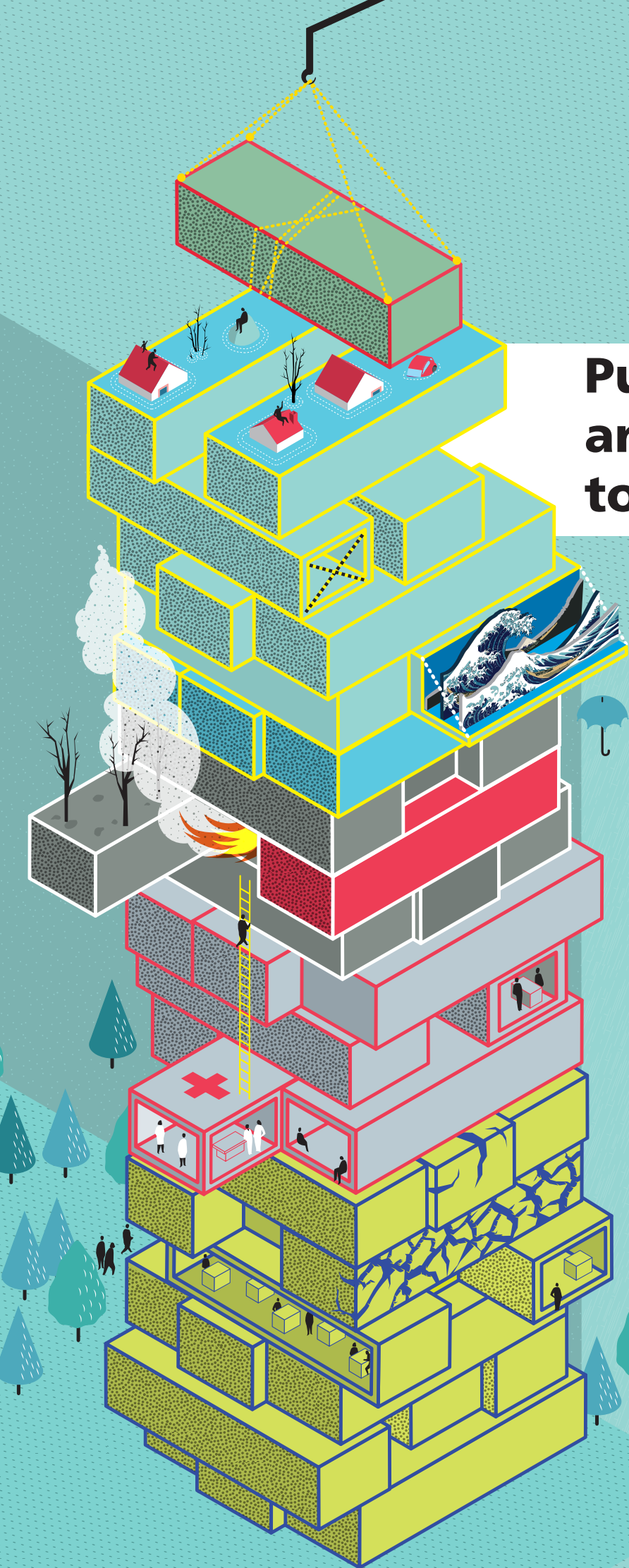
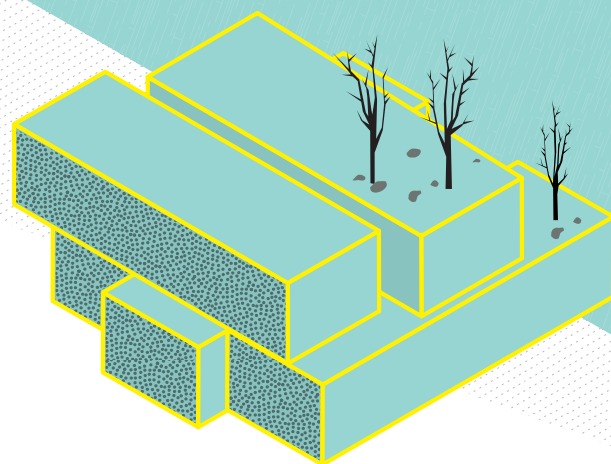


# Public services and adaptation to climate change





ETUI study commissioned by EPSU  
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## Foreword - Public services and adaptation to climate change

The European trade union movement welcomed the international commitment, agreed at the Paris Climate Conference (COP21) in December 2015, to limit the increase in global warming to below 2 degrees Celsius (2°C) by the end of the century. But even if this target is met, the impact of climate change will still be felt throughout Europe and across the world, with a greater risk of extreme weather events such as prolonged drought, storms and floods. Member states therefore need to ensure, as a matter of urgency, that adequate and effective adaptation measures are in place.

The European Commission explains that “Adaptation means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise.”

Examples include using scarce water resources more efficiently; adapting building codes to future climate conditions and extreme weather events; building flood defences and raising the level of dykes; developing drought-tolerant crops; choosing tree species and forestry practices that are less vulnerable to storms and fires; and setting aside land corridors to help species migrate.

In 2009 the European Commission published its adaptation strategy with the aim of improving information and promoting action by member states, particularly the development and adoption of adaptation strategies and action plans. Later this year the Commission will review its adaptation strategy and the European Federation of Public Service Unions (EPSU) has commissioned this report by the European Trade Union Institute (ETUI) as a contribution to this process. It identifies some of the main challenges facing public services and is a follow up to an earlier EPSU report, *Climate Change and its Impact on Public Services* (Dupressoir 2011).

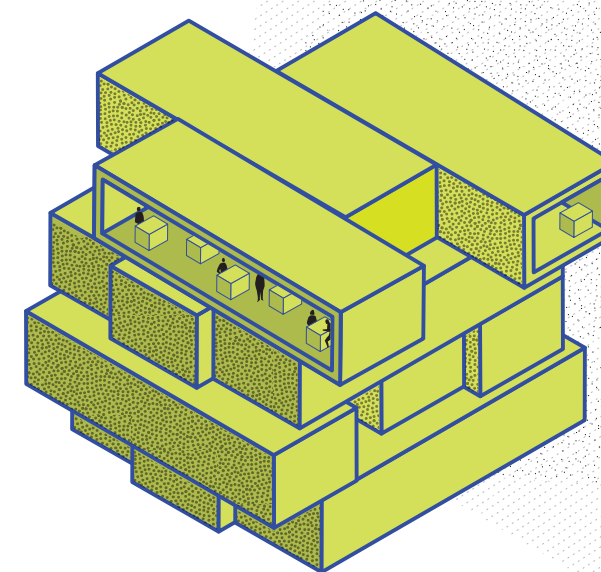
It shows that European Union attempts to ensure that adequate adaptation plans are in place have largely failed. It reveals gaping holes in member states’ adaptation policies and shows that concrete, practical measures and inadequate financial backing are particularly lacking.

Significant investment in preventative measures and funding to ensure that public services, particularly fire and other emergency services, have the resources to tackle major events like floods and forest fires is crucial. Indeed, the European Commission says that well planned, early adaptation action saves money as well as lives.

But the report makes clear that many countries have had to assess their adaptation initiatives requiring public investment or funding in the context of austerity. This has been a particularly acute problem for local and regional levels of government which often have primary responsibility for adaptation measures, while at the same time suffering some of the deepest cuts in public finance.

The report also finds that:

- most national adaptation plans do not specifically address the role of public services or the competences of different levels of government;
- only a minority of member states have drafted clear, well-thought-out plans that include information about how measures should be financed;
- most national adaptation strategies include very few concrete measures, with the extent of any monitoring and evaluation also very limited; and
- while there is some evidence of joint initiatives between countries and cities, the systematic exchange of best practice on how to adapt to climate change is largely absent.



Similar conclusions were also reached in a recent European Commission report, *Resilience of large investments and critical infrastructures in Europe to climate change* (Forzieri et al 2016). This warns of an increased risk of damage to energy, transport and other critical infrastructure and outlines the need for a European Union (EU) commitment to coordinate responses and exchange information.

Floods, fires and other extreme weather events will have an impact on our public service infrastructure, from hospitals, child and elderly care to schools, libraries and museums, and will all require protection and investment.

EPSU affiliates are acutely aware of the impact of climate change, with thousands of workers in the fire and other emergency services called on to tackle major events like the flooding that swept across Central and Eastern Europe in 2013. However, only three member states’ adaptation plans even mention emergency and rescue services.

Climate change is having a major impact on many workers and citizens, so it is also concerning that consultation over adaptation plans appears to be limited to experts and scientists, with the social partners (employers and trade unions) overwhelmingly absent from this process.

EPSU will use this report to ensure that the European Commission’s forthcoming review of its adaptation strategy addresses the gaps and weaknesses it highlights.

We want to see the development of a coherent, European approach along with national plans that include concrete measures, financial planning and effective monitoring and evaluation. The EU needs to recognise that public investment in public services is central to adaptation strategies.

