



**Network of**  
**European Environment and Sustainable Development**  
**Advisory Councils (EEAC)**

# STATEMENT

and background document

## TOWARDS SUSTAINABLE EUROPEAN INFRASTRUCTURES

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<sup>1</sup> Three organisations represented in the council abstain.

# Sustainable Infrastructures for Europe

Infrastructure policy and its implementation are paradigmatic for thinking and acting “sustainably for a long way ahead”. Today’s infrastructure decisions will shape Europe’s “hardware” for at least the next 50 years, thereby determining future mobility patterns and energy systems, and hence the level of greenhouse gas emissions, as well as the shape of settlements and biodiverse landscapes. In the view of the fundamental transformation of the energy and transport systems needed to ensure a socially just and ecologically resilient Europe within this time span, the traditional infrastructure planning arrangements will no longer work. The “predict and provide approach” frequently ends in wish lists for private or public infrastructure projects, which will have to become obsolete within the life-time of many new infrastructure projects. It perpetuates the mobility and energy systems of the fossil-fuel dependent age. Current EU energy, transport and climate change policies already commit the Union to a new approach where energy and transport systems will have to rely on considerably lower energy needs and on fossil- and carbon-free energy sources. So infrastructure provision and financing must become strategic and visionary, led by robust principles and guaranteeing demanding targets. Mobility and energy systems, together with the corresponding spatial patterns of human settlement, viable land usage and connecting infrastructures for the second half of the 21<sup>st</sup> century, will look very different from those of today. It is time for the EU to plan now for those future dramatic shifts in policy and funding. This EEAC Statement lays the ground for such a new more visionary approach, as illustrated by the example of transport infrastructures, infrastructures for electricity from renewable resources and green infrastructures consisting of local and regional green belts as well as Trans-European Habitat Networks.

Future infrastructure policy must be guided by a number of principles for sustainable development, such as:

- Acting within the bounds of nature’s functions and ecological resilience and using natural resources efficiently and frugally so that they are not used up and hence denied to future generations.
- Creating a society that is robust in the face of these boundary conditions, which seeks fairness of treatment and justice for present and future generations, which is supportive of forms of production and consumption that do not create either natural disruption or social disparities, and which reinforces social cohesion and creates new jobs of high quality.
- Paying for all forms of economic activity so that the costs to both present and future generations are included in all investments in order to provide forms of funding that promote sustainable investment and entrepreneurship.
- Acting on the basis of the precautionary principle so that all the best in scientific understanding is complemented by an awareness of the worst case outcomes, and their possible implications for nature and humanity, which lie at the margins of our modelling.
- Ensuring a participatory democracy which recognises the need to be responsible for ensuring sustainable behaviour

and for the betterment of the wellbeing of the planet as a whole. This also includes paying more attention to the need to protect and enhance regional diversity in Europe as well as worldwide, based on local economies, cultural traditions and social cohesion.

- Planning on the basis of the subsidiarity principle so that infrastructure and spatial planning becomes a multilevel exercise where local and regional competences and resources should receive priority. Sustainable local and regional infrastructure needs come first. Competences at higher levels of planning, budgeting and regulation are only justified in order to address the national or European dimensions of infrastructures, aiming at solving problems which cannot be adequately addressed at the lower levels.
- Demonstrating that a model of society based on the principles of sustainable development is possible, especially for the developing countries.

There is an emerging consensus that, in the view of the objective of the EU to limit global temperature increases to 2 degrees, industrialized countries will need to reduce human-caused emissions of greenhouse gases by 80–95% by 2050, and by at least 30% by 2020. In the view of the high economic value of ecosystem services and the immensurable intrinsic value of nature the continuing loss of biodiversity must be stopped. Any new investment in energy, whether based on renewable energy or fossil fuels, needs to fully take into account these long-term principles and objectives. For sustainable transport infrastructure policy the EEAC therefore suggests:

- A more integrated spatial planning approach, including a comprehensive assessment of social and environmental assets and uses of urban space and landscape (e.g. ecologically sensitive corridors, cultural heritage, leisure, etc), which may limit further expansion of infrastructure in favour of more local and flexible transport management approaches.
- Incorporation of climate change mitigation and adaptation strategies that are in line with overall EU climate policy.
- Reasonable standards for accessibility and mobility for reaching essential services and facilities.
- At member state level, price signals should be imposed, but taking into account the social justice implications for the poor. These should be based on full accounting of short- and long-term social and ecological benefits and costs, direct and environmental transport costs and benefits to underpin technological innovation and to encourage the most sustainable use of transport infrastructure.
- Stable financing mechanisms that incentivise sustainable transport planning decisions, integration of transport demand-side measures in infrastructure planning.
- Careful and coordinated assessment of long-term capacity needs and restrictions for all modes of transport including airports and harbours.
- Improvements to the interconnectivity of the different European railways systems.

For sustainable energy infrastructure policy the EEAC suggests:

- Extend the time scale of the energy and climate debate. The EU energy and climate agenda must be extended

to the year 2050 in order to set the right signals, but with clear targets for 2020. A commitment to reduce greenhouse gas emissions by at least 80–95%, as suggested by reports for the IPCC and also endorsed by the European Commission should be included, coupled to at least 30% reduction of all GHGs by 2020. A reformed Emissions Trading Scheme (ETS) with a longer time perspective, and a well planned, toughly regulated, and a respective progressively reducing carbon cap will have to play an important role. A predictable long-term political framework and agenda meeting those requirements is essential for investors to engage themselves in a transition pattern.

- Give a strong signal in favour of high renewable energy growth beyond 2020. The renewables potential may reach 45% by 2030 according to scenarios for DG TREN, and may become the dominant energy source for electricity production by 2050. Both local renewable electricity for local consumption, as well as large scale off-shore wind or solar energy will also have to play a role in meeting overall demand and will require priority access to available and new electricity grids.
- Intensify the energy efficiency agenda, especially as regards efficiency standards, progressive pricing and appropriate pricing incentives for contracting.
- Increase the level of research and the share of ETS-auctioning revenues to be earmarked for innovative renewable energy projects.
- Check all open and hidden subsidies and research to other low carbon technologies for their impact on the development of renewables as part of impact assessments.
- Continue with efforts to liberalize the European energy markets with a view to a complete unbundling of ownership between electricity production and distribution, privileged access to renewable energies and strong incentives for new investment in national and European grids for renewable energies.
- Mobilize high level political commitment. The Mediterranean solar plan and the North Sea Grid for Off-Shore Wind-Energy should become elements of a European flagship project for a low carbon economy, as part of a European contribution to a “Green New Deal” for economic recovery, and as a strategic element for the Lisbon and the EU sustainable development agendas.
- Mobilize capital for investment, by targeting the financial instruments of the EU and establishing a single European operator or strengthening the role of a network of transmission operators for investing in a long distance grid. Set the right incentives for private and public investment in networks linking renewables production (e.g. off-shore wind) to the centres of consumption.
- Strengthen the incentives for Northern Africa, Southern and South Eastern Europe to reinforce the role of renewable electricity both for the European and their domestic markets in line with aspects of energy security objectives. For a transitional period both ETS, clean development mechanism (CDM) and technology oriented support will play a role here.
- Improve public acceptance and minimize trade-offs with green networks by use of strategic environmental

assessments, additional investment for underground cables or using existing infrastructure corridors.

