found in the urban sphere. For instance, the International Panel on Climate Change (IPCC) estimates that there is a potential to reduce approximately 29 per cent of the projected baseline emissions by 2020 in the residential and commercial sectors.

II. THE NEEDS FOR AND BENEFITS OF CLIMATE NEUTRAL CITIES

5. There is no clear estimate of the contribution that cities make to GHG emissions. In general, estimates agree that cities are responsible for a large proportion of GHGs, but vary widely from approximately 20 per cent (for instance, roads account for 9.9 per cent of those emissions, and residential buildings for another 9.9 per cent¹) to up to 75–80 per cent.² In a

¹ World Resource Institute (WRI)-Climate Analysis Indicators Tools (CAIT).

recent study, the International Institute for Environment and Development estimated that the true value of those emissions is closer to 40 per cent.³

6. In the long run, it is also estimated that economic losses will result from increased heat waves, floods, storms and coastal erosion in some urban areas. Many organizations, scholars and climate change experts agree that the potential economic loss could be around 5–10 per cent of global gross domestic product (GDP)⁴, with poor countries suffering the most. In general, across the UNECE region infrastructure damage costs for instance will increase substantially due to climate change mitigation and adaptation (Deda and Georgiadis 2009).

7. Despite the different estimates on contributions to GHG emissions, authors concur both that cities will be heavily impacted by the consequences of climate change and that cities are an important part of the solution. The climate, energy and financial crises may offer opportunities to rethink current development patterns and building practices.

8. As of today, “climate neutral cities” sounds more like an oxymoron than an achievable goal. However, certain steps have been taken by several cities (London, Paris, Moscow and Frankfurt, among others) to reduce GHG emissions, and mechanisms are being identified at the urban scale to offset currently unavoidable emissions. Climate neutral cities are the goal to which all urban areas should aspire, including the identification of trade-off mechanisms that, as some emissions would remain unavoidable, would bring to zero the final overall balance.

9. Climate neutrality, however, is not simply a goal to reduce global warming, but also a way to address some of those environmental, economic and social challenges that are part of the broader sustainability agenda for urban areas. This will make individual benefits obtainable, such as reduced costs, increased living comfort and improved health.

10. The sustainable development agenda, as agreed in Rio de Janeiro (Brazil) in 1993, was translated by local authorities and guided by the Local Agenda 21 document in a range of different actions globally to enhance economic, social and/or environmental performance of urban areas. However, since the release of the Bruntland report⁵, sustainable development has been interpreted by many according to their own specific interests. As a result, while the term has become widely recognized, acceptable and used, it has also lost its integrity as a political concept (Keiner 2005). This has also resulted in a lack of clear indicators for the measurement of sustainable goals and a lack of clear targets for action.

11. Despite the associated lengthy negotiations to agree on commitments, the scenario at the international level and the collective global goals are quite clear: the overall reduction of GHG emissions is necessary to halt global warming.

12. Mechanisms are in place or under discussion to make this goal achievable. However, as in the climate change debate, there are different possible paths to reach the desired goals. Theoretically, for instance, heavy fertilization of the seas and oceans could considerably decrease GHG levels in the atmosphere. This solution would, however, bring other unsustainable ecological impacts, triggered by the collapse of those key ecosystems.

² See the Clinton Climate Initiative estimates, and data reported by the Executive Director of United Nations Human Settlements Programme (UN-Habitat) in her speech to the sixty-second session of the General Assembly, Paul Dickinson, the Carbon Disclosure Project, etc.

³ Satterhwaite 2008.

⁴ Stern 2007.

⁵ Bruntland 1987.

13. The clear target of climate neutrality therefore must be pursued within a framework of balanced actions that also address economic, social and development problems and do not simply “relocate” the problem elsewhere. Thus climate neutrality in cities should be seen as a strategic goal whose tools and actions will trigger beneficial effects for several sectors, and for the community as a whole as well as for individuals. Efforts should be geographically focused, allowing for a local balance of emissions and their management.