Jan Willem Goudriaan  
EPSU General Secretary

## Public services and adaptation to climate change

### Executive summary

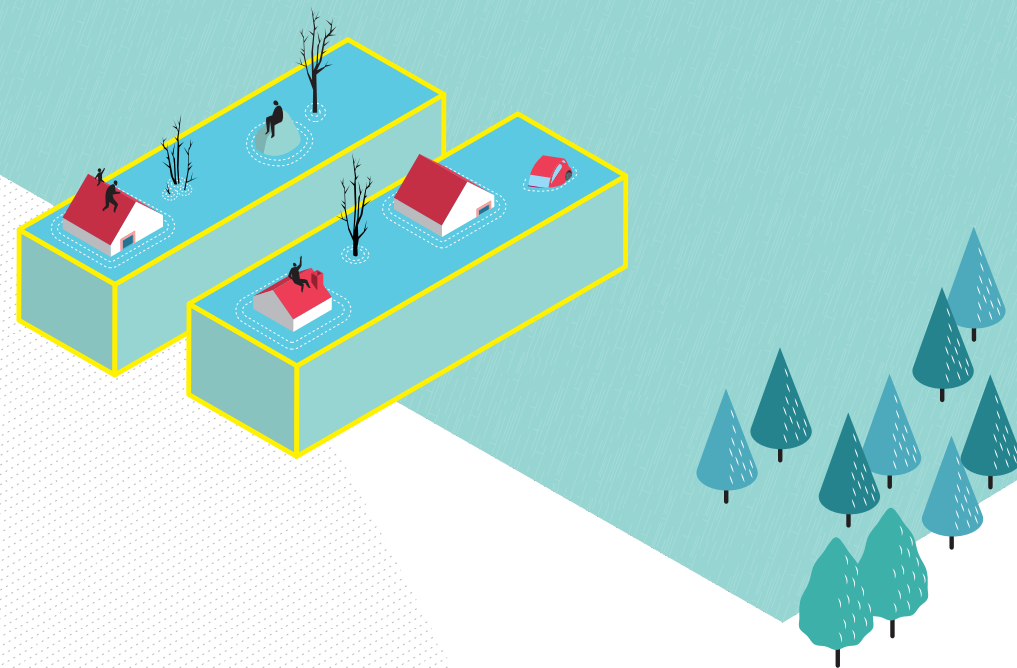
Global carbon emissions were 58% higher in 2012 than they were in 1990. The Paris Climate Conference (COP21) Agreement established a commitment to limit global warming to well below 2°C (and to pursue efforts to limit the temperature increase even further to 1.5 °C) by the end of the century. However, national pledges made in Paris are not enough to achieve this. Indeed, even if countries fully honour their Paris pledges, temperatures may still increase by 3.5°C by the end of the century.

This emissions gap poses a tremendous challenge to climate change adaptation efforts. The effects of global warming will include increased floods, severe storms and wild fires, with huge risks for public infrastructure, buildings and coastal areas. The European Commission Joint Research Centre (JRC) (Lorenzo A. et al 2015) predicts that, taking climate change and the current trend of urbanisation into account, the average annual cost of flood damage in the EU could rise from €4.5bn to €23bn a year by 2050. A further JRC study (Forzieri et al. 2016) found that the annual cost of damage from the effects of climate extremes on critical infrastructures, currently estimated at €3.4bn, could triple by the mid-2020s, grow six-fold by 2050, and increase 10-fold by the end of the century.

The 2009 White Paper *Adapting to climate change* (European Commission 2009) presented a catalogue of issues but failed to set priorities or establish mandatory national targets and standards. The EU Strategy on adaptation to climate change (European Commission 2013), along with the Climate Adaptation Platform (Climate-ADAPT), provides useful tools for sharing knowledge and good practice on climate adaptation, but is not a substitute for a comprehensive EU-level strategy. Although EU member states are obliged to develop risk assessments at national or the appropriate subnational level, and provide a summary of the relevant elements, there are still no binding criteria for national climate adaptation plans.

A review of national adaptation plans (NAPs) and corresponding comparative analyses shows that progress in adaptation often depends more on ad hoc factors and initiatives than on systematic planning and coordination. Only a minority of member states have ambitious and well-founded adaptation strategies with adequate financial backing. Despite an urgent and growing need to upgrade climate change adaptation measures – presenting a major financial challenge in the context of tight public budgets – there is no EU-wide strategy available for tackling the central issue of funding. In particular, municipal communities, where most of the adaptation efforts are supposed to take place, are still in the dire straits of austerity while at the same time facing this growing adaptation challenge. Public services that should be at the centre of adaptation efforts are under stress, and desperate efforts by municipalities often involve dubious initiatives to involve private capital. The majority of national adaptation strategies do not specifically address the role of public services, nor do they stipulate the competences of different levels of governance. Although stakeholder involvement is addressed by the EU adaptation framework, and referred to in most national strategies, the involvement of the social partners is mentioned only in exceptional cases. The EU Investment Plan and national investment project proposals to the European Fund for Strategic Investments (EFSI) do not specifically address adaptation to climate change and less than 10% of the project proposals make relevant contributions to adaptation. Finally, the EU does not have a comprehensive and comparable disaster loss recording system, representing a major challenge for cross-border co-operation on damage prevention (JRC 2015).

The forthcoming Commission review process must address these shortcomings in order to strengthen the EU Strategy on adaptation to climate change.



## Adaptation to climate change and the role of public services

### Introduction

This report focuses on the effect of climate change adaptation strategies on public services and maps out the challenges, considering both the effects of climate change and adaptation policies. This dual focus is necessary as without a comprehensive and balanced policy framework, the challenge of climate change is not manageable.

When discussing climate change caused by human activity in the context of the public sector, it needs to be emphasised right from the start that its root cause is a fundamental market failure. The resource-depleting economic activity of mankind since the onset of the industrial revolution has been based on the market mechanisms of the capitalist mode of production that fails to take into account the true cost of using natural resources. Public services have a central role to play in correcting this market failure. This does not automatically mean that the state (at local, national or supranational levels) needs to or can intervene directly. Instead, there is a need for a comprehensive policy mix that includes a strong regulatory framework in the form of performance targets, standards, fees and penalties, but also mechanisms that influence market actors, such as taxes, incentives and subsidies. Public investment should play a central role in both mitigation (efforts to reduce or prevent emission of greenhouse gases) and adaptation efforts.

The public sphere has a central role in shaping the whole process of paradigm change, from a resource-depleting fossil fuel-based production model towards a zero-carbon sustainable economy. But a major factor presenting an obstacle for greater public-sector involvement, in climate change mitigation or adaptation, is the fundamentally changed macroeconomic environment since the onset of the financial crisis. Seven years of austerity, hitting public services hard, have created an environment in which climate policy initiatives have been pushed into the background, progress has been reversed in many fields and new conflicts have emerged. These conflicts appear in financing, burden sharing (among the main income holders such as the state, households and the business sphere, but also between different levels of governance, including central/federal, regional and local) and in social and labour issues. The collapse in both public and private sector investment – particularly in clean technology and energy (for details, see: ETUC/ETUI 2014) – is one of the most visible negative consequences of this.

As a result of austerity, public investments in clean energy, infrastructure, and urban and rural development have clearly suffered deeply. Municipalities' finances have suffered even more than national public finances (even in countries where austerity has not been widespread, such as Germany). This development is in sharp contrast with the pronounced objectives of the EU Investment Plan (although the latter can at least be seen as a sign of hope and potential).

Given the tight finances and resources at state level, and in particular at municipal level, public authorities often have no other option than to involve private capital. These forced private-public partnerships often end up using greater resources and increasing the cost to the public purse. This basic contradiction between the need for investment and tight public finances will be one of the major constraints for public services in the context of climate change adaptation and prevention.



## 1. Framing the challenge: the effects of climate change and adaptation

### 1.1. Climate change

Climate change is taking place at an accelerating pace, largely due to human influence.

The fifth assessment report by the Intergovernmental Panel on Climate Change (IPCC), concludes that – based on a business-as-usual scenario – global average surface temperature is projected to rise by 2.6–4.8°C by 2100 when compared to pre-industrial levels.

The report also warns that sustained mass loss of ice sheets would cause a greater rise in sea level, and some of this might be irreversible. Should the Greenland ice sheet be completely lost, for example, global sea level rise would be up to 7 meters. For this to happen the threshold temperature, according to IPCC models, is estimated to be just under 4°C global mean warming compared to pre-industrial levels. Moreover, global temperatures will remain high and the effects of climate change will persist for many centuries even after CO<sub>2</sub> emissions are stopped.

This irreversibility of the effects of climate change, even after the point when net zero CO<sub>2</sub> emissions are reached, means that adaptation to climate change is a strategic objective in addition to the maximum efforts that can be made through climate change mitigation.

Global carbon emissions in 2012 were 58% higher than they were in 1990. The historical importance of the Paris Agreement is that a global commitment was made for the overall goal of a below 2°C temperature increase by the end of the century and that this is supported by national commitments and a transparent mechanism. At the same time, these commitments are not nearly enough to reach the overall goal.

### 1.2 The effects of climate change, with particular reference to public services

#### Most likely physical impacts of climate change in Europe

According to the European Environment Agency (EEA 2017), the average annual temperature over European land areas increased by 1.45 to 1.59°C in 2006–2015 relative to the pre-industrial period, higher than the increase in global average temperature.

Although different parts of Europe will be affected by climate change in different ways, common features will include more frequent storms, more extreme weather conditions and greater volatility. Increasing temperatures will have a severe effect on southern Europe, while eastern Europe will also be heavily affected.

General trends in all models include the following:

- (1) Warming is expected to be greatest over eastern Europe in winter and over western and southern Europe in summer.
- (2) In mountainous areas, warming will exceed the average continental trend (already documented in the Alps region over recent decades).
- (3) In northern Europe, the projected increase in temperature will be evenly distributed over the seasons.
- (4) The temperature changes will be accompanied by increases in annual rainfall in northern Europe and decreases in southern Europe.
- (5) More volatility will be a common feature with the intensity of daily rainfall projected to grow even in the areas where a decrease in annual rainfall is forecast.
- (6) Climate is expected to become more variable, with a greater risk of extreme weather events, such as prolonged drought, storms and floods.