For the establishment of a green infrastructure net for Europe, and for the proper integration of the different infrastructures the EEAC suggests:

- Establish the baseline situation. To inform thinking on green infrastructure and identify the most important actions we need to know the baseline situation. Member states will need to identify current assets, functional requirements and benefits of green infrastructure and identify the challenges including climate change and population and development pressures.
- Develop the means. There is a need to build on existing networks (PEEN - Pan-European Ecological Network, PEBLDS - Pan-European Biological and Landscape Diversity Strategy, European Green Belt initiative) and policies such as the Water Framework Directive (WFD) and Integrated Coastal Zone Management (ICZM), and there is a need for co-ordination and participation. In addition member states should be invited to incorporate biodiversity “offsets” for all contracts involving new infrastructure, so that developers invest in appropriate green corridors and stepping stones for the effective migration of species as habitats shrink due to climate change.
- Design policy options. Measures at EU level should include the development of a strategic vision, guidance and standards for member states, sector specific instruments (regulations, guidance), impact assessments, and financial instruments.
- Ensure adequate funding. Potential sources include the European Financial Instrument for the Environment (Life+), Structural and Cohesion Funds through inclusion as a priority in strategic and operational plans, the European Agricultural Funds for Rural Development (EAFRD) for actions in a forestry and agricultural context.

In the long run we suggest the reconsideration of the current lack of EU competence on spatial planning, while fully respecting the subsidiarity principle. Many EU policies directly and indirectly affect land use. Yet the EU has no instrument and no competence to strike a balance between the different and sometimes conflicting uses. Green infrastructures, as first established by the Water Framework Directive and the Habitat- and Birds Directives, need to be further developed. Indeed they should be an essential pillar of such a European spatial development perspective, which should be considered as a critical complement to national, regional and local spatial planning approaches. Strategic environmental assessments at all levels, including proper mechanisms for public participation, should help to anticipate trade-offs, to find less conflict-intensive alternative options, and to organise an informed public debate, which helps to better integrate the different infrastructures.

EEAC encourages the European Commission and its prospective research centres, member states, industry and NGOs to engage now in deliberations for such an integrated European infrastructure perspective for 2050. This perspective should ensure coherence, be strategic and target led, make fundamental choices transparent and lay the ground for a sustainable development path.

# Background document: Sustainable Infrastructures for Europe

## 1. Introduction

Infrastructure policy and its implementation are paradigmatic for thinking and acting “sustainably for a long way ahead”<sup>2</sup>. Today’s infrastructure decisions will shape Europe’s “hardware” for at least the next 50 years. They thereby determine future mobility patterns and energy systems, and hence the level of greenhouse gas emissions as well as the structure of settlements and biodiverse landscapes. In the view of the fundamental transformation of the energy and transport systems needed to ensure a socially just and ecologically resilient Europe within this time span, the traditional infrastructure planning arrangements will no longer work. The “predict and provide approach” frequently ends in wish lists for private or public infrastructure projects, which will have to become obsolete within the life-time of many new infrastructure projects. It perpetuates the mobility and energy systems of the existing fossil-fuel dependent age.<sup>3</sup> Current EU energy, transport and climate change policy already commit the Union to a new approach where energy and transport systems will have to rely on considerably lower energy needs and on fossil carbon-free energy sources. So infrastructure provision and financing must become strategic, and hence target and principles led. Mobility and energy systems, together with the corresponding spatial patterns of human settlement, viable land usage and connecting infrastructures for the second half of the 21<sup>st</sup> century will look very different from those of today. It is time for the EU to plan now for those future dramatic shifts in policy and funding. This EEAC Statement lays the ground for such a new approach.

New infrastructures for transport, energy, and biodiversity play a key role for the policy agenda of the European Union, as shown in a series of recent communications of the European Commission:

*Public and private infrastructure investments will be an important element of the forthcoming economic recovery programmes.* The world is facing one of the deepest economic crises since the 1920s. In order to prevent the human and social catastrophes which followed the world economic crisis of 1929, the European Union and other states are reacting with debt financed economic recovery programmes. It is of highest importance that those investments do not only reflect immediate economic and social needs, but also long-term sustainable futures. The recovery programmes should, therefore, be used to invest in a low carbon and sustainable future which exploit the opportunities that are also embedded in the crisis. This is the essence of the “Green New Deal”

2 EEAC (2008): “Sustaining Europe for a long way ahead. Making long-term sustainable development policies work. EEAC Statement, September 2008.

3 SRU (German Advisory Council on the Environment) (2005): *Environment and Road Transport. High Mobility – Environmentally Sound Traffic. Special Report. Key Findings.* Berlin: SRU.

advocated by EEAC in its Bordeaux Declaration, together with many other actors.<sup>4</sup> It is also essential that those investment programmes embrace a global, and European, as well as national dimensions.

*The EU Budget and many other financial instruments of the EU, namely its cohesion, social and structural policies, will continue to finance infrastructures especially for improved accessibility and communication technologies for the less wealthy regions.* The ongoing review of the EU budget priorities is important and should also address the sustainability of infrastructure investments, possibly involving new forms of sustainability structural funding schemes along the lines of the principles outlined in the section that follows.<sup>5</sup>

*The European Commission’s Second Strategic Energy Review, published in November 2008, focuses on the role of infrastructure policies for energy security in a low carbon energy system.* This package currently lacks vision for the time beyond 2020, which is crucial for long-life-time investments for sustainability. Nor does this review explicitly make provision for sustainability principles to be applied.<sup>6</sup>

*Since the mid-1990’s, the EU has been funding pre-investment feasibility studies through its instrument Trans-European Networks for Energy (TEN-E).* The priorities of these studies need to be thoroughly reviewed in the light of the climate change debate. The Commission Green Paper on “A better integrated Trans-European Transport Network” (2009) kicks off this important debate. Hopefully this Statement will contribute to this critical discussion.<sup>7</sup>

*The development of new infrastructure could potentially have a negative impact on the European wide network of protected sites (Natura 2000), the range of habitats and species currently in, or close to, favourable conservation status as well as good ecological status as required by the Habitats and Water Framework Directives and the target to halt the loss of biodiversity by 2010 and beyond.* These conflicts must be addressed at an early stage in the planning process with more open and comprehensive impact assessments. In the light of growing evidence provided by the European Environment Agency, namely that the EU should provide for the resilience of ecosystem functions which are so vital for economies and societies, and which cost so much to replace by artificial