14. In the context of the contemporary crises the world faces, this definition highlights how the transition to reduced emissions would bring benefits at three different social levels:

- (a) Direct benefits to climate, by reducing GHG emissions;
- (b) Direct and indirect economic, ecological and collective benefits to society and the overall sustainability of the city (the right mix of policy actions can at the same time stimulate economic recovery and improve the sustainability of the environment). In particular, in developed countries there are major emerging economic policies to improve energy efficiency and conservation, to increase the use of cleaner energy, to make the transport sector more efficient and environmentally sound, and to create new jobs and boost certain economic sectors in the short term (UNEP 2009);
- (c) Direct and indirect benefits to the individual citizens and their welfare. For instance, enhanced energy performance in homes results in reduced bills and increased comfort for households, with direct benefits on the overall income and indirect benefits on health and living conditions (see table).

15. There are, however, considerable disparities between the UNECE countries region that need to be addressed. Given these disparities, there is no “one size fits all” solution, but rather a range of possibilities for its member States that need to be adapted to countries’ specific stages of socio-economic development as well as to their political and cultural heritage.

16. Although much progress has been made recently in terms of energy efficiency, the existing situation in all UNECE countries leaves much room for improvement. Even those member States that are considered to be advanced in terms of building standards are far from fully realizing the sector’s potential. Transition countries in particular lag behind, and their housing is characterized by low-efficiency standards (especially the panel-built houses dating from the 1960s–1980s). A specific challenge for these countries is overcoming called the “energy efficiency trap”, the situation in which countries with lower energy efficiency are unable to change due to the lack of funds, experience, technology, adequate institutions and initiative (UNECE 2009a).

Table. Trickle-down benefits of climate neutral cities

| Policy | Tools | Environmental sustainability | Overall sustainability (including welfare and health gains) |
|-------------------------------------|--|---|---|
| Energy efficiency in housing | Low energy appliances Use of appropriate construction materials Better insulation Use of renewable energy sources | Reducing emissions in buildings: 29 per cent estimate by IPCC | Reduced use of energy consumption Better living conditions: increased housing comfort and better air quality |

| Policy | Tools | Environmental sustainability | Overall sustainability (including welfare and health gains) |
|--|---|--|---|
| | Effective heating/cooling system (including passive housing) Optimize the life cycle of buildings | | |
| Sustainable transport | Increase public transport opportunities Encourage investment in renewable fuels Promote cycling and walking | Less GHG emissions from reduced traffic Reduce pollution | Competitive gain from reduced expenditures and time in transport Save money at the individual level, from less money spent on transport Health gains from healthier lifestyles Time-saving: better quality of mobility |
| Urban greenspace | Urban forest Greening roofs in areas with a high proportion of buildings Green public space | Absorb emissions of carbon dioxide Enable evaporative cooling Increase biodiversity | Better living conditions: increased recreational opportunities and a healthier environment Conserve natural ecosystem value |
| Reduce urban sprawl (neighborhood planning) | Protected open space Smart growth Greenbelts Densification: encourage polycentrism Mixed land-use | Reduce emission from buildings Diminish the need for individual transport Increase green areas | Improve city “efficiency” and competitive gain Reduce the formation of unsustainable informal settlements Socially functional city; encourage social integration Create living communities |
| Manage urban infrastructure | Control waste management: create waste-to-energy systems at landfills Improve water distribution systems and leak management | Protect water sources from pollution Reduce pollution from waste | Better water for human consumption Improve living and sanitary conditions Save money |

III. CURRENT POLICIES, OPPORTUNITIES AND SOLUTIONS

17. Most existing programmes and projects to reduce emissions in urban areas have been developed at the local level. Local authorities have a clear understanding of local needs and

opportunities and can facilitate the implementation of small-scale projects as well as lobby national governments to implement projects at the national scale.⁶

18. Listed below are some of the areas for policy development currently identified or under consideration by Governments and local authorities that have proven beneficial to reducing emissions and carbon dependency and to increasing the overall sustainability of cities.