As a result, the most significant effects on vulnerable regions are expected to be:

- more intense droughts (particularly in southern Europe but also in certain regions of eastern Europe);
- more intense floods (in coastal areas and in central and eastern Europe), often accompanied by the simultaneous effect of droughts;
- heatwaves (in southern Europe and eastern Europe);
- thawing permafrost (in northern Europe); and
- rising sea-levels (in coastal areas).

#### Main areas of public services that will be affected

One of the most direct effects of climate change on public services will be its impact on public infrastructure, particularly transport (roads, railways, ports), threatening major disruption and making the strengthening and preservation of public infrastructure a key element of any

adaptation policy. Water management (distribution, storage, irrigation) will also face huge challenges and require adaptation responses.

Around three quarters of Europe's population lives in urban areas (EEA, 2012) and expert projections suggest (World Bank 2010) that up to 80% of adaptation costs will emerge in cities. Water security, water distribution, storm and water run-off management will be key issues for public services. Buildings face major risks of damage from the projected impacts of climate change due to more frequent weather extremes, storms, winds and heavy rain. Under business-as-usual projections, the global use of energy in buildings could double or even triple by 2050. Public services therefore also need to focus on energy generation, distribution and efficiency.

The main areas of public services that will be affected by climate change and adaptation are: central and local government, social services, education, healthcare, public utilities (such as energy, water and waste management), public transport, disaster management, and emergency services (e.g. firefighters).

The public sector has a key role in climate change mitigation and adaptation policy and implementation. This role includes public investment, public procurement, managing the energy transformation where public utilities have an important role, and dealing with flood defences and water management.

## 2. Critical overview of recent EU policies on climate change, mitigation and adaptation

In the wake of the economic crisis, the major challenge facing Europe is how to manage the transformation to a zero-carbon economy and at the same time generate higher economic growth and create employment.

Europe is plagued by high unemployment, increasing divergence between its regions at a time when progress on environmental sustainability is losing momentum. This underperformance in all dimensions demonstrates the failure of European austerity policies.

Alongside the collapse in clean energy investment in Europe (a 53% decrease between 2011 and 2013, see Galgoczi 2015), there has been little progress on energy efficiency (see Torregrossa 2015), even though the effect of the latter offers the most efficient way of decarbonising.

The COP21 Agreement in Paris has been called historic and indeed the fact that 187 countries made commitments to the overall objective of a below 2°C temperature increase is without precedent. However, even if all the national pledges are kept, but no further policy correction occurs, global warming will still reach 3°C by the end of the century. This means that climate adaptation will still have a key role even if the Paris COP21 commitments are implemented.

As a consequence, the EU needs to reassess its climate and energy targets for 2020 and 2030 and redefine a pathway to net zero emissions by 2050. This is an enormous challenge and needs a new climate policy approach.

By 2030, current EU policies (and the COP21 pledge) will have achieved a 40% reduction in greenhouse gas (GHG) emissions from 1990 – an emissions reduction of 2.2Gt CO<sub>2</sub> equivalent. In the following twenty years (2030-2050), the remaining 3.2Gt needs to be eliminated – 45% more in half the time! This is a GHG reduction intensity of almost three times that Europe is on track to achieve by 2030.

The current policy course therefore needs to be revised, and the earlier the better. The EU has already promised to increase its 2020 GHG reduction target to 30% if commitment at global level emerges. This condition has now been met by the Paris Agreement, so action needs to follow. The 2030 targets of 40% GHG reduction need to be redefined in accordance with a pathway to reach net zero GHG emissions and an exit from fossil fuel by 2050.

The lack of progress and ambition in climate change mitigation efforts and the growing gap between current performance and mid-term targets means that climate adaptation strategies will be even more vital in the future than would have been predicted a few years ago.

## 3. The impact of austerity

The response to the economic crisis in Europe has been characterised, especially in peripheral countries such as Portugal and Greece, by austerity measures aimed at reducing fiscal deficits

and sovereign debt, with a view to correcting so-called ‘macroeconomic imbalances’. Examples of how energy and climate policy have been affected by austerity in Italy and Spain can be found in the respective chapters of an ETUI publication (Galgoczi 2015).

In the United Kingdom, a study commissioned by the *Financial Times* (2015) featured a detailed breakdown of council spending over the past five years and revealed that local government services have been squeezed by growing demand and the huge spending cuts forced on them by central government austerity policies. The study shows that between 2010 and 2015 local government budgets had been cut by 20%, twice the level of cuts in public spending as a whole. This means 20% less resources for local schools, health institutions, infrastructure development as well as for adaptation to climate change.

The prevalence of austerity policies in Europe (at EU, member state and municipal level alike) has paralysed both public and private investments for many years. The effects on green economy investment in general and on climate adaptation investment in particular have been pervasive. Any successful climate adaptation strategy needs to break this investment deadlock in the future.

#### 4. Adaptation to climate change: challenges for public services

##### 4.1. General framework of the adaptation challenge

The IPCC’s fifth assessment report on climate change (IPCC 2014) showed that damages and losses due to weather and climate-related events have grown substantially over recent decades. Damage estimates are largely under-reported due to the fact that they are focused only on direct material damage and do not take the value of human lives, cultural heritage, biodiversity or that of ecosystem services properly into account.

The European Commission Joint Research Centre (JRC) (Forzieri et al. 2016) conducted an assessment of the risk exposure and vulnerability of critical European infrastructure to extreme weather events. This confirms that the number of hydro-meteorological disasters is on the increase.

The assessment warns that over the coming decades, Europe will face a significant increase in extreme weather-related damages in critical infrastructure: “the current expected annual damages of €3.4 billion/year for the EU are projected to triple by the 2020s, multiply six-fold by mid-century, and increase to €38 billion/year by the 2080s”. These figures only reflect the combined damages projected for the energy, transport and social sectors. For these sectors, it makes detailed estimates for expected damages over the coming decades. For the energy sector, the forecast is that the current level of extreme weather-related damage will grow 16-fold by the 2080s. Total damages to society are likely to be much higher.

The study concludes that actions and measures, if well implemented, can reduce the economic and human health impact of a hazardous event. In recent years, policies for disaster risk reduction and management have shifted to a comprehensive, integrated risk approach where the full disaster cycle – prevention, preparedness, response and recovery – is taken into consideration. Adaptation to climate change and disaster risk management provide complementary approaches for managing the risks of climate extremes and disasters.

##### Disaster risk management

Disaster risk management is a key element of local and national adaptation strategies and helps to optimise available resources. For efficient disaster risk management, institutional structures and management tools need to be responsive to weather-induced catastrophic events. Proper data-sets on weather-related loss and damage are a critical precondition for risk management and following adaptation strategies. For the implementation of the International Framework for Disaster Reduction, the 2005 conference on *World Disaster Reduction* proposed an international framework known as the Hyogo Framework for Action (HFA). This was endorsed by 168 countries.

In line with the respective work programme of the UN Framework Convention on Climate Change (UNFCCC 2013), the United Nations Development Programme (UNDP) provided wide ranging support for the implementation of loss and damage databases worldwide and financed the development of such databases in 25 countries. The UNDP also prepared a detailed screening of national and regional damage and loss databases (UNDP 2013). Its main conclu-

sion was that an ideal loss and damage database for decision making must be continuous over a longer period, and needs to be credible, publicly accessible, and supported by quality assurance. According to the UNDP report the most important functions of loss and damage data sets in weather-related disaster and risk management are as follows:

1. Data on physical damage and its economic equivalent provide a basis for the financing requirements of recovery and reconstruction;
2. Past loss and damage records are not fully indicative of future losses but provide essential data for vulnerability and risk assessment;
3. Calculation of the cost-effectiveness of damage reduction investments;
4. Monitoring and evaluating outcome indicators on loss and damage for international policy frameworks, such as the HFA and UNFCCC.

The UNDP’s Global Risk Identification Programme (GRIP) has identified 62 disaster-loss databases worldwide which collect data on mortality, morbidity and physical damage across the social, infrastructure and productive sectors of the economy. Regional coverage shows that while the Americas region had 26 databases, the Asia-Pacific region 19, and Africa 5, Europe had only one.

The current practice in disaster-loss data recording across the EU shows that there are no comparable disaster damage and loss data available. There are differences in the methods of data recording as well as in governance approaches to managing disaster damage and loss data. The lack of standards for damage and loss data collection and recording represent the main challenge for damage and loss data sharing and comparison, especially for cross-border cooperation within the EU (JRC 2015).

Steps have recently been taken to overcome this deficiency but it will take years to develop a comparable EU database on disaster loss and damage.

The Decision on a Union Civil Protection Mechanism by the European Parliament and Council, in effect from 1 January 2014, sets the objective for more resilient communities to climate change (European Parliament, 2013). Under the Decision, Member States agreed to develop national and regional risk assessments and make them available to the Commission by the end of 2015 and provide updates every three years.

Developing and strengthening an institutional and legislative disaster risk management framework is essential for appropriate budget planning of adaptation measures, and also for their implementation. Clarifying the roles and responsibilities of local and national governmental bodies in risk reduction, as well as emergency preparedness and response, would improve disaster risk management capacity.

