

7th ETAP Forum on Eco-innovation

Adapting to Climate Change through Eco-Innovation

Summary of the event

Copenhagen
23 - 24 November 2009



Driving climate-change adaptation

While mitigation is taking centre stage in attempts to reduce global warming, adaptation to climate change is essential to tackle the now unavoidable alterations to the environment that we ourselves have already caused over the past 50 years.

The 7th European Forum on Eco-Innovation in Copenhagen, Denmark brought together more than 200 high-level stakeholders from business, the research community, policy makers and non-governmental organisations (NGOs) to review the potential adaptation mechanisms possible through eco-innovation at global, national, regional and local level – including more efficient use of scarce water resources and better spatial planning to attenuate climate-change effects.

The Copenhagen Forum – part of the EU Environmental Technology Action Plan (ETAP) – was a joint initiative of the Danish Ministry for the Environment and the European Commission. The event provided a series of recommendations to drive adaptation to climate change as the essential partner to mitigation.

Key messages included the need not only to develop new technologies to enable us to adapt to climate change but also to remove barriers to the exploitation of existing technologies. Participants strongly supported the need for longer-term decision-making by politicians to recognise the costs involved and support a consistent approach to tackling adaptation, a review of legal constraints with better communication and co-ordination between different policy groups to ensure coherency in meeting the climate-change challenges, more focus on the gap between research and deployment of new technologies and the provision of financial assistance for changing behaviour at all levels, including citizens.

Adaptation will take time and requires innovation in mindset as well as technology but action is required immediately as underlined in the European Commission White Paper on climate adaptation published in April 2009. This policy paper explains the impact of changing climate on Europe's regions and key sectors and sets out a framework to reduce the EU's vulnerability to this impact. The framework focuses on four pillars and is designed to evolve as further evidence becomes available. It will complement action by Member States and support wider international efforts to adapt to climate change.

Overall, major challenges include:

- Reducing vulnerability to environmental change which affects both the population and the economy as they are inherently interlinked;
- Developing 'green' infrastructure such as floodplains, separating sewers and surface water runoff, green roofs and getting nature to work for us to reduce exposure; and
- Exploiting synergies between adaptation and mitigation such as land management and use to retain water and prevent soil erosion that also help prevent carbon release.

The Forum set the framework for the discussions through a series of thought-provoking overviews on the need for adaptation, action already being taken at EU, national, regional and local level, support required by banks, businesses and politicians. A strong focus on case histories enabled stakeholders to exchange views and experiences. Participants elaborated a series of recommendations to the European Commission on climate-change adaptation that will be fed into EU climate-change actions and the current review of ETAP.

Principal recommendations included:

- New thinking to integrate all priorities and promote cross-sector co-operation for solutions to climate-change adaptation, provide no-regret solutions, join up research policy and business, and remove barriers to implementation to speed up adaptation;
- The public sector must give stronger market signals to business and particularly to small and medium-sized enterprises (SMEs), including the use of public procurement to build coherent value chains meeting climate-change adaptation goals; and
- The strong need to bridge the gap between research and development, and technology deployment through public stimulation of pilot trials and innovative financial mechanisms.

Case studies

A series of case histories was presented at the Forum to demonstrate steps already being taken at local and regional level to face the climate challenge. These are available in a booklet entitled Tackling the inevitable: Innovation and best practice in climate adaptation².