A. Policies and tools at the city level

19. Land-use planning for climate neutral cities includes policies, projects and plans for urban green space⁷, natural areas and biodiversity to mitigate climate change in urban areas. The need for a healthy balance between the built and natural environments has noble historical precedents, already being formalized in the nineteenth century (e.g. the London greenbelt). Green infrastructures have, however, assumed added value in the planning practice as tools to reduce carbon dependency and provide ecosystem services such as cooler microclimates and the reduction of surface water run-off, thereby increasing cities' potential to adapt to climate change. Green roofs have been demonstrated to reduce the urban heat island phenomenon and to help mitigate climate change by sinking carbon and providing cooler indoor temperatures, thus necessitating less artificial cooling.⁸ Urban forests are also considered one of the key instruments to curb the effects of GHGs and an increasing number of cities are launching plans and actions to enhance the size of the urban canopy.

20. "Smart growth" policies have also been identified as a solution to optimize city density and forms to reduce urban sprawl, thus contributing to reduced GHGs. Again, policies to increase urban densities and make cities more compact are not a direct result of the climate quest. They predate the international attention to global warming and were initiated as part of the larger sustainability agenda, to make urban spaces socially cohesive and combat the uncontrolled urbanization of city boundaries, leading to long commutes to city centres and consequent exponential increases in urban traffic and the use of cars. "Smart growth" policies do respond effectively to the current need to reduce emissions, however, as they prevent urban sprawl and promote efficient public transport systems as well as pedestrian- and bicycle-friendly urban design, in turn reducing the need for cars and thus emissions from transport.⁹

21. Measures to reduce unsustainable uses of land, including the formation of informal settlements, support the rationale of "smart growth" and also address specific problems related to development in the region. As a recent UNCE study¹⁰ has highlighted, the rapid urban growth of many post-socialist countries has led to the low-density urbanization of suburbs. This is coupled with a tendency of all urban areas in the region to develop residential areas at the outskirts of cities, where affordable land is available. The rapid and often illegal "colonization" of peri-urban areas has led in some cases to a complete lack of infrastructure, low-quality settlements and poor living conditions. City governments often decide to "upgrade" new settlements and to include them in the urban tissue, thus extending urban boundaries well beyond the central areas where urban life usually takes place. Whether these phenomena are the outcome of legalization processes of poor informal settlements or the

⁶ Bukeley and Betsill 2005.

⁷ Gill et al. 2007.

⁸ Laukkonen et al. 2009.

⁹ Chatterjee 2009.

¹⁰ UNECE 2009b.

authorized and planned construction of suburban middle-class villages, they result in increased use of land, deforestation and unsustainable mobility patterns, all contributing to increased emissions. Land use policies to limit land use change, both at the urban and regional scales, should be developed and mutually coordinated.

22. The regional scale of development is an additional dimension to be considered when planning for climate neutral cities. Policies that promote a decentralized polycentric structure to increase urban densities and reduce travel distances should be encouraged. The unsustainability of “leapfrogging” – the scattered development of buildings that become extended urbanized areas (e.g. Los Angeles) – has been criticized in the urban planning theory and practice over the past 40 years. This is due to the high consumption of agricultural land and natural areas, the lack of urban centres to support social exchange, and the dependency on the car as the main mode of transportation. Climate change concerns reinforce the need for sustainable regional planning, distributing urban growth around major and medium-sized centres, again avoiding low-density developments.

23. Infrastructure planning is another strategic component of urban performance; one of the key elements is the choice of transport means and modalities. Transport planning for climate neutral cities includes interconnected steps. The first key step is the development of alternative transport solutions such as non-motorized transport systems, the increased use of public transport and the decreased use of cars, the main emitters of carbon dioxide. Numerous initiatives exist at the urban scale in many UNECE countries to reduce the use of private automobile, or if its use is indispensable, to make it more efficient (through carpooling, park and ride, etc.). The use of alternative transport means will have immediate and quantifiable effects on urban pollution and GHG emissions. Alternative transport systems, however, go hand in hand with supporting city planning strategies, promoting cycling and making space for increased public transport.

24. The second step is the use of clean energies and hybrid technologies for city buses and municipal vehicles. While planning can make the case for alternative and additional transport modes, technology can pave the way for less polluting vehicles. This step is strictly interrelated with the previous one, for if clean energies are not part of the increased stock of public (and private) vehicles, urban planning alone cannot reduce the contribution of traffic to emissions. While in many western countries in the UNECE region, in particular due to European Union (EU) regulations, vehicles are following agreed energy standards, both the public and private vehicle stocks in several countries of Eastern Europe, Caucasus and Central Asia (EECCA) and South-Eastern Europe (SEE) are still characterized by poor performance, highly polluting engines and obsolescence.