Public resources spent on disaster damage restoration in an ad hoc way tend to outweigh systematic spending on prevention and adaptation. With the trend of a growing risk of disasters on the one hand and pressures on financing preventive measures and investments on the other, the vulnerability gap is widening.

##### Levels of administration in climate change adaptation

Adaptation to climate change is needed at all levels of administration, from local to international. While climate change is a global issue, communities, regions and states are exposed to its effects in different ways. While climate change and mitigation is a global concern, adaptation is mostly a local issue. As the European Commission White Paper on climate adaptation puts it, “different vulnerable systems at different geographic levels will require different approaches: adaptation options have to be tailor-made to the specific geographic area, considered in terms of the vulnerable landscape types (e.g. coastal areas, wetlands and rivers, mountains and glaciers, the Mediterranean, etc.) and the sectors involved” (EC, 2009).

Local, regional and state governments are responsible for proactively planning and implementing adaptation by tailoring adaptation strategies to their specific context, but the funding and support for adaptation needs to be provided and guaranteed by central government. Cities are increasingly becoming the main stage of worldwide development, and urban areas are central to the process of adaptation to climate change for several reasons.

Cities are highly vulnerable to climate change. Around three quarters of Europe’s population lives in urban areas (EEA, 2012). Cities use the vast majority of energy and contribute most to global GHG emissions, but are also the places where concentrated populations will be most vulnerable to the effects of climate change, in terms of sea level rises, storm surges, flooding and heatwaves for example.

Climate change impacts are manifested locally and “the global problem is translated into local phenomena on the basis of various environmental, social and economic factors” (Snover et al, 2007).

Municipal and city administrations have responsibility for several areas related to adaptation and the benefits of these policies appear locally. Two specific cases that represent major adaptation challenges in Europe are forests and floods.

#### 4.2. The adaptation challenge for European forests

##### The vulnerability of forests to climate change

Forest trees have long lifespans and will be affected by the climatic conditions prevailing by the end of this century. Predicted climatic impacts for Europe most relevant for forests include milder and wetter winters, hotter and drier summers and, most importantly, more frequent and intense extreme weather events.

Regional projections predict that warming will be highest in eastern Europe in winter and in southern Europe in summer and warming in mountainous areas will exceed the average for the continent. Natural hazards characteristic of mountainous regions (for example landslides, rockfalls and avalanches) are also sensitive to climate change. In this regard forests also have an important function in protecting infrastructure and settlements in mountainous areas. This should be taken into account in the design of locally-applied adaptation measures. In northern Europe temperature increases will be coupled with higher rainfall, while in southern Europe temperature increases and lower rainfall will further increase the probability of forest fires.

Long-term prevention measures are therefore an important element in the fight against forest fires. This includes the development of forest-management programmes, with special regard to regions with an increasing risk for wild fires. According to the recommendations of the European Forest Institute (EFI 2008) these should include the following:

- replacing highly flammable species,
- regulating age-class distributions, and
- changing the species composition of forest stands (largely uniform collections of trees) and planting forests with genetically-improved seedlings adapted to a new climate.

##### Increasing risk of forest fires

Climate change projections suggest substantial warming and an increasing number of droughts, heat waves and dry spells in most of southern Europe. These projected climate changes would increase the length and severity of the fire season, contributing also to desertification in southern Europe. According to the European Environment Agency (EEA 2015a) climate change will lead to a significant increase in forest fires in south-eastern and south-western Europe.

As a result of global climate change, hotter and drier climates have already led to a worsening of wildfires around the world. At the same time wildfires are further aggravating climate change by killing trees that absorb carbon in the atmosphere.

A recent study published in the journal *Nature Communications* (Jolly. et al 2014) found that between 1979 and 2013 the length of the fire season increased for more than a quarter of the Earth’s surface covered by vegetation. The trend was true for all continents where wildfires occur, except Australia.

An effective disaster management system should include an integrated monitoring system for forest fires. In areas of wildfire risk, development of an early warning system for monitoring forests is particularly important. For an efficient early warning system, standardised data collection (for example on soil moisture, humidity and rainfall), supported by satellite technology and digital cartography, will be necessary. As in the case of floods, internal cooperation within a country among the various sectors and agencies (for example hydro-meteorology, forestry sector and firefighting command) and externally with neighbouring states is very important for wildfire monitoring systems to be effective.

##### An initiative by the EPSU Firefighters Network

The EPSU Firefighters Network adopted a statement on practical steps to fight climate change and improve disaster reduction (EPSU 2015): “adaptation to climate risks and disaster reduction requires an enhanced regulatory capacity for governments and the strengthening of public services. This includes recruiting new staff and equipping public sector workers – in particular those on the frontline, such as first responders, nurses, firefighters, emergency responders,

medical assistants and doctors – with the skills required to ensure risk preparedness in order to reduce and prevent climate risks and disaster reduction and to address the needs of the most vulnerable. More focus is needed to ensure that public sector workers find the appropriate recognition in the European framework of Civil Protection and Disaster Risk Reduction.”

#### 4.3. The adaptation challenge: floods

##### Increasing flood risk

The European Commission Joint Research Centre (JRC) (Lorenzo A. et al 2015) examined how flood risk in Europe would change under the IPCC’s high emissions scenario of 5°–6°C of warming by 2100 (compared to pre-industrial levels).

The model results for 22 European regions with large rivers show a polarised picture. Northern and eastern Europe (nine regions) would experience an increase in average annual rainfall of up to 80% by 2080. In seven southern European regions, annual average rainfall would decrease by up to 30%.

Projections for the maximum expected rainfall per day showed increases for almost all regions by 2080 when compared to values recorded in 1990. This means that while on average some regions would get more rainfall and others would be threatened by desertification, all would face more extreme events. As for the amount of rainfall within a short period of time, all regions would face higher intensity, meaning that even in drier areas local floods may happen.

##### Flood damage in recent years

According to the European Environment Agency (EEA 2017) large areas of Europe have been affected by flooding since 2000. In the period 1980–2013 almost 1 500 flood and wet mass movement events (subsidence, rockfalls, avalanches and landslides) were recorded in EEA member countries, with more than half of these since 2000. These floods have caused direct economic losses of more than €150 billion (at 2013 prices), almost a third of the damage caused by all natural hazards.

The European Union Solidarity Fund (EUSF) was created in 2002 in response to the Elbe and Danube floods in central Europe. It seeks to provide funds to help nations recover from natural disasters. Between 2002 and 2012, the EUSF provided funds to 15 countries recovering from flood events (36 out of 56 applications). The total reported flood damages amounted to €54.4 bn, of which €5bn was paid as financial support to the applicant countries. The highest damages were reported for the Elbe and Danube in 2002 (€15.1bn) and 2013 (€10.3bn).

##### The benefits of adaptation

The European Flood Awareness System (EFAS) is based on existing flood damage cost data and uses calculations of potential avoided flood damages. It gives a good estimate of the benefit of early flood warnings (Pappenberger 2015). The benefits amount to €400 for every €1 invested. There is therefore evidence that investment in Europe-wide flood early-warning systems multiplies the resilience to natural hazards.

##### Lessons from the 2014 UK floods

The material damage caused by the 2014 winter floods in England was at least £1bn, compared with a yearly average across the entire EU of around €4.5bn over the last decade. Due to climate change, as well as population growth and urbanisation, this amount is estimated to rise to €23bn a year by 2050 (Jongman et al 2014).

The growing prosperity of citizens is also a factor driving up the level of damages.

Flood protection would help, but given the short-term interest of governments driven by the electoral cycle, there is no political will to mobilise the necessary investments to deal with “once-in-a-century” floods.

In 2010, for example, the UK government cut flood defence spending as part of its austerity policies and previously planned flood defence systems were not built as a consequence.

According to research by Jongman, investing €1.75bn into flood defences in the EU in order to prevent rare but huge flood events would save on average €7bn a year by 2050. In addition, simulations show that by 2030 exceptional flood events like the 2013 central European floods will regularly occur if no further action is taken.

Flood protection standards in Europe need to be strengthened substantially and this can be done in a cost-effective way. In the context of the 2014 UK floods, the *Guardian* newspaper



referred to calculations by government advisers showing that cutting flood prevention investment by £500m would result in avoidable damage costing six times more (Guardian 2014).

In face of the current and projected impacts of weather-induced natural hazards, an effective disaster management system needs to be based on an integrated hydro-meteorological monitoring and forecasting system.

Flood protection investments are of key importance for an efficient adaptation strategy for vulnerable regions and localities. These investments may include, for example: riverbank protection; improvement of reservoirs and dykes; retrofitting of dams for safety with larger spillways and gates; enlargement of floodways; building of levees, floodwalls and seawalls/bulkheads; dam monitoring; and reviews and revisions of the operating rules for dams. Feasibility studies with economic, environmental and social assessments are essential components of any flood protection investment and, in addition to damage and loss data and history, they should also take climate change data and projections into account.

## 5. EU climate change adaptation strategy

A major problem in assessing climate change adaptation strategies, both at EU and national level, is that broad-based European strategy papers are often little more than policy declarations and wish lists. Writing these down costs very little but putting the measures into practice is another matter, especially during the years marked by the economic crisis and austerity policies. There is no reference to financial feasibility in the context of austerity in any of these adaptation strategy papers, or in other words, how the declared objectives can be put into practice at a time of massive budget cuts.