4 EEAC (2008): *The Bordeaux Declaration, November 2008.* David, H., Sys, M. (2009): *Meer investeren in milieu als maatregel tegen de economische crisis, Capitulum Selectum, Minarraad 2009/1.* SRU (2008): *Klimaschutz in der Finanzkrise, Kommentar zur Umweltpolitik.* Jackson, T. (2009): *Prosperity without growth The Transition to a sustainable economy, Sustainable Development Commission.* Edenhofer, O., Stern, N. (2009): *Towards a Global Green Recovery: Recommendations for Immediate G20 Action.* UNEP (2009): *A Global Green New Deal, Final Report Febr. 2009.*

5 EEAC (2008): *Sustaining Europe for a long way ahead, p. 6 on “Budgets”.*

6 *European Commission (2008): Second Strategic Energy Review. An EU Energy Security and Solidarity Action Plan. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Com(2008) 744.*

7 *European Commission (2009): Ten-T: A policy review. Towards a better integrated Trans-European Transport network at the Service of the Common Transport Policy. Green Paper. COM (2009)44 final. Brussels 4.2.2009.*

means, such an assessment should also identify measures to improve biodiversity corridors and “stepping stones” through the creation of features that enhance ecological coherence and connectivity as well as likely impacts arising from climate change (as outlined in Article 10 of the Habitats Directive and Article 3 of the Birds Directive). Improving the structural and functional connectivity of the Natura 2000 network will facilitate landscape permeability for species, improving resilience and adaptation to climate change.<sup>8</sup>

*For many decades experts have called for a stronger role for the EU in all aspects of spatial planning.* These calls have so far been ignored by member states and the various EU Treaties. However, only a stronger capacity of spatial planning in accordance with the subsidiarity principle, will allow planners to anticipate the trade-offs between the different networks, to identify synergies between them, to adopt a broader view on the ecosystem bottlenecks to infrastructures and to minimize the need to travel. Spatial structures also provide a crucial determining factor for the level of transport demand. Urban sprawl and dispersed settlements should be avoided; decentralised concentration around central locations or axial developments should be advanced.

*The Lisbon Treaty proposes giving a stronger place to the TEN-E.* Its renewal is crucial for the legitimacy of the European Project and important for a more integrated European infrastructure policy approach.

## 2. Principles guiding sustainable future infrastructure planning

The guiding principles of sustainable development have been suggested in the EU official sustainable development strategy as well as in many national sustainable development strategies.<sup>9</sup> These are:

- Acting within the bounds of nature’s functions and ecological resilience and using natural resources efficiently and frugally so that they are not used up and hence denied to future generations.
- Creating a society that is robust in the face of these boundary conditions, which seeks fairness of treatment and justice for present and future generations, which is supportive of forms of production and consumption that do not create either natural disruption or social disparities, and which reinforces social cohesion and creates new jobs of high quality.
- Paying for all forms of economic activity so that the costs to both present and future generations are included in all investments in order to provide forms of funding that promote sustainable investment and entrepreneurship.
- Acting on the basis of the precautionary principle so that all the best in scientific understanding is complemented by an awareness of the worst case outcomes, and their possible implications for nature and humanity, which lie at the margins of our modelling.

- Ensuring a participatory democracy which recognises the need to be responsible for ensuring sustainable behaviour and for the betterment of the wellbeing of the planet as a whole. This also includes paying more attention to the need to protect and enhance regional diversity in Europe as well as the world over, based on local economies, cultural traditions and social cohesion.
- Planning on the basis of the subsidiarity principle so that infrastructure and spatial planning becomes a multilevel exercise where local and regional competences and resources should receive priority. Sustainable local and regional infrastructure needs come first. Competences at higher levels of planning, budgeting and regulation are only justified in order to address the national or European dimensions of infrastructures, aiming at solving problems which cannot be adequately addressed at the lower levels.
- Demonstrating that a model of society based on the principles of sustainable development is possible, especially for the developing countries.

These principles are enshrined in EU formal policy thinking, but they have yet to emerge in formal investment strategies and funding streams.

In particular, there is no obvious recognition of the need to create a permanent low carbon and sustainable economy in current infrastructure planning. There is an emerging consensus that, in view of the objective of the EU to limit global temperature increases to 2 degrees, industrialized countries will need to reduce human-caused emissions of greenhouse gases by 80-95% by 2050.<sup>10</sup> In the view of the high economic value of ecosystem services and the immeasurable intrinsic value of nature, the loss of biodiversity needs to be stopped. Any new investment in energy, whether based on renewable energy or fossil fuels, needs to fully take into account these long-term objectives. So there is a need to offset any additional carbon based emissions from the new roads or rail structures designed and built as well as any unavoidable land use change affecting biodiversity, so that all future transport investments are specifically designed to be carbon and biodiversity neutral. At the very least there should be a process put in place that encourages the full environmental and social burden of all proposed infrastructure investments, so that any adverse outcomes for the furtherance of these six sustainable development principles are fully identified, discussed by key interested parties, and any residual costs for ecosystem resilience and social wellbeing are incorporated into final planning via agreed compensatory arrangements. Such a dramatic shift in infrastructure policymaking will involve:

- A formal systems-based procedure for complete life cycle calculation and costing, including, specifically, carbon burden accounting.
- Proper consideration to assess the various likely ecological and social consequences of any policy pattern or programme, so that the final scheme will reflect the

<sup>8</sup> EEAC (2005): *Biodiversity Conservation and Adaption to the Impacts of Climate Change*, EEAC Statement, September 2005.

<sup>9</sup> HM Government (2005) *Sharing the Future: The UK Sustainable Development Strategy*. London: HM Stationary Office.

<sup>10</sup> European Commission (2009): *Towards a comprehensive climate change agreement in Copenhagen. Communication of the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. COM(2009) 39 final. Brussels, 28.1.2009. WBGU (2009): Solving the Climate Dilemma. The budget approach. Berlin: WBGU.*

bettering of both the environment and society on a long-term basis.

- A mechanism for guiding the markets so that any commitment to either public or private financing, or both, introduces these principles and sustainable investment criteria and is shown to do so.
- An inclusive model and vision to show the likely consequences of any full scale infrastructure scheme on existing and possible future Natura 2000 sites, on settlement patterns and forms of associated economic activity, and of the consequences for mobility and accessibility generally, bearing in mind the overall purpose of sustainable development.
- A life systems thinking which specifically encourages resilience and adaptability in infrastructure design and planning, which provides adaptability for the longer term (where there are genuine deep uncertainties), which enables staged participatory involvement and consensus building, and which ensures that any future “hard wire” investment is sufficiently reversible for new conditions and social values to be accommodated.