¹ Adapting to climate change: towards a European framework for action [COM/2009/0147 final]
² http://ec.europa.eu/environment/ecoinnovation2009/2nd_forum/pdf/case_studies.pdf

Speakers and panellists

Featured guest speakers and panellists included:

Troels Lund Poulsen
Danish Minister for the Environment

Aaron Atteridge
Stockholm Environment Institute

Gustaaf Borchart
Director for Water, Chemicals and Cohesion,
European Commission Environment DG

Bryan Boulton
Head of Environment Strategy, Hampshire County Council

Henrik Dissing
Head of eco-innovation sector, Danish Federation of Industries

Lorenzo Galbiati
Head of the planning and sectors coordination Unit,
Catalan Water Agency

Timo Mäkelä
Director for Sustainable Development,
European Commission Environment DG

Jan Rasmussen
City of Copenhagen

Dorthe Rømo
City of Copenhagen

Magnus Rystedt
Managing Director,
Nordic Environment Finance Corporation (NEFCO)

Alexander Schink
State Secretary, Ministry of the Environment and
Conservation, Agriculture and Consumer Protection
of the German State of North Rhine-Westphalia

Ronan Uhel
Head, Natural Systems and Vulnerability,
European Environment Agency

Pier Vellinga
Scientific director/chairman of the Netherlands
National Research Programme on Climate Change

Need for coherent vision

“While we understand the challenges and the need for mitigation, there must be a coherent vision about solutions and how to address adaptation. Innovation is needed in products, systems and business models. There are opportunities but it is not an easy road. We must encourage the deployment of R&D results, ensure sustainable financing and encourage the public sector to play its role in mobilising the private sector through reducing regulatory barriers and opening up new markets.”

Timo Mäkelä
European Commission Environment DG

No longer a theory

“Climate change is no longer a theory but is happening. We need new knowledge and ideas through partnerships between public and private sectors and knowledge providers to clarify the needs and overcome the restraints.”

Troels Lund Poulsen
Danish Minister for the Environment

Why climate-change adaptation?

There is more than enough evidence about the effect that we are having on our climate. Not only is climate change happening but it may well be more rapid than currently expected. So there will be immediate benefits from adaptation to current climate variability and extreme events. The question now is what innovations are available to help us in this adaptation.

The number of disastrous weather and climate-related events in Europe increased by about 65% between 1998 and 2007 compared with the 1980s. About 95% of economic losses caused by catastrophic events in Europe since 1980 are attributable to climate and weather. And, in the second half of the century more severe effects of climate change on economic assets will be felt.

Vulnerable sectors include, but are not limited to: ecosystems and biodiversity; agriculture and forestry; water resources; coastal zones, marine resources and fisheries; tourism; energy supply and demand; built environment and infrastructure; human health; land management, regional planning (cross-cutting); and insurance services.

Cities in firing line

Cities are in the front line as 80% of Europe will soon be urban. Climatic events can have a major impact on households, businesses and critical infrastructure involved with transport, energy and water supply, as well as affecting vulnerable sections of society such as the elderly, disabled and poor income households.

Both high and low tech approaches exist to overcome problems. For example, Madrid architects have developed a futuristic air-tree that offers an opportunity for passers-by to cool down. But planting real trees also makes a genuine difference. Planting 100 m² of trees in a city can help reduce the temperature by 1°C. And green surfaces are 10°C cooler than artificial ones.

A bigger problem is the intensive use and sealing of soil surfaces, causing more damaging flash floods. This requires more control of water run offs, such as:

- Preventive measures, including good housekeeping and rainwater harvesting;
- Vegetated landscape features with smooth surfaces and a gentle downhill gradient to drain water evenly off impermeable surfaces;
- Infiltration devices to allow water to drain directly into the ground;
- Permeable and porous pavements;
- Basins, reed beds and ponds designed to hold water when it rains; and
- Green roofs and reuse of water.

Agriculture is particularly affected by climate change with more variable crop yields because extreme weather events are projected to increase in frequency and magnitude. Changes are needed in terms of both the types of crop and the control of inputs of water and nutrients. Half of the EU budget currently goes into agriculture but only one study has been carried out so far into the effect of climate change on European farming.

An interesting alternative is fast cropping vertical farms in cities. Three pilot projects are underway in the USA and one has been proposed in London, where vertical allotments are being developed in tower blocks for demonstration during the 2012 Olympics.