The 2009 White Paper *'Adapting to climate change: Towards a European framework for action'* put forward recommendations, most of which were implemented over the following years (European Commission 2009). The Commission initiative can be regarded as a broad framework based on a 'laissez-faire' approach. It provided a catalogue of issues but did not set priorities or establish mandatory national targets and standards. Entirely absent is any reference to the growing vulnerability gap – due to slow progress in climate change mitigation on the one hand and tight public finances on the other. The strategic importance of the public financing of climate adaptation is also missing and there is too much reliance on the role of private capital (including in the form of public-private partnerships).

The declared strategic goal of the EU Adaptation Strategy is to create a climate-resilient Europe in order to tackle the impacts of global climate change. The strategy tries to ensure that adaptation considerations are integrated into all relevant EU policies and as a 'framework strategy' it sets general goals. This 'mainstreaming' approach sets the outline and framework, and proposes a catalogue of possible actions and practices, but does not regulate in detail and does not set binding criteria. In addition to the short framework document, staff working documents cover specific fields such as infrastructure, health, cohesion, rural development and coastal areas. As the *Bottom-Up Climate Adaptation Strategies Towards a Sustainable Europe* (BASE) research project document (BASE 2014) explains: "the Strategy assumes that specific policy areas and sectors will take on the real climate adaptation 'work'. This approach promotes soft policy instruments in an effort to integrate climate adaptation into different policy areas".

The EU Strategy on adaptation to climate change package (European Commission 2013) consists of a number of background documents aimed at developing the tools of the 2002 Climate Adaptation Platform (Climate-ADAPT) into a 'one-stop shop' for adaptation information in Europe.

Climate-ADAPT provides useful tools for sharing knowledge about observed and projected climate change and its impacts on environmental and social systems and human health, including the dissemination of relevant research results. It also provides a platform for sharing experience with national and sub-national adaptation strategies and plans, as well as adaptation case studies. However, this useful tool is no substitute for a comprehensive EU-level strategy. Although EU member states are obliged to develop risk assessments at national or the appropriate subnational level, and provide a summary of the relevant elements, there are no binding criteria for national climate adaptation plans.

Regular co-ordination between the European Commission and representatives of national contact points on adaptation takes place at meetings of a Working Group on Adaptation.

For monitoring, the Commission proposed an 'adaptation preparedness scoreboard' that identifies key indicators for assessing member states' levels of readiness and aims to review the standard steps in adaptation policy making – including risk and vulnerability assessment, setting adaptation goals and priorities, implementation, monitoring and evaluation.

A document by the Latvian Presidency (UNFCCC 2015b) summarises the actions and progress taken by member states in their adaptation efforts in line with the Monitoring Mechanism Regulation. According to the document, 20 member states had prepared adaptation strategies and action plans by March 2015.

A report by the European Environment Agency on monitoring, reporting and evaluation of climate change adaptation strategies in Europe (EEA, 2015b) stated that 14 EEA member countries had applied systematic monitoring, reporting and evaluation (MRE) approaches in the context of their adaptation strategies. In 2017 the Commission will assess member states' level of readiness for climate change adaptation based on key indicators defined by the "adaptation preparedness scoreboard". Member states' monitoring mechanism reports will feed into this process and the Commission will prepare scoreboards for each individual EU member state in 2017–2018 in the framework of a 'process-based' monitoring system.

The Commission will then assess whether sufficient action is being taken in the member states and consider whether additional measures are needed.

One example of action at local level is the Mayors Adapt initiative, where 120 European cities and provinces are working together to develop local adaptation strategies and review their outcomes on a biannual basis.

Most adaptation strategies were broken down into more practical action plans and sectoral policies. The Latvian Presidency reported that most member states were still in the early stages of adaptation, with only a minority containing practical measures and sector-specific plans, to cope with heatwaves and drought for example. Two thirds of national plans did not include comprehensive vulnerability assessments to underpin policy. Monitoring and evaluation appeared to be the most problematic area, with only minimal development of indicators and monitoring methodologies.

The cross-border dimension of adaptation is of strategic importance given that the impacts of climate change do not respect national borders. EU cohesion policy provides resources for such co-operation projects and there are a few examples of joint regional initiatives, such as flood prevention co-operation in the Danube area and Baltic Sea region.

## 6 National adaptation strategies

### 6.1 General framework on national adaptation strategies

Eakin et al. (2009) identified three approaches to adaptation and categorised them as: the social vulnerability approach (addressing underlying social vulnerability), the resilience approach (managing for enhanced ecosystem resilience) and the targeted adaptation approach (targeting adaptation actions to specific climate change risks). The UK Climate Impacts Programme identified four categories: living with risks and bearing the losses, preventing effects by reducing exposure, sharing responsibility (e.g. by insurance schemes), and exploiting opportunities (UKCIP 2005).

Most national adaptation strategies (NASs) appear to be based on a general interpretation of vulnerability with reference to international assessments. Not all use vulnerability and risk assessment specifically designed for their own country. In addition, a study by a consortium of environmental research institutes found that there is no consistent and systematic use of scenarios across countries (PEER, 2009). As for the sectoral focus, there are a wide range of topics and vulnerable sectors addressed by the NASs. Some countries focus on a number of key sectors while others address cross-cutting issues and inter-relations between sectors. One example is Spain where water resources, biodiversity and coastal zones are seen as having a major impact on other sectors and on the whole of society. The French strategy distinguishes between cross-cutting issues such as water, health, biodiversity and risk prevention, and sectoral policies such as agriculture, energy and transport.

NASs do not distinguish between the private and public sectors – certain sectors or subsectors just happen to be public, such as coastal infrastructure, flood protection and public infrastructure for example. In the overwhelming majority of national strategies, "mainstreaming"

(that is integrating adaptation considerations into relevant policies) seems to be the guiding principle but no special attention is given to this and no specific financial arrangements are attached. The French and, to some extent, the Dutch adaptation plans are exceptions to this, but neither draw any conclusions about how to strengthen public services in order to cope with the new tasks and challenges. The differentiation is even less marked for sectors that are more mixed, such as health care, building and transport.

Most national strategies follow an integrated approach and therefore acknowledge that there is an active role for national government. Denmark, however, follows a different approach, arguing that vulnerable actors have a direct incentive to adapt and that adaptation could be treated as a societal challenge to be left largely to individual actors and free markets. There are several reasons why this market approach is liable to fail (Berkhout, 2005), including lack of information and knowledge, lack of capacity (in terms of finances and labour) and short-term thinking. Government co-ordination is necessary to overcome these hurdles.

Although the NAS is a central government document, its ultimate objective is to enable adaptive practices at multiple levels of governance. Berkhout also points to the value of stakeholder involvement, as it enhances the viability of the adaptation effort, raises the quality of vulnerability assessment and raises awareness and mobilisation.

## 6.2 National Adaptation Strategies in selected member states

France, Germany and the Netherlands all have comprehensive national adaptation strategies based on a strategic approach with clear priorities, clarified responsibilities at the different levels of administration and a monitoring and evaluation system. The French national strategy has a strong monitoring and assessment system, while the German strategy is among the few adaptation approaches where the financial aspects are addressed in detail. The German adaptation strategy also introduces incentive systems for the private sector, in particular in the energy sector. The Dutch national adaptation strategy puts the emphasis on the clear designation of tasks to different levels of governance and also distinguishes the role of public services by designating adaptation responsibilities to the public and private sectors. Its multi-stakeholder approach makes it a good practice case study.

### France: Adaptation to climate change and forest management

The French Adaptation Strategy (French Government, 2013) refers to the pace of climate change that is more rapid now than warming was at the end of the Ice Age. The French National Adaptation Plan (NAP) has an essentially centralised approach that sets up a common framework, with specific measures and standards within that framework, and provides guidance. Coordination with regional and local action is limited to the monitoring and reporting phase.

The main focus of the French NAP is security, health and natural heritage. One of its distinguishing priority areas is increasing the resilience of public infrastructure to climate change. Vulnerability assessments of key transport infrastructure (roads, railways, airports) provide the basis for reviewing design and building codes. Regular overviews of the climate resistance of these networks take place under the co-ordination of regional infrastructure managers.

It highlights the need to build capacity at an early stage in order to enable good and shared understanding of adaptation objectives with the involvement of representatives of the private sector, other interest groups and stakeholders.

The French adaptation plan has a particular focus on forests as an important part of the country's natural heritage. Based on a report by the National Observatory for the Effects of Global Warming (ONERC 2014) the NAP acknowledges that the projected pace of warming is faster than the natural adaptive capacity of forests. The spontaneous adaptability of forests will not be sufficient and their resistance and resilience needs to be enhanced.

Adaptive capacity depends on multiple factors that often interact with each other. The ONERC report proposes a consistent three-stage approach with diagnosis, the definition of management objectives and implementation. The managers of individual forests are responsible for applying this strategic approach, but co-ordination and monitoring takes place at national level.

The French national strategy sets out a regular monitoring process for the implementation of the NAP, with the latest medium-term monitoring report having been made for the period 2011-2015.

According to this report, 92% of planned actions have been implemented. Key challenges were identified as transparency and responsibility in the allocation of finances to specific ad-

aptation objectives. In some cases, the report identified financial bottlenecks and credit constraints that slowed down, limited or even suspended adaptation projects.

### The German climate adaptation strategy

The German Adaptation Strategy (DAS) follows a science-based approach and builds on projections of the IPCC's high emissions scenario supposing that average annual temperatures in Germany could rise by up to 4.5°C by 2100, compared with temperatures in 1990. Based on an integrated approach, the model projects an increase in winter rainfall of up to 40%, but a decrease in summer rainfall of up to 40%. The climate impact analysis also considers the consequences of more frequent extreme weather events. Based on the applied climate model, the national strategy examines vulnerability, sensitivity and adaptive capacity in key sectors.