25. Traffic can also be reduced by through urban design that encourages more sustainable choices. Measures in this direction, strictly linked to “smart growth” theories, promote an increase in, inter alia, public spaces that are pedestrian-friendly, and making different services available around main neighborhood centres. Disincentives to car use (e.g. traffic calming or deviations) can also discourage cars in the proximity of urban centres when the same locations can be reached via public transport or walking/cycling.

26. Urban infrastructure also includes a number of other networks and supply chains where sustainability and the carbon footprint need to be ascertained and addressed. Given the focus of the Committee’s work, this paper will not deal in detail with these areas, but it is important to recall some of them: (a) the relevance of implementing localized, cleaner

electricity generation systems or other energy sources; (b) creating waste-to-energy systems at landfills; and (c) improving water distribution systems and leak management.¹¹ The carbon performance of a city will also be determined by the harmonization of planning choices, and waste and energy production infrastructure are part of these schemes.

B. Policies and tools at the building level

27. It is estimated that buildings alone represent nearly 15 per cent of GHG emissions (residential building accounts for 9.9 per cent and commercial buildings for 5.4 per cent). Most of the emissions occur during the use stage of the building, with construction and demolition accounting for 10–20 per cent of total emissions.¹² Due to their energy consumption, buildings account for a considerable proportion of carbon dioxide emissions. In the UNECE countries, the main sources of energy in the buildings sector are electricity, district heat (especially in EECCA) and natural gas. This entails both (a) direct carbon dioxide emissions from the buildings sector via the “on-site” combustion of fossil fuel and (b) indirect (upstream) emissions via demand for electricity and district heat. Upstream emissions are dominant in the UNECE countries.

28. In the region, buildings are responsible for over a third of total final energy consumption; by and large, this energy is used by the residential sector (20–30 per cent of the total final consumption on average). Demographic, economic and cultural changes further increase the pressure of housing on energy use and are accompanied by even higher levels of related GHG emissions. It is the building sector and particularly the residential sector, however, that can generate some of the greatest energy savings when compared to other energy users (UNECE 2009a).

29. Energy efficiency in housing is therefore one of the main areas for policy intervention. Improved energy efficiency in housing is defined as successful efforts to reduce the energy intensity of the residential services without compromising the well-being of residents or environmental conditions. Alternatively, a housing sector with relatively excessive energy consumption, environmental pollution and/or problems with energy affordability cannot be considered as efficient.

30. Policies, plans and actions initiated within the UNECE region in this area are numerous. Related constraints in implementation and other policy challenges are thoroughly discussed in informal notice 2 (Green homes: towards energy-efficient housing – prospects for UNECE member States). Information is also available in document ECE/HBP/2009/6, which contains the outcomes of the first UNECE workshop on energy efficiency in housing (Sofia, 21–22 April 2009).

31. In general, policies in housing range from technical solutions such as low-energy housing, to passive housing, to new standards for energy-efficient buildings, to increased use of renewable energy, to energy audits and retrofitting programmes for municipal and private buildings. There is a need for greater awareness of the building sector’s potential as an accessible and efficient avenue for reducing GHG emissions.¹³ The problem is similar in both developed States and countries with economies in transition, and the solution is at hand:

¹¹ <http://www.c40cities.org/>

¹² See the United Nations Environment Programme (UNEP) Climate Neutral Network: http://www.climateneutral.unep.org/cnn_contentdetail.aspx?m=96&amid=234.

¹³ See the letter sent by the Chairperson to Committee members, July 2009.

technologies that can reduce buildings' energy consumption between 30 and 50 per cent without greatly increasing investment costs. Over the long term, these investments effectively pay for themselves through lower energy bills. An increased global focus on energy-efficient housing would promote the sharing of trade and technology between countries, and would generate employment and promote better living conditions in member States. Virtually all countries have the potential to reduce their energy consumption in the housing sector through regulatory and financial instruments. Furthermore, it would be relatively easy to measure and monitor countries' progress vis-à-vis energy-efficient housing through universal metrics and standards.