Water-management plans essential

River-flow droughts are increasing with Europe affected by several major droughts in recent decades – for example in central regions in 2003 and in the Iberian Peninsula in 2005. Southern and south-eastern Europe are most prone to an increase in drought hazard, but minimum river flows will also increase in many other regions. However water management plans are only now being developed that take climate change into account – and these are not due until 2015.

Coastal management is equally important with new designs and new approaches required that take into account a market increase in water levels – and this includes rivers management as well.

Big changes will also be needed to tourism and recreation. For example winter seasons in ski areas will be shorter. This will require new technologies in terms of snowmaking – or perhaps alternative approaches such as skiing in cities on artificial slopes.

Addressing water-management issues

Several existing EU policies address water-management issues. The most important are the EU Water Framework Directive (WFD) and its daughter directives – the EU Floods Directive and the EU Water Scarcity and Droughts Strategy. Although climate change is not explicitly included in the text of the WFD, the stepwise and cyclical approach of the river-basin-management planning process makes it well suited to manage climate-change impacts adaptively. This approach means that we can revisit plans to scale up or down our response to climate change in accordance with monitored data, and can avoid over-investment. On the other hand, it is important that long-term climate projections are built in to the design of measures – driven by current pressures – that have a long design life and high costs. Member States should demonstrate how climate-change projections have been considered in the assessment of pressures and impacts, monitoring programmes and appraisal of measures.

Source: Common Implementation Strategy for the WFD 2000/60/EC(2009)

Framing the Debate

- Need to develop policy framework at European, national and regional/local levels;
- Integrate adaptation into other policies and measures;
- Enhance EU and national research on vulnerability assessments, good practices and costs and benefits, with stakeholder involvement;
- Improve management practices for non-climatic reasons, as potential to reduce vulnerability;
- Exchange experiences amongst relevant public and private stakeholders at EU, national, regional and local level; and
- Communicate risks clearly to those affected and the actions they can take.

Ronan Uhel
European Environment Agency

Range of measures necessary

A range of measures need to be taken as quickly as possible, both reactive and proactive. Regional and local governmental organisations, NGOs and the private sector must adopt new policies, regulations and standards for climate change. Measures are needed mainly in areas with a long tradition of dealing with climate extremes such as flood defence.

Many adaptation actions have already been initiated because of substantial losses from extreme weather events in recent years. However, policies and measures designed to address long-term climate change impacts have not been developed to the same extent. Challenges for integration of adaptation into other policies and measures include scientific uncertainty from a low level of confidence in climate-change scenarios of extreme events.

Policy action is essential at regional and local level with stakeholder involvement to overcome gaps in knowledge on potential adaptation policies and measures, and lack of resources. Assessments of the costs of adaptation and the benefits are required to overcome gaps in knowledge: how to identify 'win-win' or 'no-regret' options, justified under many plausible scenarios. And coordination is essential between sectors to enhance efficiency and effectiveness of measures with many organisations involved.

A coordinated approach to adaptation for protecting the built environment

There are clear benefits to approaching adaptation in the urban environment in an integrated, coordinated manner at EU level. Climate-change damage to Europe's infrastructure and buildings may affect the proper functioning of the European internal market – such as closure of ports, airports and road and rail infrastructure. Infrastructure networks are often cross border and therefore adaptation needs to be coordinated. Furthermore, there is a significant amount of EU funds available for infrastructure projects, in which climate adaptation considerations should be integrated. As infrastructure and building investments may have a long lifetime – more than 50 years – they are likely to experience a changing climate. Climate mainstreaming for new infrastructure and buildings will most likely be cost effective and proportionate.

Source: Impact Assessment on the White Paper on adapting to climate change (April 2009)

Taking action at all levels

Action is crucial at all levels: international, national, regional and local. The European Union has taken an important first step to climate adaptation with the publication of a policy paper on climate adaptation in April 2009. The White Paper proposes a two-phase strategy at EU level to complement actions being taken by Member States. National adaptation plans are already being drawn up, with similar initiatives at regional and local level in many European countries.