The National Action Plan identifies activities for which the Federal Government is directly responsible and refers to its functions as an owner of land, properties and infrastructure, and also as an infrastructure developer. This includes building codes and standards for federal buildings in accordance with adaptation objectives, but also climate resilience standards for transport infrastructure. Climate adaptation objectives are specified for different levels of administration including international, regional and local level.

The NAP was developed in coordination and consultation with the federal states. The Conference of German Environment Ministers set up a Permanent Committee on 'Adaptation to Climate Change Impacts' at federal and regional level to accompany the process of the national adaptation strategy and federal states were involved by means of a formal consultation on the Draft Action Plan in 2011. Stakeholders, interest groups and representatives of sectoral organisations were also involved in the development of the national strategy.

The National Action Plan is based on three main pillars:

- a targeted information and communication strategy to raise awareness of climate change adaptation with the involvement of stakeholders;
- the creation of a national framework of regulations and standards for adaptation objectives across sectors by setting incentives and a funding framework; and
- measures where the federal government has direct responsibilities, including federal buildings, land and public infrastructure at national level.

On top of these, international commitments of the German state are covered and co-ordinated as a separate pillar, including international and European climate policy agreements and adaptation frameworks.

Within the NAP, funding programmes are widely used as incentives for private sector actors and individuals to include climate change adaptation objectives in their business and investment decisions. One such funding programme aims at maintaining biodiversity, while another aims to strengthen co-operation and networking related to adaptation at local level. For the energy sector, additional investments in climate adaptation are reimbursed by the Federal Ministry of Environment funding programme.

### The Netherlands adaptation strategy

The Dutch National Adaptation Strategy 2016 (NAS) is based on a number of supporting research projects conducted by the Dutch institute 'Kennis voor Klimaat', the National Planning Bureau and the Dutch Meteorological Institute (KNMI).

Based on the latest KNMI climate scenarios and the most recent studies of climate science, the risks and opportunities of climate change for seven specific sectors are assessed and analysed. Trends and (policy) developments that affect the vulnerability of sectors are also identified and targets for the implementation of measures and policies set. The main sectors included are: transport and energy infrastructure, information and communication technology, health care, agriculture, horticulture and fisheries.

An important issue in climate adaptation is who is in charge of adaptation measures. A Utrecht University study (Runhaar 2014) examined the division of responsibility for climate change adaptation and systematically mapped and tested the legal responsibilities for key sectors, both public and private. The study was focused on ICT networks (internet and data centres), energy (electricity grid management), transport and infrastructure, and health care.

The study concluded that climate risks and related responsibilities were not clarified by the legislation nor were they put into place in practice. It recommended:

- raising awareness of the sector-specific consequences of climate change and setting up an inventory of sector- and area-specific climate risks;



- coordination of these inventories by administrative bodies for risk management within designated 'security regions';
- including climate risks and related responsibilities in the existing Security Regions Act which covers vulnerable regions;
- paying more attention to cross-sectoral cascade effects when extreme weather events and damages in one region or sector have a significant influence on other sectors; and
- a co-ordinated approach between the adaptation strategies of different sectors in order to prevent multi-hazard chain reactions, addressed by the relevant legislation.

Although there is growing awareness of climate risks in the Netherlands, this is concentrated in particular sectors and regions, such as water management and coastal regions. In general, municipalities and the public sector take more account of climate risks with adaptation strategies integrated into their operational practices than do small and medium sized enterprises and individuals.

### Highlights of other national adaptation strategies

#### Denmark:

The Danish strategy emphasises 'autonomous adaptation' by vulnerable stakeholders and communities. The government is mainly seen as a facilitator.

#### Finland:

Finland was the first EU country to prepare its National Adaptation Strategy. It is based on a comprehensive approach that mainstreams adaptation into policy instruments and planning. The responsibilities at central, regional and local levels are well defined, with the Ministry of Agriculture and Forestry in charge of national level coordination. Each ministry has its own competence for climate adaptation with resources allocated accordingly. The National Strategy was subject to comprehensive mid-term evaluation in 2013 and a national monitoring group was set up in 2015 to follow-up and evaluate its implementation. The results were taken into consideration as part of preparations for the National Adaptation Plan 2022. Climate resilience is an overarching objective of Finnish development policy with all projects being subject to climate screening.

#### Ireland:

The Irish adaptation strategy is regarded as a good practice case study for successfully co-ordinated, multi-level governance built upon sectoral- and local-level interests. The central co-ordination mechanism is led by the Irish Ministry of the Environment which oversees sectoral adaptation plans. Advice and assistance are provided by the Environmental Protection Agency and includes vulnerability and risk assessments with the use of adaptation indicators.

#### Latvia:

The focus is on agriculture, coastal management, forests and water resources. Sectoral adaptation policies support the development of national strategy.

#### Portugal:

Portugal's strategy focuses on water, forest fires and tourism. National policy is supported by private consultants. The NAS includes a sectoral approach and is based on high levels of public involvement.

#### Spain:

The Spanish adaptation strategy has a principally centralised approach, but provides special rights for the autonomous regions. Adaptation objectives are linked to climate change mitigation policies and to detailed vulnerability assessments. The main sectors it focusses on are tourism, transport, energy, construction and the food industry. Regular monitoring reports are carried out by the Ministry of Agriculture, Food and Environment.

#### United Kingdom:

The UK adaptation strategy is built on a comprehensive approach, based on strong scientific and technical support with an emphasis on the legal framework, implementation and review. Key sectoral focuses are transport, energy, water management, coastal areas, finances, forests and health care.

Climate adaptation objectives are integrated into major sectoral policies. The UK ministry in charge of transport, for example, applies detailed guidelines and standards as to how key transport infrastructure should be made climate resilient, taking vulnerability and risk assessments into account.

This summary is based on the findings of key studies referred to above (PEER, 2009 and BASE, 2014).

## 6.3 Comparative analysis of national adaptation strategies

### 6.3.1 Overall structure and procedures

There have been a number of systematic comparative analyses undertaken by research institutes to monitor and evaluate EU member states' national adaptation strategies:

- A study by a network of research institutes (PEER 2009) compared NAS documents in relation to their overall structure, main topics of focus and procedures;
- The Bottom-up Climate Adaptation Strategies towards a Sustainable Europe (BASE) research network monitored and compared national adaptation strategies (BASE 2014); and
- The Latvian EU Presidency prepared a report for the UNFCCC on the progress of climate change adaptation policies in EU Member States (UNFCCC 2015b).

These analyses found that the role of actors at different levels of decision making is a crucial feature of any adaptation strategy.

In the Netherlands, national, provincial and municipal representatives, together with experts and representatives from water boards, regularly discuss the multi-level dimensions of adaptation issues. Participatory approaches in implementing the NAS were also mentioned in the Danish, Finnish and UK plans, but without specific details. All the strategies stress the importance of taking measures at the most appropriate scale of governance: regional, local or individual. A number of strategies are centralised with a clear leading role for central government, as for example the German and French examples. The Danish and Dutch strategies, on the other hand, are based on a more decentralised approach and argue that an appropriate setting should be created at local level by stimulating social learning, self-organisation and mobilisation. In a number of cases, national governments play a co-ordinating role in order to involve lower levels of governance in the most efficient way. The UK NAS, for example, explicitly mentions the removal of any formal or informal barriers that might hinder the development and implementation of adaptation strategies. The majority of national strategies do not clearly specify roles and responsibilities at regional and local levels and few strategies assigned clear responsibilities to sectors, although Finland has, for example, implemented the NAS by drawing up several sectoral adaptation strategies that build on existing institutional settings. With the exception of the Dutch strategy, the national strategies do not include cross-sectoral approaches that take into account potential cascade effects. In several cases, unclear and overlapping division of responsibilities has resulted in conflicting incentives, while financial constraints often lead to competition for resources between sectors.

Mainstreaming of adaptation into new and existing policies is a general principle that appears in most strategies, while some have opted for a public-private partnership approach (e.g. Denmark and the Netherlands). One major shortcoming for all the national strategies is that financial resources are not clearly allocated to the adaptation objectives, whether on a central budget or project-based financing principle.

### 6.3.2 Thematic comparison of adaptation strategies

The PEER report examined the main thematic focuses that were applied by national adaptation strategies with respect to the following six overarching issues: main objectives, scientific background, communication, the role of the different levels of administration, sectoral policies and monitoring and assessment.

Most levels of governance were addressed in national adaptation strategies by the major member states as Table 1 shows.

The PEER report also identified the main sectors that were addressed as being vulnerable to climate change in the national adaptation strategies as Table 2 shows. These reflect both national specificities and priorities. It should be noted that emergency and rescue services are only covered by three member states (Germany, Denmark and Latvia). See Table 2.

All the expert reviews have emphasised that funding is the weakest link in national adaptation strategies. Among the major countries, only France has a solid financial mechanism (although details were not specified). The Finnish strategy does not assign a specific fund for climate adaptation; instead financing should follow from the sectoral programmes. The Netherlands pursues both public and private funding of adaptation, often through public-private partnerships based on cost-benefit analysis. In Germany, Spain and the UK, there is no specific financing mechanism for adaptation and its control is not specified in the adaptation strategy. See Table 3.