These are tough and novel conditions, but this kind of approach can no longer be avoided. There will have to be new forms of decision making arrangements involving innovative approaches to modelling, to back-casting and to envisioning so that genuinely creative outcomes can be arrived at. So the EEAC also asks for a review of the decision making apparatus and of the current forms of thinking of sustainability assessments. An interagency dialogue based on a common understanding is needed, that will facilitate innovative outcomes. Such outcomes for sustainable infrastructure cannot be guaranteed under the present institutional arrangements.

### 3. Transport infrastructures

Transport related emissions are among the fastest growing source of greenhouse gas emissions in Europe. Transport related emissions (excluding aviation and marine) in the EU grew by 27 percent between 1990 and 2006, offsetting improvements in other sectors. Road and air freight transport in the EU increased by 35 percent, rail freight transport by 11 percent and inland waterway freight transport by 17 percent. Car ownership increased by 22 percent and passenger car use by 18 percent.<sup>11</sup>

Between 1990 and 2006, transport related emissions rose in almost all EU-member states, with the exceptions of Germany (-1%), Bulgaria (-21%), Lithuania (-22%), and Estonia (-28%). In Ireland such emissions increased by 165%, Luxembourg 162% and the Czech Republic 144%. Eleven EU countries saw their transport related emissions rise between 50 and 114 percent. In sum, EU transport emissions continue an unsustainable, long-running, upward trend.<sup>12</sup>

Existing road, rail, water, and air links were largely developed during an era when relatively cheap fossil-fuel transport

was taken for granted and the number of vehicles on the road were still limited. This energy intensive path is no longer sustainable from various perspectives: urban air pollution, congestion, climate change, and loss of natural habitats. Despite continued growth in demand for freight and passenger transport, the simple expansion of existing infrastructure must be avoided. Business as usual trajectories would make achieving the EU's 20 percent greenhouse gas emission reduction goal for 2020, and the Natura 2000 goal of halting biodiversity loss by 2010 mere pipe dreams. Since these are both critical minimum conditions for the EU to hold credibility as a serious environmental actor in the coming decade, it is vital that we change direction in infrastructure financing and planning.

Europe's long-term goal in the transportation sector should be the development of a more accessible and equitable; integrated, yet concentrated, and non fossil fuel-based transportation system. Transportation reform must take into account carbon reduction, climate change impact adaptation and biodiversity preservation imperatives, as well as the reality that in the long run, yet deeper emission cuts and more aggressive measures to preserve open spaces will be necessary. After having made conventional cars considerably more energy efficient, with the aim of reducing average consumption of the whole passenger car fleet to levels of below 80g CO<sub>2</sub>/km by 2030, a transition towards electric-powered vehicles (whether based on hybrid, battery electric, fuel cell, or hydrogen technologies) may in the long-run provide the potential more easily to control greenhouse gas emissions, especially to the extent renewable energy becomes a major component of a future electricity system. Success in this technological revolution will require large-scale public-private collaboration in investment in research, demonstration, and development of electric vehicles and public transportation systems. Major changes to transportation and electricity infrastructures will also be necessary. How long this transition will take is still uncertain. This uncertainty highlights the importance of strengthening EU-wide policies to promote green transport infrastructure. There are many measures that can and should be taken to reduce the greenhouse gas emissions of European transport as outlined in the European Commission's February 2009 Green Paper, "Towards a Better Integrated Trans-European Transport Network at the Service of the Common Transport Policy." The European Community can facilitate the transition to a greener transportation system in a number of ways.

*A focus on spatial planning.* Europe, like other regions of the globe, has experienced a massive growth in urban population, a sharp rise in highway and road kilometres, and a loss of open space. Enhancing requirements for concentrated spatial planning at all levels - from the town and village, to the metropolitan region, the national, and EU-wide levels - can reduce transportation-related problems, including urban air pollution (NO<sub>x</sub>, CO, and fine particulate emissions) and noise, congestion and loss of natural habitat. At the urban level, sprawl is associated with the building of ever more roads, air pollution, congestion, greenhouse gas emissions, and noise, among other problems. Smart regional planning concentrates development near urban centres, minimizing the need to travel long distances to reach essential facilities, like schools, hospitals, and supermarkets. Linked with the development

<sup>11</sup> EEA (2009): *Transport at a crossroads. TERM 2008: indicators tracking transport and environment in the European Union*, EEA Report No 3/2009.

<sup>12</sup> EEA (2009): *Transport at a crossroads. TERM 2008: indicators tracking transport and environment in the European Union*, EEA Report No 3/2009.

and expansion of public transportation systems and bicycle paths, green spatial planning can minimize the need for private vehicle trips.

Given the regional and trans-national aspects of goods and private transport, spatial planning is also critical at the regional, national, and European levels. What is especially needed is the identification of ecologically sensitive corridors and natural bottlenecks, which might limit further infrastructure expansion and require instead transport management approaches for better infrastructure use and for reducing the need for transport. As this will require cooperation among EU member states, the European Commission can play an influential role in promoting cross-border discussions and decisions on the development of efficient, integrated, transportation infrastructures that minimize the further loss of biodiversity by habitat fragmentation. Such major infrastructure changes require both persistent and substantial strategic planning and financial support. It will also require a reconsideration of current uses of structural funds, with incentives to reduce unnecessary vehicle movement over long distances (e.g. just-in-time delivery). Such incentives should involve road pricing and carbon and biodiverse neutrality compensatory measures.

*Enhancing inter-modal connectivity.* While numerous improvements to Europe's transportation system have been realized in recent years, transportation networks and hubs remain insufficiently inter-connected and poorly planned - from both climate change and biodiversity perspectives. Improvement in the connections among transportation modes - for example, through the linking of road freight, rail, and waterway ports - will cut energy costs, improve European inner-connectivity and speed the flow of goods and people. The European Community should intensify its efforts to facilitate such trans-national discussions and planning. There should also be a combination of appropriate incentives and regulatory measures to limit inefficiencies of movement on roads, rail and waterways, and in the air.

*Development of rail and inland and marine waterway transport as a substitute for air and road transport of goods.* Goods transport within Europe can be made more environmentally-friendly by shifting goods from road and air to rail and inland waterways. Particularly important are improved connections between long distance rail lines. While numerous priority projects have been identified, investment levels in the development of rail transport are not commensurate with the need at hand. In addition, combined with an effort to reduce emissions from marine ships, the better use of existing inland waterways could provide a less climate damaging approach to goods transport. Appropriate financing and planning measures need to be put in place to ensure this important objective.