Survival of the most adaptable

The European Commission White Paper on adapting to climate change puts its priority on the implementation of an integrated approach to tackling climate adaptation to maximise effectiveness and improve cross-border co-operation. The first phase from 2009 to 2012 will focus on building a stronger knowledge base through learning and dissemination, mainstreaming climate change impacts into key EU policies, developing suitable instruments and supporting wider international efforts on adaptation.

Many technologies are involved – such as in water policy, where it is important to have enough water to grow crops but not too much to avoid flooding. The key is effective stewardship; otherwise there will be insufficient clean water for European citizens.

In parallel to legislation, there is a need for technology to improve efficiency; eco-innovation therefore has a key role to play in climate adaptation. For example, much water is now returned to the sea through sewers. There is a clear need to change the paradigm to focus on retaining water rather than getting rid of it. This will also help reduce flood risks.

Agriculture accounts for half of the water consumption and a third of the surface area in Europe. Simple measures are needed to retain water – and crop varieties should be selected that require less water. It is also necessary to change water management policies – such as reinstating flood plains.

Equally important is the need to review all legislation to ensure that climate adaptation is being taken into account. Governments need to revise targets and structures to reflect much longer terms of engagement – and convince their citizens of the importance of the changes. Moreover, while the EU should set an example, local communities around Europe are already increasingly seizing the initiative and designing new ways of managing their local resources.

The current review of the European Technology Action Plan (ETAP) offers the chance to mainstream climate adaptation into the plan.

Building on national expertise

The Netherlands has a particular problem as much of its territory is under sea level and protected by a vast network of dikes. The same problem affects parts of Denmark, Germany and the UK. A marked increase in sea level is forecast as a result of climate change – from 0.5 to 1.5 m over the next 20 to 50 years if global temperature increases can be kept to 2°C. Therefore a fundamental rethink of national water strategy has been necessary in terms of coastal protection policies and practices, based on the many centuries of expertise acquired by the country.

Widespread flooding is not new in the Netherlands, with major disasters every 100 years or so. The last major event was in 1953, with more than 1800 killed. New safety measures were developed in the 1960s but formally and legally agreed safety standards are no longer being met for around a quarter of the length of exposed dikes. A new delta plan is therefore being developed, especially as climate change challenges the use and extrapolation of historic storm-surge and peak-river-discharge data.

Three different concepts can be considered for climate proofing the Netherlands: an offensive move towards the sea, protection within existing contours or a selective retreat towards higher – German – ground. Different approaches to reduce the risk of flooding include heightening existing dike rings, making more and smaller safety compartments; building up the entire country with sediment from the North Sea or broadening the dikes to make them break proof.

Broadening the dikes appears to be the most effective approach to protect the country from rising sea levels and attenuate the effect of increasingly fierce storms. The real breakthrough is the innovative use of these broader dikes for living, transport and other infrastructure applications.



Adapting at the regional level

German states play a key role in the field of climate adaptation as the nature and extent of climate changes vary considerably at this regional level. The states are responsible for implementation of laws and regulations in many fields that are affected by climate change, and they have local authorities with a range of expertise – such as in water management, forestry, regional and land use planning.

North Rhine-Westphalia (NRW) is Germany's most densely populated state with some 18.1 million people. Despite this and its high industrial concentration, over 50% of the land is used for farming and forestry. It offers a good example of how a region can react, and published a new climate adaptation strategy in April 2009 from both sectoral and regional perspectives. The aim is that the stakeholders take the action necessary rather than the state government – but with state support.

The state is already providing funds to promote innovation – such as identifying alternative tree species and developing an urban climate manual to be published in March 2010. Many cities, towns and local councils are already actively involved as participation in the NRW Action Climate^{Plus} competition shows.

