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'Green infrastructure benefits and conflicts - the European experience'

First of all, thank you for inviting the EEA to come to this very important meeting. Our executive director asked me specifically to come because I was brought up in London myself on some of the green spaces, Morden/Wimbledon area, therefore, I am very much into and it is part of my culture this idea of the green belt. I spent the whole of my professional life working as a European Union (EU) civil servant for the last 30 years as an environmental scientist working in environmental policy and environmental assessment and information systems to support sustainable development. This is the scope of the work that we do at the EEA. It covers over more than just the current 28-member states of the EU, it also covers up to 33 countries in the west Balkans, Turkey, Switzerland, etc. Therefore, all the evidence and information that we have whether it is about climate change or about urban areas is from this large geographical area. All of the work we do is, as I said, to support policy making both at European level but also at national level and in many cases, particularly for the urban work, at local level as well.

For any of these decision making processes - and this has already been mooted before - we need some sort of overarching perspective and policy. What I would like to do is, first of all, give a broad view of that, then give some facts and figures about urban sprawl from the European context and then move on to the issues of climate change and how cities can actually contribute to that to mitigate the effects of climate change and adaptation where green spaces are fundamentally important. This vision here is the overarching vision of the EU when it comes to environmental statement of development, and it is a fantastic, amazing vision which I hope going forward the UK will stay very much closely associated with. It is revolutionary in its scope and no other group of countries around the world has such a broad vision. Basically, it is saying in 2050, which is not so far ahead - my two granddaughters that I have will be over 30 years old at that time, therefore, this is not so far ahead at all - will live well within the planet's ecological limits, will have a circular economy where nothing is wasted, biodiversity is protected, waste enhances society's resilience and our low carbon growth has long been decoupled from resource use.

Now, I mention this because any discussion about London's green belt has to be also seen within these broader visions; how any development is going to contribute to this type of vision. Already it has been mentioned that when we look at urban areas we have to look at them as systems. In fact, this is the way that we look at all of the work and the assessments that we do at a European level. What we see is that everything is embedded within the environment. We have this concentric ring approach or the egg model of the world, not the Olympic rings model - the overlapping pieces between environment, society and economy in sustainable development - no, it all sits in the middle. The systems we have in the middle are sociotechnical systems and we specifically emphasise the urban system as one of those. We will look at the inter-component and interconnecting parts of those systems and treat them as

multifunctional ways of understanding the changes that we are looking at. This has already been mentioned. Fundamentally, we look at the system not just the state of the environment. Cities have an important role to play in the improvement of sustainable consumption and production processes in this overall system.

The challenges in an urban setting can actually be seen through at least these three lenses: the greatest and the actual built environment itself, the socio aspects as well as ecosystems. Let me go through these in reverse order. The built infrastructure that we have and the new infrastructure we are putting in place has a half-life or a lifetime which is way beyond many of our lifetimes. Railways have a lifetime of something like 150 years and perhaps we are seeing, at the moment the end of that 150 years cycle in the UK and in London in particular, which needs improving. Housing and building is 100 years. The renewable power sources, but also all of the energy sources may be 50 to 70 years. Any planning decision now has a very important perspective into the future and cities, effectively, can lock us in to unsustainable modes of consumption production if we do not get things right.

The second challenge is often overlooked in many ways when we talk about environmental and economic activities. However, of course, the actual societal dynamic is growing, is aging and its diversity is extremely important. The differences and the diversities are changing and, perhaps, also becoming even more unequal - and some of these points have already been touched upon in the debate. It is really important in all of these debates to look at the lifestyles, the values, and the political and economic system, which is very closely connected to the societal values.

Then thirdly the ecosystem, green areas. This is a picture of the extremely forward-thinking planning that was done for the London Olympics, taking the River Lea, opening it up, creating an area for recreation and wildlife, but also in an area to dampen any flooding to about 10,000 residents downstream because this natural wetland area can absorb flood conditions. Ecosystem services within the city boundaries are really very important. In fact, we have a number of different aspects here. We have the local climate regulation that happens in an ecosystem setting. There is carbon sequestration. We have the flood regulations that I have already mentioned. Ecosystems services in more general terms to do with biodiversity in particular, economic and recreational values and, of course, the aesthetic values, which we must not overlook as well. These multi-functions have to be looked at when we are looking particularly at the renovation, perhaps, and improvement of the green belt around London.