#### 6.4 Good practice case studies

##### *Denmark: coordination with municipalities and stakeholders*

The Municipality of Dragør is among the regions with the highest vulnerability to floods in Denmark. The coastline has been designated by the EU as one of ten 'risk areas' in Denmark likely to be hit hard by coastal flooding and sea level rises. According to the community website (Klimatilpasning) the climate change adaptation plan of Dragør municipality applies four different dyke scenarios for the most vulnerable south-western part of the municipality. The basic principle of the community is that as far as possible climate change adaptation practices should fit into the natural landscape.

The decision about which dyke scenario should be applied depends on a comprehensive expert analysis followed by dyke related meetings in both municipalities and a public consultation.

##### *Netherlands: climate-proof Rotterdam*

Facing the challenge of climate change and also exploring future opportunities, the City of Rotterdam has set up the 'Rotterdam Climate Proof' programme to make the largest European port city climate resilient by the next decade. Measures are selected for their multiple benefits and their contribution to the social-economic development of the city by engaging stakeholders through participation and capacity-building. Examples are green roofs, so-called 'water squares' and a new rowing course that also has a water storage function. As a pilot project, floating architecture is being applied in the old port areas. The European Commission selected Rotterdam as one of the 'Peer Cities' in the Cities Adapt Programme. Businesses profit from public-private partnerships and international cooperation. The Rotterdam Adaptation Strategy is one of the pillars of the Dutch National Adaptation Strategy.

#### 6.5 The role of stakeholders and social dialogue

Member states have mostly included stakeholders in the planning of their adaptation policies, involving representatives of subnational level governments, scientists and researchers. In some cases, non-governmental organisations (NGOs), through consultation and information-sharing, and the general public, through public consultation and dissemination of information, have also been involved. There is no specific reference, however, to the involvement of the social partners, even though most NAS documents emphasise the importance of stakeholder involvement in making strategies more transparent and inclusive. Employer organisations are mentioned in the French NAS in the context of financing, but in most cases there is no reference to the trade unions. Table 4 summarises the role of stakeholder involvement in the development and implementation of NASs.

The main method of stakeholder involvement in most countries is to involve external experts and scientists. Wider consultations, social dialogue and the involvement of NGOs happen sporadically and in only a minority of member states.

In Finland, stakeholders were involved both in assessment and revision of the National Strategy for Adaptation to Climate Change. For the strategy revision process, the stakeholder

involvement included: a 'stocktaking' questionnaire on climate change impacts and risks with a view to sectoral or regional vulnerabilities; an open seminar ('public hearing') on the strategy; and a 'Have your say' e-Participation forum for the public.

Although the Netherlands mainly involved experts and scientists in strategy formulation, the social partners and NGOs were also involved in specific programmes and projects.

#### 6.6 The role of the municipalities in climate adaptation

Municipalities are facing the climate adaptation challenge in very different ways. Geography and specific vulnerabilities to climate change differ greatly, as do legal systems and institutions. There are huge differences among local communities in terms of financial resources and access to expertise. The differentiation has grown substantially following the economic crisis as austerity measures implemented by central governments have hit the municipal level of public administration the hardest. Communities dependent on the redistribution of resources by central administrations are often left behind while rich municipalities with their own substantial resources are better able to cope with complex challenges.

Most climate change adaptation actions are embedded in municipalities' existing plans and strategies, such as land use and capital infrastructure. Specific policies and regulations on climate change adaptation may target one adaptation issue, but can be also wide-ranging, tackling numerous climate issues that affect various departments and even external organisations.

One key issue is assessing vulnerability, a common element of risk management approaches to identify potential risks to municipal policies, programs, infrastructure and other assets.

The IPCC Working Group II (IPCC 2014-2) concluded that limits and barriers to adaptation are technological, financial and cultural. Groven et al. (2012) explored why climate change adaptation was not integrated into civil protection in three municipalities in Norway, Sweden and the Netherlands, and found a range of factors, including perceived vulnerabilities, lack of awareness and the role of their legal and institutional status. Van Aalst et al. (2008) concluded that for the successful use of community-based risk assessments for introducing adaptation, climate information must be better tailored to community needs. Other studies have found that the lack of time and capacity of municipal employees to integrate climate adaptation into their daily work can often be a serious barrier.

A Swedish case study on the barriers to adaptation (Carlsson-Kanyama et al 2013) involved key stakeholders in developing scenarios of two ideally climate-adapted Swedish municipalities 20–30 years into the future. Five scenarios of possible adaptation measures designed by higher levels of public administration were examined to see how municipalities could actually respond to local adaptation needs in key sectors such as transport, energy and health care. Public procurement practices and the detrimental effect of privatisation were identified as the main barriers to adaptation.

### 7. Public and private sector involvement in adaptation

Since the early days of capitalism, the market economy has failed to account of the true cost of using natural resources. In order to correct this historic market failure, a collective public effort is needed to mitigate the damage caused and adapt to its consequences, with a central role for public services in shaping the whole process of paradigm change from a resource-depleting fossil energy-based production model towards a zero-carbon sustainable economy.

This does not automatically mean that the state (at local, national or supranational level) needs to or can intervene directly in each case. Instead there is a need for a comprehensive policy mix that includes a strong regulatory framework in the form of performance targets, standards, fees and penalties, but also mechanisms that influence market actors, such as taxes, incentives and subsidies. Public investment has a key role to play in both climate change mitigation and adaptation efforts.

#### 7.1 The role of public investment in adaptation

The role of public investment is crucial in breaking away from the slow growth/high unemployment/low investment deadlock Europe has found itself in since the onset of the economic crisis in 2008. Moreover, the 2050 European climate policy targets (e.g Energy Roadmap



Table 1: Multiple levels of governance in the NAS by member state

Country	International	European	National	Regional	Local	Individual
Denmark		•	•	•	•	•
Finland		•	•			•
France	•	•	•	•	•	•
Germany	•	•	•	•	•	•
Netherlands		•	•	•	•	
Spain	•	•	•	•	•	
UK	•	•	•	•	•	•

Source: PEER  
(2009)

Table 2: Vulnerable sectors in national adaptation strategies

Vulnerable sector	DE	DK	ES	FI	FR	LV	NL	PT	SE	UK
Agriculture	•	•	•	•	•	•	•	•	•	•
Biodiversity	•	•	••	•	••	•	•	•	•	•
Energy	•	•	•	•	•	••	•	•	•	•
Finance	•	•	•	•	•	•	•	•		•
Forests	•	•	•	•	•	•	•	•	•	•
Health	•	•	•	•	••	•		•	•	•
Water management	•	•	••	•	••	•	••	•	•	•
Construction	•	•	•	•	•		•	•	•	•
Fisheries	•	•	•	•		•		•	•	•
Coastal areas	•	•	••			•	••	•	•	•
Tourism	•		•	•	•		•	•	•	•
Land use	•	•		•			••	•		•
Transport	•	•	•	•	•				•	•
Communication infra-structure	•	•	•						•	
Industry	•		•	•	•					•
Emergency services	•	•				•				
Mountains	•		•							

Source: BASE 2014, PEER (2009). Note: • sector is dealt with; •• identified as a key sector in the national strategy

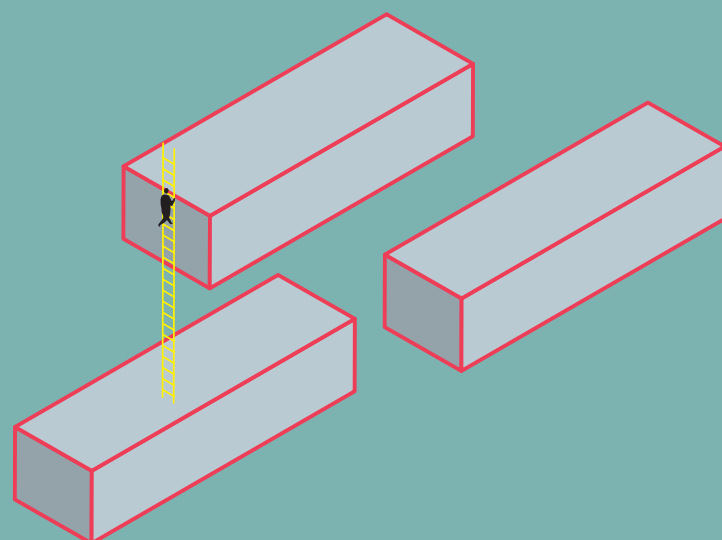


Table 3: Funding adaptation measures within multiple governance levels and sectors

Country	Does NAS refer to adaptation funding?	Who pays for the implementation?	Who controls the use of funds?
Denmark	Not specified	Public and private sectors coordinated by the government	Monitored by coordination forum
Finland	Not explicitly	All relevant actors through mainstreaming into existing policies	No separate funding
France	Defined without commitment	Government, stakeholders, professional federations	ONERC orientation council
Germany	Not specified	Not specified	Not specified
Netherlands	No reference to specific funding	Both public and private (PPP) at all levels	Cost-benefit analyses
Spain	Not specified	Not specified	Not specified
UK	Mentions funding for regional partnerships and research	Not specified	Not specified

Source: BASE (2014)

Table 4: Involvement of stakeholders and social partners in adaptation

Country	Participation in developing NAS	Participation in implementing NAS
Austria	Two stakeholder workshops	
Germany	Three stakeholder conferences	
Denmark	Wide public consultation process involving experts, social partners and civil society	Self-mobilisation of stakeholders is advocated; NGOs are not formally represented in the coordination forum
Finland	Sectoral stakeholders, public hearing before NAS finalisation	Sectoral stakeholders are involved within the sectoral strategies and action plans
France	Stakeholder meetings	Not specified
Latvia	Scientists, experts and agencies	Not specified
Netherlands	Government representatives and experts	Regional consultation rounds and workshops with regional and sectoral representatives and social partners; local interactive participation
Portugal	Experts, local and sectoral stakeholders	Not specified
Spain	Public consultation process for the adoption of NAS	Not specified
Sweden	Participation and consultation processes are advocated in the national legislation linked to the NAS	Not specified
UK	Scientists and experts	Stakeholders are involved via the newly established 'Partnership Board'

Source: BASE (2015)

2050; European Commission 2011) have already defined a huge investment need. For 2050 climate and energy policy targets to become achievable, these investments must be realised in practice.