*Prioritizing budgets.* In 1990, the European Community launched action plans for the development of Trans-European Networks, including one for transportation (TEN-T). The goal of the networks is to improve the integration and efficiency of European infrastructures for transport, communication, and energy. Currently EU support for TEN-T is at approximately Euro 8 billion for the 2007-13 period, of which just over

Euro 5 billion is for 30 priority Transeuropean rail and other infrastructure projects. The European Commission estimates that the priority projects will result in new jobs, time saving, reduction in congestion, and a 4 percent reduction in greenhouse gas emissions. Attention should be given to the more efficient use of those funds: sometimes there are alternatives to high-speed links (like the pendolino technique) and large-scale bridges. However, at present much more is being invested in the context of the EU regional and cohesion policy and by the EIB (European Investment Bank) in favour of motorways. The allocation of funds for road development in the structural and cohesion funds should be reassessed and a far greater share allocated to public transportation development. Those investments are incompatible with the EU climate and biodiversity policy goals. Adequate frameworks and funding structures must be developed to promote both public and private investment at a level necessary to make possible major modal shifts towards rail, inland waterways, and regional public transportation infrastructures.

*Improving the efficient use of existing infrastructures.* In the short-term, measures can be taken to reduce the percentage of freight trucks that return after delivering their goods with empty loads. The reform of cabotage regulations that currently restrict how many cabotage operations a lorry may engage in a destination country is an example of a measure that could quickly reduce a structural inefficiency. The introduction of smart transportation technology (e.g. GIS-based information technology that can redirect traffic to minimize road congestion) could also minimize current wasteful use of energy. Price incentives should be devised to ensure this overall objective.

*Multi-level planning and subsidiarity:* Careful attention should be given to the subsidiarity principle: Despite the tremendous growth of long-distance freight and passenger transport, most day-to-day transport is local and regional. Hence also the necessary transformations will have to start at the level of the big urban agglomerations. In a multi-level exercise the EU should focus on strategic links of a real Trans-European, long distance dimension. Coordination of global airport hubs, of international sea ports, the high speed railway system and some motorways with a strong Trans-European dimension may belong to that category. Networks of a national or only regional cross-border dimension should not be part of the TEN-T, but part of national networks. Member states may also decide to decentralize multimodal planning responsibility and budgeting to regions for the intra – and interregional levels.<sup>13</sup>

*Promoting societal understanding of the necessity of greening Europe's transportation network.* With even the best of measures in place, increasing mobility patterns with their concomitant externalities in the forms of congestion, accidents, noise, pollution, and land degradation will place even greater strains on Europe's natural systems. Beyond this, there must be societal appreciation of the importance of

<sup>13</sup> SRU 2005 has proposed a respective model for devising regional, national and EU competence for a multilevel, multi-modal infrastructure planning approach.

reducing the greenhouse gas emissions from transport while at the same time developing a transportation network that minimizes impacts on biodiversity and nature. The European Community can play an integral role in educating the public about steps that can be taken to reduce individual CO<sub>2</sub> emissions (e.g., taking the train or riding a bicycle instead of driving a car) and in supporting fair pricing.

*Demand-side management measures.* Demand-side measures are needed to ensure the efficient use of transport infrastructure and should be integral to infrastructure planning. These include road charging schemes to incentivise more environmental transportation modes and the application of intelligent transport systems. Current and future transport infrastructure will need to accommodate the needs of increasingly smarter vehicles and be able to provide greater flexibility to all users.<sup>14</sup>

In summary, a sustainable transport infrastructure policy should incorporate:

- a more integrated spatial planning approach, including a comprehensive assessment of social and environmental assets and uses of urban space and landscape (e.g. ecologically sensitive corridors, cultural heritage, leisure, etc), which may limit further expansion of infrastructure in favour of more local and flexible transport management approaches,
- climate change mitigation and adaptation strategies that are in line with overall EU climate policy,
- reasonable standards for accessibility and mobility for reaching essential services and facilities,
- at member state level, price signals should be imposed, but taking into account the social justice implications for the poor. These should be based on full accounting of short- and long-term social and ecological benefits and costs, direct and environmental transport costs and benefits to underpin technological innovation and to encourage the most sustainable use of transport infrastructure.
- stable financing mechanisms that incentivise sustainable transport planning decisions, integration of transport demand-side measures in infrastructure planning,
- careful and coordinated assessment of long-term capacity needs and restrictions for all modes of transport including airports and harbours,
- improvements to the interconnectivity of the different European railways systems.

#### 4. Infrastructures for renewable electricity

With its triple 20% targets for 2020 the EU has entered an early transition process towards a low carbon economy. The EU is committed to reduce its greenhouse gas emissions by 20%, to achieve a share of renewable energies of 20% and to improve energy efficiency by 20%. In the case of equivalent measures by other industrial countries and commitments of the emerging economies the EU aims for a 30% climate target. EEAC welcomes the reforms of the ETS and other measures adopted within the Energy and Climate Package in December

2008 as an important unilateral, yet still insufficient step for a more credible climate mitigation policy.<sup>15</sup>

However a more long-term perspective, with binding commitments, is urgently needed in order to avoid short-term decisions, which might deliver the 2020 targets but which are inappropriate in a more long-term perspective, e.g. beyond 2050.<sup>16</sup> This applies especially for very capital intensive investments in the power sector with a life span of 40 years or more, which are to be expected for the next two decades. Some of those projects might become economically unsustainable under a more carbon constraining policy regime for the period after 2020. Emission trading hence must also give the right medium-term signals for the reductions needed by 2050 in order to function properly as a market instrument. Furthermore a much more aggressive policy on energy efficiency is needed to exploit the still considerable technical potential for reducing energy demand.

Careful consideration must also be given to the systemic compatibility between the different energy supply strategies. In fact member states and the EU are promoting and subsidizing renewable energies, nuclear energy and coal with carbon sequestration at the same time, without sufficiently considering potential systemic conflicts between base load and volatile energy sources: The rapid growth of fluctuating renewable energy for electricity beyond 2020 may in some regions not be compatible with high shares of energy from coal and nuclear: Coal and nuclear are designed to run at constantly high degrees of capacity utilization, and due to their high capital intensity, it makes economically little sense to switch them on and off. More flexible, fast-response systems are required to complement intermittent renewable energies. Giving priority access to renewables in the grid will make some of the traditional base load energy supply unprofitable. On the other hand if base load is prioritised, then the growth of intermittent renewable energy sources will be severely restricted.

There are compelling arguments for keeping the options open for a dynamic renewable energy growth.<sup>17</sup>

- Climate change mitigation will not be possible without considerable shares of renewable energies.
- Renewable energies may meet very high shares of electricity demand in Europe at reasonable system cost compared to other decarbonisation options.
- Renewable energies are the supply option with the least technological risk of major hazard.
- Renewable energies are the only available really long-term solution, as other energy sources have at the best only a transitional role.
- Renewable energies may cost less in the medium-term than other options, but need to be supported in the short-

<sup>15</sup> *They go a long way towards the recommendations of the EEAC statement 2007: Energy Efficiency. Key pillar for a competitive, secure and environmentally friendly European Energy Policy.*

<sup>16</sup> *The services of the European Commission, namely DG ENV and DG TREN have started reflections on a transition agenda for the needed low carbon future. This process merits full support.*

<sup>17</sup> *SRU 2009: Setting the Course for a Sustainable Electricity System; CADS (2009): Analysis of the energy metabolism of the Catalan Economy"; CADS (2008): Climate Change and Energy Crisis: Common Solutions. Proceedings of the Conference organized by OCEAS; Papeles de Sostenibilidad 13/2008. See also: the EEAC Search Engine ([www.eeac.hscglab.nl/](http://www.eeac.hscglab.nl/)) for further pieces of advice related to renewables from EEAC members.*

<sup>14</sup> *SCD (2008): Sustainable Mobility 2010. UK, Sustainable Development Commission, London.*

term against excessive subsidies for nuclear and clean coal technologies.