Interregional support is seen as equally important. Since 2004, NRW has been chairing the working group on climate change of the ENCORE environment network and organised an international symposium on Strategies for Adapting to Climate Change in the Regions of Europe in Düsseldorf in October 2009.

Getting funding right

“Financing climate adaptation is a problem as public funding is not sufficient. The insurance industry will have a role to play in setting risk-based premiums but what should not happen is the private sector making profits while the public sector picks up the bill.”

Gustaaf Borchardt
European Commission, Environment DG

Regional adaptation strategies

European regions will be affected by a rapidly changing climate. The need to adapt is therefore high. Scarcity of concrete adaptation strategies in European regions suggests that the availability of guidelines for designing regional adaptation strategies (RAS) can be helpful to assist regions preparing their climate-adaptation strategies. The primary aim of the RAS is to:

- Provide a step-by-step process that will lead to a strategy for reducing regions' vulnerability to climate variability and change;
- Identify and prioritise adaptation responses; and
- Where possible, integrate climate adaptation within a wider range of policies, plans and programmes.

Source: Design of guidelines for the elaboration of Regional Climate Change Adaptation Strategies (Ecologic, 2009); Tender DG ENV. G.1/ETU/2008/0093r

Keeping the taps flowing

Southern Europe is particularly affected by climate change, especially in terms of water supply. Current scenarios indicate that the rainfall in Catalonia will decrease by between 10% and 20%, reducing water availability – and increasing variability will make use of existing resources more difficult. Moreover, storm frequency is set to increase by up to 20% in the period 2070 to 2100 – increasing the probability of floods.

Catalonia has a clear vulnerability to water scarcity. Historically, solutions were based on water transfer and increase of water availability but, since 2004, the water authorities have focused on supply rather than demand. The Catalan Water Agency (ACA) has exploited innovative techniques to increase water availability.

ACA is developing a water-management strategy in the framework of the European Water Framework Directive that includes water saving, increasing user efficiency, water reuse and aquifer recovery. Moreover, it is applying advanced techniques to produce water through desalination, and recycling and re-using water through its drinking-water and advanced wastewater treatment plants to tackle problems related to water scarcity and drought and climate change to increase water availability up to the level required in 2027.

Integrating adaptation in urban planning

More and more intensive rainfall, rising sea levels and a warmer city centre have prompted Copenhagen to integrate climate-change adaptation into all aspects of urban planning from its overall municipal plan to local and sector plans. Six goals are involved, covering energy, transport, buildings, urban development, behaviour and adaptation.

There is a clear vision of Copenhagen as a climate capital with green and blue urban spaces. Such climate adaptation will bring many benefits, including use of rainwater as local water features; the ability to bathe in the harbour, the re-opening of streams and the development of 'pocket' parks.

Improved rain-water management is being developed with a separation of sewage and rain water drainage, innovations in sustainable drainage systems and cleaning road water run off by removing oil and heavy metals. The intention is to meet the goals for the Water Framework Directive, recreational use and climate adaptation.



Great Potential for Green Roofs

Use of green roofs in Copenhagen is expected to rise from around 65 000 m² in 2011 to 325 000 m² in 2015 as they offer an architecture that can meet the challenge of climate change.

On a hot day, the temperature in a city centre is up to 10°F warmer than in the surrounding areas as cities have a lot of dark coloured and paved surfaces. Plants and soil absorb rainwater and slow storm-water runoff into sewers. Rainwater falling on the surface of a conventional roof quickly flows off the roof and into a storm sewer. When rain falls on a green roof much of it is absorbed by the plants and the soil. Green roofs are also living systems and provide habitats to support wildlife. Green roofs benefit buildings owners and the environment alike. Building owners benefit as green roofs last twice as long as conventional roofs, insulate the buildings, reduce infrastructure costs and increase property value. The environment benefits because such roofs capture 60% of the rain, improve air quality, increase vegetation and wildlife habitat and reduce urban heat islands.