32. In addition to energy efficiency, it is the overall building performance that also can contribute to reducing the carbon footprint of a building. Indeed, emissions from buildings are not only due to their direct energy consumption. The overall impact is also linked to their environmental performance, including their life cycles.

33. It is thus important to optimize the life cycles of buildings and reduce their environmental, social and economic impacts during their lifespan.¹⁴ In particular for new construction, it is important to assess and address the impacts of construction, from the extraction/removal or production of building materials to their transport and final installment. Several of these steps have a high environmental impact and the activities are serious emitters of GHGs. Production of concrete, deforestation, use of energy in steel manufacturing industries and transport of raw and final products, for instance, are some of the activities that, before the building is in existence, have already contributed to its carbon footprint.

34. Along these lines, the choice of materials for both the construction and refurbishment is a key element of the carbon balance of a building as well as of its overall sustainability. Although different technologies have been identified to reduce the climate footprint of different building materials (e.g. recycled concrete), in general the suggested policy is to use, as much as possible, locally available materials. In addition to the usual better performance of local materials vis-à-vis local climatic conditions and biological setting, they drastically reduce transportation costs. The potential for the material to reduce carbon dependency by storing carbon (e.g. in timber) should also be considered.

35. A part of the life cycle of a building is its lifelong maintenance. In many UNECE countries, maintenance has become the most pressing challenge, as privatization has led to more individualistic attitudes to property and a lack of interest and attention in the maintenance of common spaces. In particular in multifamily buildings, leaks, lack of proper insulation, and individual and scattered restorations have not improved buildings' overall performance. Proper maintenance is urgently needed to reduce heating loss and to increase both energy efficiency and buildings' overall environmental performance.

36. The UNECE region has in many cases reached a high level of environmental performance of buildings. Examples can be seen, in particular in North America and Western Europe, of buildings with high environmental performance, often called "green buildings". Although there is no single definition, the concept emphasizes the importance of overall reduced environmental impacts, achieved through the use of sustainable technologies and materials. Green building also underlines the relevance of new and alternative ways of

¹⁴ UNEP Sustainable Building and Construction Initiative <http://www.unepsbci.org/>

building that can boost the housing sector, and it is seen as an important element of a “green new deal” that, while curbing the negative impacts of phenomenon such as climate change and environmental degradation, could create new jobs and help retool the economy.

III. FOLLOW-UP BY THE COMMITTEE

37. Many of the areas and activities of the Committee’s current programme of work indirectly address the reduction of GHG emissions.

38. Programme element 10.1.2 (Improvement of urban environmental performance) is very closely linked to the issue of climate change. Studies concluded so far on spatial planning and informal settlements have already indirectly addressed the negative environmental impacts of urban sprawl and uncontrolled urban development. Under this programme element, the Committee could also address climate neutral cities, while focusing on the contribution of planning to GHG emissions reduction.

39. Climate neutrality is also strategic when it comes to land uses, as is touched upon by programme element 10.1.3 (Land registration and land markets). In the United Nations system, an interdisciplinary group under the leadership of the Environment Management Group of the United Nations Environment Programme (UNEP) is currently assessing how land management and use are linked with and can enhance climate neutrality, as identifying land is a primary element for carbon storage, reduction of emissions and climate neutrality. This aspect should also be considered when discussing existing land-use planning practices and land administration strategies within the Working Party on Land Administration, in particular vis-à-vis the development of peri-urban areas.

40. Under programme element 10.1.4 (Housing modernization and management), the issue of climate neutrality is well covered by current work on energy efficiency in housing. It is important that the relevance of the Committee’s work on the topic also be acknowledged in the broader framework of climate neutrality, and that its potential is stressed at future events such as the Second Workshop on Energy Efficiency in Housing (Vienna, 23–25 November 2009).

41. The Committee may wish to discuss how areas and activities of its current programme of work indirectly address the reduction of GHG emissions, as well as how:

- (a) To provide member States with adequate tools to face the challenges posed by climate change in urban areas;**
- (b) To emphasize the relevance of the Committee’s activities to the climate change debate;**
- (c) To reinforce the validity of those policy areas and increase the attention of policymakers;**
- (d) To increase the overall performance of the sector.**

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