The most common approaches to all of this over the last 50 years has to improve efficiency. Basically, we make sure that our cars can go further on a gallon of petrol. That is the efficiency model. In fact, now we have the extreme of that with the Tesla where we perhaps do not use any petrol to go anywhere, we just use electricity, although energies come from somewhere - hopefully renewable energy for that. This is the pinnacle of the efficiency model, but actually it does not change the fact that we still have congested streets. They will just be full of Teslas or normal diesel-powered vehicles, which may be more pleasant and better air pollution but it does not solve the integral issues in the city. There are limits to the efficiency model that we tend to use most of the time when we talk about planning and development. We need long-

term visions, long-term strategies which is really the most important takeaway I would like to have from my intervention here. It is to say that any discussion about the green belt of London has to be carried out within these broader long-term visions and strategies and to be managed by those. Of course, we have in the past had many visions and strategies and for London maybe we should take the green city reference for this and understand what has been happening.

In the research literature we have heard already some findings about this, and there are a number of different things which are important to recognise. In fact, in a certain archetypal way, there are three types of intervention: those things which are at a level one, which is simply improving what you have and maintaining what you have; the second way is up where the level of engineering increases, is to create some additional multi-functional aspects to the environment that you are trying to bring and use planning tools as well. Yet also in the extreme level you have designer management of even new ecosystems. I could argue that the London 2012 development on the River Lea was of that nature. Basically, a complete redesign of an area intervention and change. Therefore, we have to understand that all of these types of intervention have their role, which also means then when it comes to green belt you can manage what you have but you can also justify it in the broader space some direct interventions to improve things as well. What this brings in is that we actually have different types of aspects here. Therefore, when you have these types of innovative planning you change the landscape itself. The marine protected areas, our networks of fisheries are the level of maintaining existing protected areas. Our waterways within cities are extremely important for this as well.

The EEA has been studying these things for the last 15+ years and we have two major reports, one which has already been mentioned, the latest urban sprawl report in 2016, and we have been monitoring what has been happening across Europe. Here are some facts and figures. First of all, here is a map of what we will call the European urban temperature across Europe and the urban population is slowly increasing. Currently it is around 74% of the population. By 2020 it is going to increase up to around 80% of the population across Europe. Therefore, these issues to do with how we use these cities correctly densifying the use of the urban spaces is extremely important. Between 2000 and 2010 urban sprawl across Europe has been five times the size of Greater London, that is the amount of urban sprawl that has happened across the whole or Europe. The other way of looking at this is to look at Greater London and to see how much land is needed to service Greater London. It is about 300; I am not sure we can be as accurate as 293, but it is around 300 times the size of London is required to service London. With that urban sprawl, imagine the impacts that are required on the rest of the environment in order to service that area of land.

The main drivers across Europe are housing and industrial/commercial sites. I think this is not surprising. What this graph also shows is that much of the changes in the period 2000 to 2010 happens actually within the buffer zone area. It is even greater. This is an equivalent of the green belt area around London. There is a tendency to spread outwards as well. These are the two main impact areas: housing and industrial/commercial sites. I think that is the same in the case of London as well. All this work is being based upon a whole series of urban morphological

zones that we have been developing across Europe and studying using satellite land cover imagery, which enables us to make the analyses with the various countries and city authorities of the zones. We are doing this through around 900 different cities across Europe.

I am based in Copenhagen in Denmark. They have had a plan for a long time called the five finger plan. The actual development though is a little bit stilted. They have two or three fingers which did not grow as expected and some of the infill that happened here has not been according to the plan and yet Copenhagen is still one of the most liveable cities around Europe, but it got as far as this because it had a plan. That plan has dictated the way in which the rail and road infrastructure has been developed and the housing has been developed. Therefore, whilst they did not reach the plan, they still have a development there which is a lot more, I would say, human-friendly from the experience of living in that city for the last 20 years.

Not such a good example is Istanbul. In Istanbul we can track the development from the 1940s to the present day and, as you can see and as you know probably of visiting Istanbul, it is a very dense and very built up city. If you look at the land take, it is extraordinary. The light colour is the most recent developments and the darker colours are the older developments. That is the urban areas. This is the agricultural land and imagine this map with only the dark colours on. That is the remaining agricultural land within the city limits. All the rest - all the yellow and not so dark - has been taken through urban development without a plan and with just sprawl. To have local agricultural areas is extremely important for urban areas. Therefore, the land take in Istanbul has been directly from the agricultural land space. When you look at some of the statistics they are quite depressing really. European cities have expanded by 78% since the 1950s. Over the past 20 years the extent of built-up land has increased by 20% while the population has only increased by 6%. The expansion of European cities is 78% but the population only by 33%. Therefore, this is also related to some of the points made earlier about density or sprawl.