The policies surrounding access and utilisation of energy infrastructure play an important role in the development of renewable energies. Without such infrastructure investments renewable energies will face considerable difficulties to link production in rural regions or on sea to the centres of consumption. As new renewable energies (such as wind) already have been given significant market shares in several member states, new or upgraded electricity grids play a crucial role for their further growth.

One of the barriers to infrastructure investment is the persistence of integrated regional quasi-monopolies controlling electricity production and distribution. Integrated regional monopolies, most still engaged in conventional energy sources, will not mobilize sufficient investment to improve the market access to their own competitors. The adoption of the original EU energy liberalisation package, promoting the unbundling of electricity production from distribution could have been one element for the further market diffusion of renewable energies.<sup>18</sup> It is to be seen, if the requirements for the independent management of the so-called “Transmission System Operators” (TSO) are sufficiently strong and will be effectively implemented by member states, in order to mobilize the needed additional infrastructure investments for delivering the growing renewable energy supply to the consumers. Liberalisation without the proper framework to fully internalise all external costs of the energy sources and/or the strong support for renewable energies however will only strengthen existing energy structures. It makes no sense at all if fossil fuelled technologies are subsidised while renewables are starved of funds. The licence to operate for electric power should carry with it full carbon costing so as to ensure fair treatment for renewables. Beyond this also stronger incentives are needed to adjust infrastructure investments to the predictable needs of renewable energies. A stronger role of public ownership for the grid may be one crucial element for mobilizing the necessary capital, especially for the long-distance connections. At least network regulators must establish an incentive framework, which ensures efficient investment in new grids. For the new type of high voltage long distance super-grids in any case a stronger supranational regulator, even if there is no single Trans-European operator is needed in the longer term.

The further deployment of volatile renewable energies also raises questions of energy security. Variability of supply can be matched by a series of measures for intelligent grid management. Among them are:

- *The further development of a “Smart grid”:* Smart grid is an aggregate term for a set of related technologies describing a modernised form of an electricity network. Its characteristics are the use of digital enhancements to existing grids and of new computing technologies to improve the network, enabling a two way communication between energy suppliers and consumers and two way

flow of electricity (smart reversible grid).<sup>19</sup> By this it allows for a more flexible load management, adjusting demand to supply, mobilizing buffer capacities or releasing stored energy in the system. A smart grid also allows for a reverse feed-in of electricity from consumers, e.g. cooling houses or electrical vehicles.

- *Investment in additional storage technologies, such as CAES<sup>20</sup>, pump storage hydro power plants or large liquid electro batteries.* Such options for storage technologies absorb electricity in peak times of supply and release electricity in low times of supply or peak times of demand. What is needed is a regulating power market mobilizing investment into smart grid and balancing power technologies.
- *The development of a SuperGrid:* Energy security can be considerably enhanced by widening the geographical balancing area, thus smoothening seasonal and temporal peaks and lows of supply and demand. The SuperGrid connects not only the European countries, but also North African countries, and the Middle East, Turkey and the Members of CIS by HVDC (High Voltage Direct Current) lines or other suitable long-distance high voltage technologies. In a very large-scale system, the wind always blows somewhere, which would flatten temporal and seasonal feed-in peaks and fill the feed-in valleys in the regional grid sections, thus increasing the stability of the system and reducing the need for back-up power or energy storage. Also solar thermal power plants in solar rich regions in Europe and beyond may help to stabilize electricity supply. The loosely joined national markets of Europe would be integrated into a common European electricity market, and join countries to this market, whose resources pose great opportunities (e.g. the possibilities in using Northern African solar and wind energy to meet energy demands in Europe). These countries would benefit from the support in building an infrastructure of renewable energy sources and the new energy markets. As the overall share of electricity imports from outside Europe is expected to be limited (< 20%) also energy security aspects are manageable. HVDC grids are technologically mature, applied already at a large-scale outside Europe, and offer opportunities for long-distance electricity transport with low electricity losses. Other equivalent technologies may also become available.

Putting in place the right infrastructure policy and balancing power regime and electricity market structure is therefore pivotal for the wide scale deployment of renewable energy. Recent concepts suggest the development of a SuperSmart Grid for Europe and beyond. The idea of a SuperSmart Grid combines a SuperGrid and a smart grid.<sup>21</sup> Instead of regarding them as mutually exclusive, the concepts can and must coexist in order to guarantee a transition to a decarbonised economy. However the interface between a decentralized smart and a centralized super grid still is in

<sup>18</sup> DIRECTIVE 2009/.../EC of the European Parliament and the Council concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC as adopted by Council, Brussels June 12/2009 (<http://register.consilium.europa.eu/pdf/en/09/sto3/sto3648.en09.pdf>).

<sup>19</sup> European Commission, DG RES (2007): *European Technology Platform SmartGrids: Strategic Research Agenda for Europe's Electricity Networks of the Future*. Luxembourg. Battaglini, A., Lilliestam, J., Bals, C., Haas, A. (2008): *The Super Smart Grid*; PIK, Potsdam.

<sup>20</sup> *Compressed Air Energy Storage*.

<sup>21</sup> Battaglini, A., Lilliestam, J., Bals, C. Haas, A. (2008): *The Super Smart Grid*; PIK, Potsdam.

need of development. Despite the challenges, it seems to be widely agreed, that the implementation of a SuperSmart Grid is a technological and economic challenge, but nevertheless realistic. Potential benefits for low carbon economic growth are clearly stated in several concepts. Implementation however needs broader high level political support and a stronger consensus on the long-term direction of the energy sector.

The idea of a SuperSmart Grid is also in line with the subsidiarity principle. Regional electricity production and distribution based upon renewables combined with smart load management should play a strong role, but as a stand-alone solution would be more expensive, than in combination with complementary national load management concepts and network extension as well as with concepts to link North Sea and North African renewable energy. The latter requires new grid technology (e.g. HVDC) and new infrastructure links to a Trans-European dimension. The EU and the involved member states will have a crucial responsibility to ensure network investment – as by establishing a single Renewables SuperGrid operator.