Harnessing technologies to meet major adaptation challenges

A series of practical case histories involving existing initiatives on the application of eco-innovation to climate-change adaptation from across Europe and further afield were presented in small groups to enable stakeholders to exchange views and experiences

Feedback from this exercise included highlighting the need to:

- Encourage behaviour changes
- Change the way climate-change adaptations are discussed
- Reduce vulnerability to environmental change affecting population and economy as inherently interlinked;
- Develop 'green' infrastructure and putting nature to work;
- Exploit the synergies between adaptation and mitigation;
- Establish public-private partnerships; and
- Finance additional costs in planning, building...



Key Messages

- Need for coherent vision
- Innovation needed in technologies/ financing and behaviour/mindset
- New technologies not always necessary, need to get existing technologies to market
- Need to remove barriers – political, legislative and financial
- Improved communication essential to reflect overlying nature



Individual Group Feedback

2BG: Use of sustainable urban drainage systems for adapting existing cities to more rain

Adaptation exists to cope with more rain but society is perhaps afraid to take the necessary big steps.

CHAMP: Local response to climate change through Integrated Management System

Measure what matters and communicate understandably – need for common languages.

EDELWAY@: Suez Environment's environmental performance commitment

Good example of linking water and energy management. Shows need to co-operate to create synergy.

ESPACE: Integrating climate change adaptation into spatial planning across Europe

Human barriers lead to institutional barriers, even when innovation easier – need to sell solutions not problems.

FIGHTING AGAINST ALIEN SPECIES: The particular case of the Zebra mussel in the Ebro Basin

Alien species affect human activities – can affect health and damage entire eco-systems. Most important challenges is understanding the effect of climate-change adaptation on several species and looking at effect on private companies.

INFARM A/S: Greenhouse gas and ammonia reduction by effective slurry/ animal-waste management

Livestock farming contributes significantly to climate change, but little attention paid and outdated legislation in place. There is a need for new ways to get farmers to reduce their carbon footprints, such as turning waste into biogas and conserving resources – this requires incentives for farmers to adopt modern technologies.

LIFELINK: Clean drinking water as sustainable business in 'bottom-of-the-pyramid' markets

Sustainability is currently missing in the development area. There is also a need for transparency to fight corruption. Installing systems is the easy part – the real need is long-term maintenance.

OPTIMIZAQUA: Demonstrating water savings through implementation of new technologies and traditional methods

There is always a clear need to show the business case in financial, economic, social and BP terms.

REDUCING FISHING PRESSURE is a triple-win no-regret strategy for adapting fisheries to climate change

Fisheries depend on natural production and therefore on maintaining sustainable systems. Fishery management over a century has been bedevilled by regulation. There is a need to avoid badly thought out subsidies, put long-term interests ahead of short-term ones and align individual behaviour with community interests.

SAFIR: Decentralised water re-use solutions for irrigation

Had to convince people to try tomatoes produced using polluted water

SONAE TURISMO: Water and coastal risk management in Troiaresort

While only slight affect from climate change, there is a clear need to work with other areas with similar problems

SWITCH & AQUASTRESS: Water management and climate change

Need to encourage transdisciplinarity – or rather to get different professions to work together to meet the same goal even when they have different drivers

TECHNEAU: Artificial recharge to address climate change impacts on water supply

Need to ensure injected water is of very high quality and to ensure buy-in and acceptance of the technology.

Moving forward

Moving forward requires actions at many levels to ensure that climate-change adaptation progresses. Banks, industry and public authorities all have their own roles to play – and progress will depend on improved co-operation, particularly through public-private partnerships. And finance is crucial. Governments can provide a certain degree of funding but there is a need to leverage the private sector.