Yes, we do need more housing. Yes, we do need to have places for people to live in. However, the density is decreasing, not increasing, which is causing all the problems with respect to transportation and quality of life, which has already been talked about a little bit so far. There are a number of other statistics. One of the most depressing is in Germany we have about 15 m^2 per second which is sealed over per decade. That is extraordinary to imagine. There are all sorts of general statistics that we draw from this European perspective. I will not go into the details. One of the most extraordinary ones is to do with transport. Actually this is a bit of a cheat as this is not from Europe but from China. It is so impressive that I put it up here. Impressive in a very negative way perhaps. Nevertheless, the impact in respect of transportation, particularly driver transportation, is, of course, behind this but I will not go into the details of that.

Now, we have all of those developments going on, then we have environmental change and we have climatic change. We have the impacts now increasingly noticeable from rising temperatures, from changing water, rainfall regimes and so on and so forth. Now cities are being confronted by these types of impacts and they can also be part of the solution, but they

will have to adapt to these types of impacts. The urban design and planning required to do that is above and beyond what we have been talking about. There are some really interesting examples of this. Before I go there though let me just point out in a very archetypal graph what urbanisation does from soil ceiling. This is the peak of stream discharge here before urbanisation and you can see what happens is the amount of stream discharge increases and the peak comes sooner, of course, because the water cannot be absorbed into the ground so easily and it runs off over the surface. Therefore, what this means that urbanisation is already increasing the chance of floods and then with changes in rainfall and greater intensity of rainfall we may need to adopt different types of dress as we go to work every morning because there might be flash floods.

In Copenhagen they have never really experienced a flood before in the city centre but in 2010 and 2011 there were two floods right in the middle of the summer from flash floods. It caused a flood of around this height. I was literally walking in the street with water nearly up to my knees and my house was flooded two times in a row. Now Copenhagen has taken a very dense planning process in order to try to create more open spaces with the underground rivers that are in Copenhagen to buffer the water which comes directly from the rainfall in this case.

Moving quickly on then, we notice that, of course, when we do think of planning of new housing we have to decide where to put that. The flood plain is not a good place anyway to put your houses, but with climate change it is an even worse place. In fact, the River Rhine has already lost four-fifths of its natural flood plains and only around 50% of the River Elbe remains. This is a very key thing. When we are talking about planning we have to look at the surfaces of the rivers around London.

However, then it has also developed some innovative ideas. In the Netherlands, where you have the expectation that things are going to flood, you design things in that way. You have floating houses, you have houses which can manage. I am sure my Dutch colleague knows about this more than I do. With cities at the frontline with over 80% of population living there, the way in which we manage our cities is an element in trying to attack climate change and trying to adapt the cities in different ways. There is a lot of research and a lot of experiences around the globe, not just in Europe, about how we can do this. This is an example in Chicago where they do not have any space but they can put green areas on the rooftops, which also delivers ecosystem services of temperature lowering, for example.

Of course, we have also looked at the way in which the impact that we are talking about are also to do with help issues, and that is extremely important. We have a report on rivers and lakes in European cities related to health issues as well. There is also some very interesting examples and experiences. This is an example in Madrid where you utilise natural systems with trees in certain orientations to reduce the local temperature in the centre areas of the city. The research shows that if you have about 100 m^2 of trees you can reduce the local temperature by about 1° centigrade. Therefore, these aspects are extremely important when you are thinking about the London green belt but about the green areas within London as well. It provides a number of important social benefits. You can see here in these pictures from London. To

conclude, these are some of the services which I have mentioned that are being provided. Climate regulation of local areas, flood regulation, carbon sequestration, habitat services, aesthetic values as well.

Finally I would like to talk about how we need to adopt this idea of having a urban agenda, where basically we are within the urban area combining rural aspects and connecting ourselves to the rural area outside. That is what is being talked about across Europe and it is exactly what you have in London with the green belt. You have a natural urban area. Finally, we should not forget the aesthetic because on top of all of this as well are the aesthetic values. The managing of the city together with the green areas manages to combat urban growth. It is ugly. There is much history and stories about how we can do this. This is not new. There are a lot of best practices and a recent report from the European Commission - I think it was this report here - has a large number of good and best practices and I highly recommend them to you to look at in the development of the areas and the improvement of the green belt around London.

Thank you very much for your attention.