EU infrastructure policies so far avoid the type of long-term system decisions, which will be needed in the course of the next decade at the latest. Renewables promotion for the time being is part of an approach promoting a broad portfolio of new and conventional energy sources, without setting clear priorities. The Second Energy Review and other recent policy papers of the European Commission make reference to the “Mediterranean Ring” including a “Mediterranean Solar Plan”, the “North Sea Offshore Grid” and to “more interregional links”.<sup>22</sup> This broader geographical scope is to be welcomed. Also the European Network of Transmission System Operators, established by the Third Energy Liberalisation package, may play a key role for preparing the Trans-European SuperGrid. But all those strategy elements do not yet receive the high level profile, which they merit. They are not yet part of a strategy fully to decarbonize Europe’s electricity production by 2050. The focus of the Trans-European Energy Networks is still the incremental improvement of cross-border links for conventional sources. This however will not be sufficient to prepare for infrastructures for the transitions needed.

EEAC therefore suggests to:

- *Extend the time scale of the Energy and Climate debate.* The EU energy and climate agenda must be extended to the year 2050 in order to set the right signals. A commitment to reduce greenhouse gas emissions by at least 80 – 95%, as suggested by reports for the IPCC and also endorsed by the European Commission should be included coupled to at least 30% reduction of all GHGs by 2020. A reformed ETS with a longer time perspective and a well planned, toughly regulated and progressively

reducing carbon “respective cap” will have to play an important role. A predictable long-term political framework and agenda meeting those requirements is essential for investors to engage themselves in a transition pattern.

- *Give a strong signal in favour of high renewable energy growth beyond 2020.* The renewables potential may reach 45% by 2030 according to scenarios for DG TREN and may become the dominant energy source for electricity production by 2050.
- *Intensify the energy efficiency agenda*, especially as regards efficiency standards, progressive pricing and appropriate pricing incentives for contracting.
- *Increase the level of research* and the share of ETS-auctioning revenues to be earmarked for innovative renewable energy projects.
- *Check open and hidden subsidies and research to other low carbon technologies* for their impact on the development of renewables as part of impact assessments.
- *Continue with efforts to liberalize European energy markets* with a view to a complete unbundling of ownership between electricity production and distribution, privileged access to renewable energies and strong incentives for new investment in national and European grids for renewable energies.
- *Mobilize high level political commitment:* The Mediterranean Solar Plan and the North Sea Grid for Offshore Wind Energy should become elements of a high level European flagship project for a low carbon economy, as part of a European contribution to a New Green Deal for economic recovery and as strategic element for the Lisbon and the sustainable development agenda.
- *Mobilize capital for investment*, by targeting the financial instruments of the EU and establishing a single European operator or strengthening the role of a network of transmission operators for investing in a long distance grid. Set the right incentives for private and public investment in networks linking renewables production (e.g. offshore wind) to the centres of consumption.
- *Strengthen the incentives for Northern Africa, Southern and South Eastern Europe* to reinforce the role of renewable electricity both for the European and their domestic markets. For a transitional period both ETS, CDM and technology oriented support will play a role here. A wider policy framework strengthening security of supply and grids will also be needed.
- *Improve public acceptance and minimize trade-offs with green networks* by use of strategic environmental assessments, additional investment for underground cables or using existing infrastructure corridors.

## 5. Green infrastructures and overall integration of infrastructure development

Green infrastructure and ecological connectivity are essential for the protection and enhancement of ecosystem goods and services. It is also critical infrastructure for Europe in the same way as our transport and energy networks and as vital

<sup>22</sup> European Commission (2008a): *Offshore Wind Energy: Action Needed to Deliver on the Energy Policy Objectives for 2020 and Beyond*. Brussels. European Commission (2008b): *Second Strategic Energy Review. An EU Energy Security and Solidarity Action Plan. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*. Com(2008) 744. European Commission (2008c): *Towards a Secure, Sustainable and Competitive European Energy Network. Green Paper*. Brussels. European Commission (2008d): *Barcelona Process: Union for the Mediterranean. Communication from the Commission to the European Parliament and the European Council*. Brussels.

to the pursuit of sustainable development.<sup>23</sup> The recent study on the social and economic costs of policy in action highlights the importance of biodiversity to our current and future wellbeing. Presently global land use changes lead to lost ecosystem services worth around 50 billion Euro each year.<sup>24</sup> Those losses are bound to grow over time.

Green infrastructure provides us with a wide range of benefits. In the first instance, green infrastructure provides space for nature and the natural systems that deliver vital ecological services underpinning our quality of life. For example, floodplains alleviate flooding by storing water after heavy rainfall and releasing it back slowly into streams and rivers. Wetlands retain pollutants, preventing them from reaching watercourses and affecting water quality. Street trees reduce air pollution and provide shade. Woodlands and extensively managed pastures act as carbon sinks, helping to offset the impacts of increasing carbon emissions, and absorb excessive rainfall. Not only are these green infrastructure benefits relevant today, but the benefits for future climate change adaptation is increasingly being recognised.<sup>25</sup>

Across the EU many initiatives have been launched at transnational, national and regional level to put such concepts into place.<sup>26</sup> There is no standard definition of green infrastructure although there are example definitions from England<sup>27</sup> and The Netherlands.<sup>28</sup> There is a wide variation in the type of work being undertaken in developing green infrastructure and it is happening at different scales: at a larger sub-regional or even regional scales, or for some species and ecosystems it is necessary to build corridors at a local scale.

Development of green infrastructure will need a long-term approach just as for other infrastructure development and it will need political support.<sup>29</sup> The complexity of the issue is a challenge as many actions will be habitat and species dependent and there is a need to consider the cost effectiveness and efficiency of measures. Given the range of initiatives that can come under green infrastructure, it

is useful to differentiate between those that are focused on incorporating multifunctional green spaces into urban environments and those which relate to national and European nature protection networks as the actions recommended would be different for each.

Strategic guidance at European level for developing green infrastructure needs to be considerably strengthened. The interim EU Biodiversity Action Plan assessment states that the experience of the application of SEA to structural funds for the protection of biodiversity suggests the need for guidance on how to do this. Spatial planning will be a key variable to the development of green infrastructure. This is presently developed at member state levels. Potential tools for use at a European level could be supporting financial instruments and strategic guidance for member states. Having regard to the very strong case arising from the health and welfare effects of living close by natural assets, then there might also be a case for some funding of green infrastructure investments through the relevant health authorities and through property insurance premiums.

Variation in methodology for identifying and implementing ecological networks or developing green infrastructure projects across member states makes comparisons difficult. Given that there is no common approach to development of green infrastructure, the European Commission and member states should identify examples of best practice and lessons learnt to inform a common European vision.