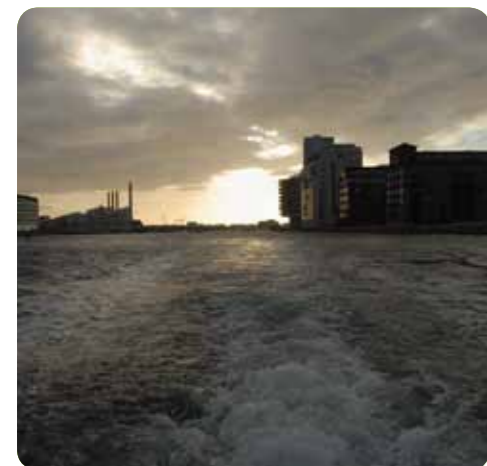
Crucial role for finance

Attracting finance for climate-change adaptation is not straightforward as there is a need to establish a market place. Funding depends on the size and the predictability – or level of risk – of the market. And the process of setting up such a market is in the hands of the politicians. Mitigation measures are already being implemented through schemes such as the Emissions Trading Scheme (ETS). But, while a market now exists, there is still a need to improve the legislation involved.

In parallel, it is important to use public procurement rules to boost eco-innovation in climate adaptation – this is an important driver as such procurement can help grow the market and cut costs.

One problem lies in understanding the issues. While banks grasp the cost of mitigation, the cost of adaptation in the private sector is more difficult – and R&D funding can often pose a particular problem. Developing countries have been targeted with large-scale financial assistance as part of the post-Kyoto process. This has been either direct individual government funding or private funding through carbon trading – however carbon trading is far from perfect and needs to be more transparent and predictable.

Technology transfer to developing countries is also important but governments do not have the technology – it belongs to industry. So some form of public-partnership is required.



Building new value chains

Increasing the use of adequate technologies in addressing climate-change adaptation is not only a matter of providing the framework, including financing for development of new technological solutions, but also – and maybe foremost – a matter of removing barriers and establishing preconditions for use of technologies already existing. Businesses want to make a difference but need market certainty to enable them to invest.

Adaptation to climate change must not be delayed. Yet current planning does not address the scale of the challenge, it rather delays costs for later payment – by which time the costs will have increased. Many climate-change adaptation challenges have come about through market failures, due to lack of pricing, metering, regulation and general public involvement.

In particular, there needs to be an appropriate market that connects cities with flooded houses to farmers with potential wetland restoration projects and foresters with potential reforestation projects. Clearer 'correspondence' is necessary between the scale of the problems and current administrative boundaries. Moreover while a range of technologies, as well as analysis, planning and modelling tools, already exists, they are not being brought into proper use.

National adaptation plans must incorporate proper financial plans. Subsidising additional water provision is probably unwise when water scarcity is increasing. Investment should go into metering and water saving/retention efforts rather than just building new sewers.

All this requires the establishment of new value chains and identification of the weak points – such as the missing links between R&D results and exploitation. Cleantech development projects are often very costly, lengthy and risky for the investors. Public funding programmes could be the key to addressing the gap between research and use.

Crucial role for politicians

Climate-change adaptation is an inherently political process as it costs – not necessarily financially but simply in terms of opportunities. This is a particular problem for the many regional level local authorities around Europe that have to adapt their services to meet the new challenges. Not only do services have to follow need, but such authorities should also be showing community leadership while reflecting the democratic voice of their communities.

An important challenge is how to bear the costs involved as this has to be met through taxation. Can the costs be split by sector or by geography – coastal protection for example – and how are the costs shared. There is also a generational element: do we pay now or are future generations expected to pick up the bill for something that we have caused. Or will they have to pay for damage caused by lack of action now?

Current financial models are also outdated as they were mostly developed in the 19th and 20th centuries. Innovation is needed here as well. Adaptation also needs to take into account often very local needs while forming bridges to the large scale.