This common European vision and guidance should take account of the differentiated responsibilities and competencies (regions within states, members states, European Union/ EEA, etc). This will need to address:

- *The baseline situation.* To inform thinking on green infrastructure and identify the most important actions we need to know the baseline situation. Member states will need to identify current assets, functional requirements and benefits of green infrastructure.
- *Means of development.* There is a need to build on existing networks such as the Pan-European Ecological Network (PEEN), –the Pan-European Biological and Landscape Diversity Strategy (PEBLDS), and the European Green Belt initiative and policies such as the Water Framework Directive (WFD) and Integrated Coastal Zone Management (ICZM), and there is a need for co-ordination and participation. In addition member states should be invited to incorporate biodiversity “offsets” for all contracts involving new infrastructure so that developers invest in appropriate green corridors and stepping stones for the effective migration of species as habitats shrink due to climate change.
- *Policy options.* Measures at EU level should include the development of a strategic vision, guidance and standards for member states, sector specific instruments (regulations, guidance), impact assessments, and financial instruments.
- *Funding.* Potential sources include the European Financial Instrument for the Environment (Life+), Structural and Cohesion Funds though inclusion as a priority in strategic and operational plans, the European Agricultural Funds for Rural Development (EAFRD) for actions in a forestry and agricultural context.
- *The eventual need to reconsider the current very limited EU competence in spatial planning.* While many EU

23 Bennett, A. F. (1999): *Linkages in the landscape. The role of corridors and connectivity in wildlife conservation.* Gland: IUCN.

24 Braat L. & P. ten Brink, (eds.), with J. Bakkes, K. Bolt, J. Braeuer, B. ten Brink, A. Chiabai, H. Ding, H. Gerdes, M. Jeuken, M. Kettunen, U. Kirchholtes, C. Klok, A. Markandya, P. Nunes, M. Van Oorschot, N. Peralta-Bezerra, M. Rayment, C. Traversi, M. Walpole, (2008): *The Cost of Policy Inaction, The case of not meeting the 2010 biodiversity target.* Wageningen, Alterra, Alterra-rapport 1718. 314 blz.; 85 figs.; 45 tables; 140 refs.

25 *Green Infrastructure: G. Clabby (2009): Critical Infrastructure for a Smart Economy –Comhar SDC commentary* [http://www.comharsdc.ie/\\_files/Commentary%2040%20Green%20infrastructure.pdf](http://www.comharsdc.ie/_files/Commentary%2040%20Green%20infrastructure.pdf).

26 *Proceedings from the Workshop “Towards a green infrastructure for Europe”, 25-26 March 2009, Brussels* ([www.green-infrastructure-europe.org](http://www.green-infrastructure-europe.org)).

27 *Natural England defines green infrastructure as ‘a strategically planned and delivered network comprising the widest range of high quality green spaces and other environmental features. Designed and managed as a multi-functional resource capable of delivering those ecological services and quality of life benefits required by the community it serves and needed to underpin sustainability.’*

28 *The Netherlands National Ecological Network (EHS) defines green infrastructure as ‘a coherent network of core areas, ecological development areas, preservation areas, connection zones and buffer zones.’*

29 Kettunen, M., Terry, A., Tucker, G. (2007): *Preparatory work for developing guidance on the maintenance of landscape connectivity features of major importance for wild flora and fauna. Guidance on the implementation of Article 3 of the Birds Directive (79/409/EEC) and Article 10 of the Habitats Directive (92/43/EEC).* London: Institute for European Environmental Policy.

policies directly and indirectly affect land use, the EU has no instrument and no competence, to strike a balance between the different and sometimes conflicting uses. Green infrastructures, as first established by the Water Framework Directive and the Habitat- and Birds Directives, need to be further developed and should be an essential pillar of such a European Spatial Development perspective.

- *Subsidiarity and spatial planning.* Spatial planning is a multi-level exercise with different scales and degrees of specification. What is needed is a European – wide approach, complementing national spatial plans and ensuring their consistency, either with EU environment policies with a Trans-European spatial dimension or identifying Trans-European infrastructure corridors with minimal conflict to environmental infrastructures.

The development of new transport and energy infrastructures may have negative impacts on shrinking natural habitats, especially on the European wide network of protected sites (Natura 2000), the favourable conservation status of habitats and species, and the target to halt the loss of biodiversity by 2010. These conflicts result from limited space and the fact that land consumption for transport and energy infrastructures lead to less space for other uses and to habitat fragmentation. Therefore, on the one hand conflicts must be addressed at an early stage in the planning process through strategic environmental assessments. However, experience shows that assessments that are based on a weighing of interests usually result in a priority for economic interests, whereas non-commercial interests have a more difficult stand. In order to take account of article 6 of the Treaty, which demands that environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities, environmental and social values must legally be made to carry more weight in these assessments.

On the other, besides analysing conflicts by strategic assessment of other infrastructure planning, also measures should be taken to improve biodiversity corridors through the creation of features that enhance ecological coherence and connectivity (as outlined in Article 10 of the Habitats Directive and Article 3 of the Birds Directive). Guidelines have been published on how to address adaptation and fragmentation

which should be used in infrastructure development.<sup>30</sup> While the EU has the means to essentially influence the EU-wide planning of energy and transport networks, this is not sufficiently the case for green networks. This imbalance must be addressed. A variety of initiatives<sup>31</sup> exists already in order to further develop European ecological networks, which will have to be developed further and need to be coordinated among each other.

On the financial side, the development of transport infrastructure funded by the EU Structural and Cohesion Funds has contributed to nature loss and fragmentation. Therefore, it is critical that full impact assessments including proper consideration of alternatives are carried out for all projects funded by the EU and European Investment Bank.

## 6. Conclusion

In the view of a low carbon future and the need to maintain natural capital the vision for Trans-European Networks needs to be reframed. As energy systems and mobility patterns will have to change, so do their infrastructures. The steady loss of biodiversity and growing pressures by unavoidable climate change will also require a “green network” to allow for some degree of ecosystem resilience and connectivity. It is time now, to prepare for the long-term future. As electrification of transport may increase, an integrated and coherent perspective between the electricity, the transport and the green networks needs to be developed.

EEAC encourages the European Commission and its prospective research centres, member states, industry and NGOs to engage now in deliberations for such an integrated European perspective for 2050, which ensures coherence, is strategic and target led, makes fundamental choices transparent and lays the ground for a sustainable development path.

<sup>30</sup> Kettunen, M., Terry, A., Tucker, G. & Jones A. 2007. *Guidance on the maintenance of landscape features of major importance for wild flora and fauna - Guidance on the implementation of Article 3 of the Birds Directive (79/409/EEC) and Article 10 of the Habitats Directive (92/43/EEC)*. Institute for European Environmental Policy (IEEP), Brussels, 114 pp. & Annexes.

<sup>31</sup> Workshop “Towards a green infrastructure for Europe”, 25-26 March 2009, Brussels, Background Document (<http://green-infrastructure-europe.org/download/Green%20Infrastructure%20workshop%20background%20document%20Final.pdf>).



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