Priority should be given to demonstration projects – ideally a few large ones, rather than a range of small ones, as the innovation level is very high. However, project applications should at the same time ensure relevance, including:

- **Involvement of end-users,**
- **A business plan for deployment;**
- **Thorough analysis of cross-sector benefits; and**
- **An assessment of greening via ICT.**

The public sector should be more responsive and proactive. Politicians are setting the goals but a corresponding set of measures involving targets, regulatory framework and technical programmes as well as a pro-active use of the public sectors impressive procurement power is not prevailing. There is a need for more dialogue, greater participation in development and use of public utilities to try out innovations.



Looking forward and backwards

New technologies have a role to play in improving resource efficiencies, reducing costs and improving aesthetics but adapting to climate change does not necessarily require high technology. Many of the technologies we need already exist. However innovation is required in finding co-benefits as planned adaptation must deal with uncertainty about future conditions. The best adaptation options therefore are those which also have other benefits, such as improving livelihoods or reducing greenhouse gas emissions.

There are no universal fits in future eco-technological solutions as they will also be affected by social perceptions, such as non acceptance of genetically modified organisms in Europe. Adaptive responses can range from technological to policy:

- **Technological – sea defences;**
- **Behavioural – altered food and recreation choices;**
- **Managerial – altered farm practices;**
- **Policy – planning regulations.**

Making existing technologies more accessible can often involve combining technologies and creative delivery of finance. A good example is reflected in the Grundfos LIFE-LINK project which combines leading pump technology with a new business model to ensure financially and environmentally sustainable water supply solutions for rural and semi-urban areas in Third World countries. Water is paid for using a mobile phone, the money is used to ensure long-term maintenance of the pump system.

Developing countries must not be forgotten either in climate-change adaption. Interestingly, according to the United Nations Framework Convention on Climate Change (UNFCCC), 40% of the world's least developed countries have already adopted national adaptation plans.

New eco-innovation action plan

The forthcoming Eco-Innovation Action Plan builds on the experiences of Environmental Technology Action Plan (ETAP) implementation in 2004-2009. The Action Plan will be strengthened with new actions which reflect the changing environmental priorities and a reinforced focus on green economy and eco-innovation. The Action Plan will be key in implementing the EU2020 agenda. Creating a competitive, green economy will be one of the main objectives of the EU2020 strategy.

Don't forget Past Practices

“Don't forget 'past' practices and probably technologies that we have all overlooked or ignore. After all, Granma did not leave much of a carbon footprint...”

Aaron Atteridge
Stockholm Environment Institute

Recommendations

New thinking

- We need new thinking joining up research policy and business. This leads integrated plans at EU, regional and local level to be delivered and sold in action with company benefits. To make an inventory;
- We need to find 'no-regret' solutions, show benefits and remove barriers for implementation – meaning quick implementation;
- Integrating all priorities for the solutions to climate change and promoting cross-sector co-operation; and
- Joint responsibilities among all levels of government and industry to implement specific projects to realise a climate friendly society.

Political initiatives

- Public sector needs to give strong market signals to get business on board and to make changes happen; and
- Public procurement must think in partnership goals: value chains rather than thinking in terms of units.

Demonstration and pilots

- Bridge the gap between R&D and deployment stages, and facilitate policy integration process; and
- Stimulate markets for and community interest in adaptation through: practical pilot projects, sharing examples of community use, innovative financial mechanisms.

Improving market conditions

- Improve market conditions for SMEs by simplifying the application procedure for the Competitiveness and Innovation Framework Programme (CIP); and
- Adapting to climate change, still respecting local culture and environment by proposing innovative solutions.

Stimulating investment

- Provide strong market signals to promote private investment, supported by demonstrative projects of disruptive technologies, publicly funded; and
- Adaptation in global-climate agreement with sufficient public and private financing.

Climate-change Adaptation Opportunity

- Funding is important but must be sustainable
- R&D is crucial but even more so is deployment
- Regulation matters in the long-term drive forward
- Public sector must play role in mobilising the private sector
- Change must be fast – replacing linearity

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