Climate policy targets and climate adaptation needs should be seen as investment opportunities, as an ambitious climate policy and accompanying adaptation strategy can be translated into investment targets. There is really nothing new in all this: the current need for investment is a clear consequence of policy targets that were identified and defined several years ago. The only question is why this is not happening; why such vitally necessary policies are not being wholeheartedly pursued. The EU 2030 climate and energy policy framework seems to fall short, both quantitatively and qualitatively, with Europe once again making it apparent that its path lies along the 'low road', where competitiveness is regarded in terms of low wages and cheap energy. Setting climate policy targets with a compromised ambition and failing to implement already-defined policy objectives is resulting in a growing investment gap, and the once clearly leading role of Europe in low-carbon industries is being swiftly eroded. The Commission's Adaptation White Paper (European Commission, 2009) does not provide any guidance as to how the massive investment need should be financed and how public authorities and public services can take up this challenge. The 2013 Climate Adapt Package provides a useful platform for exchanging knowledge and best practice but does not fill this gap. It is not enough that a small number of member states (such as the Netherlands and France) have set financial instruments and mechanisms for adaptation objectives. In most member states, financial resources for adaptation purposes are not clearly defined.

## 7.2 The role of the EU Investment Plan and the European Fund for Strategic Investments (EFSI)

According to the European Commission, annual investments of €200 billion into energy efficiency and renewable energy generation are necessary in order to reach the objectives of the European Energy Union.

Europe suffered a dramatic fall in investment in the aftermath of the economic crisis and investment levels in 2016 were still 6.6% below the peak of 2007. As regards clean energy investment, the situation is even more dramatic with yearly investment levels between 2012 and 2016 stagnating at around the level of €45bn, just slightly above half what Europe invested in 2011 (ETUC/ETUI 2017).

The EU Investment Plan was designed to overcome these shortages and put Europe back on a sustainable, investment-led growth path while the European Fund for Strategic Investments (EFSI) was meant to prioritise low-carbon investment projects.

In spite of the ambitious declarations and its green priorities, the Investment Plan for Europe has not brought about a turning point in this investment stalemate. EFSI factsheets and other expert reviews do not specify climate adaptation-related investments in their accounting, therefore it is difficult to quantify the exact share of adaptation-related investments within the EFSI framework.

But according to latest European Commission factsheets (2016b) 5% of EFSI transactions approved by the European Investment Bank (EIB) by mid-2016 had an environment and resource efficiency objective and 23% were dedicated to the energy sector. A coalition of NGOs (CAN 2016) points to the fact that 15% of the projects approved by the EFSI for the energy sector support fossil fuel investments.

Although adaptation to climate change does not appear as a specific priority area in the EU Investment Plan, 'energy efficiency-smart cities' (5% of approved projects) and 'climate resilience infrastructure and environmental protection' (7% of approved projects) may be taken into account as relevant for adaptation. Even if we assume that the majority of these investments are relevant, their share remains under 10% of total investments to date.

By the end of 2016 the EFSI did not appear to have had a positive effect on investment activity. This is particularly true with regard to clean energy investments, even though these are supposed to be a priority area. Energy efficiency is a declared objective, but its 5% share currently leaves much room for improvement. The EFSI has failed to deliver on sustainability objectives and additional policies are required to boost investment in sustainable infrastructure, clean energy and energy efficiency.

In December 2016, the European Commission (2016) announced two new proposals to extend and strengthen the EFSI. Firstly, it proposed doubling both its financial capacity and duration to provide at least €500 billion of investments by 2020 and make sure that a minimum

of 40% of projects are dedicated to climate action. This is certainly a positive initiative but the low carbon commitments of the investment decisions need to be more stringent and the links between the EFSI and the Energy Union strengthened further in order to deliver the EU's 2030 and 2050 climate goals.

## 7.3. Mobilising private investments for climate change adaptation – the EU LIFE Programme

There have been several initiatives aimed at mobilising private investment into climate change adaptation, as given its long-term prospects and low profitability, it is not an obvious investment target for private capital. A database developed by UNFCCC (2012) provides an insight into good practice case studies and profitable climate change adaptation activities developed by business (often in partnership with NGOs or the public sector) from different regions and sectors. Activities include the development of low-carbon goods and services, investments to increase energy efficiency, measures to reduce vulnerability to extreme weather conditions and climate proofing practices through the value chain.

With regard to the municipal level, and in particular to urban areas, a World Bank study stresses that due to the concentration of the population and public infrastructure in cities, the urban dimension of adaptation will take up four fifths of the expected annual \$80-100 billion adaptation costs (World Bank, 2010). The study also emphasises that raising financial capital for urban adaptation is key for both the public and private sector to be able to mobilise and allocate resources for climate change adaptation in an efficient way.

The LIFE Programme is the EU's funding instrument for the environment and climate action (European Commission 2017). One of its sub-programs is devoted to climate action that covers adaptation and mitigation. The 2014-2020 multiannual budget includes €1.1 billion under Environment and €0.36 billion under Climate Action. According to the Commission website, the funding of the LIFE Programme in the 2014-2020 period will apply "innovative financial instruments".

A main theme of the LIFE Programme, within the adaptation sub-program, is *Resilient Communities*. A LIFE Programme expert document (Giordano et al, 2012) providing adaptation guidelines for municipalities argues the following: "basic infrastructure – such as roads, a drainage system or a retention wall – has a huge local value, but does not generally provide a direct investment opportunity". In order to make adaptation or resilience projects attractive for private investors these projects need to be integrated into broader upgrading or development investments. This way property values will increase and higher rents and profit margins can be realised. As the document sets out: "building green is a way to optimise return on assets by reducing operating costs and by offering higher quality living spaces and work environments".

One idea is that "specific financing instruments could be designed to create diversified, scaled options for direct or integrated investments". The proposed financial instruments could be portfolio-based loans, catastrophe bonds or other forms of securitised financial products. In this way much larger private capital flows could be sourced for adaptation and other kinds of disaster risk reduction.

The report's recommendations include recent 'financial innovations', such as the creative use of land leases, land-swaps, 'bonusing' incentives and value capture schemes. Catastrophic risk could be addressed through a catastrophe bond, catastrophe insurance, or other securitisation instruments that pool risk and thereby spread it across numerous cities.

Mobilising private capital for climate adaptation purposes can indeed play an important supplementary role, but going back to pre-economic crisis financial instruments that hide risk exposure by securitisation should not be seen as a sustainable solution for filling budget gaps. Public financing at both national and municipal levels needs to provide the main source of investment into adaptation.

## Conclusions and policy recommendations

Based on the COP21 pledges the most likely temperature increase by 2100 is still expected to be 3-3.5°C – significantly above the below 2°C objective. Inadequate climate change mitigation efforts point to the unquestionable urgency of climate change adaptation. In Europe, the major challenges for climate adaptation are fading mitigation ambitions and the pressure of austerity on public finances.



EU level initiatives on climate adaptation – the 2009 Adaptation White Paper and the 2013 Adaptation Package – do not provide answers to this basic contradiction. These strategy papers are often little more than policy declarations and wish lists, but the reality is markedly different, especially in the years marked by the economic crisis and austerity policies. The strategy papers make no mention of financial feasibility in the context of tightened public finances under austerity, raising the question: How can the declared objectives be put into practice at a time of massive budget cuts?

The adaptation challenge is huge, as this report makes clear. For example, the annual average cost of flood damage across the European Union of €4.5bn could rise to €23bn a year by 2050.

The European Commission Joint Research Centre (JRC) (Forzieri et al. 2016) found that damage from climate extremes to critical infrastructures and key investments in the energy, transport, industrial and social sectors in the EU, that currently cost €3.4 billion a year, could triple by the mid-2020s and amount to more than 10 times the current amount by the end of the century.

However, the EU still does not have a comprehensive and comparable disaster loss data recording system and the lack of standardised damage and loss data collection is a major hurdle for cross-border data sharing and cooperation within the EU (JCR 2015). The European Parliament and Council only launched the Union Civil Protection Mechanism in 2014 (European Parliament, 2013), yet member states were supposed to have delivered comparable and standardised risk assessments at national and sub-national level to the Commission by the end of 2015. As a result, the EU lacks the basis on which to build an effective and coordinated EU climate adaptation strategy.

In the absence of stable and systematic public financing of an adaptation strategy, at both national and municipal levels, we have to face two major threats:

1. Adaptation and prevention take a back seat and resources are focused on ad hoc catastrophe management; and
2. Municipalities particularly have little choice other than to enter into risky financing solutions with the private sector.

The responsibility and participation of private capital is not in question in general. All investors, whether in real estate, infrastructure or energy, should have the proper incentives to make any future investment, as long as there is respect for stringent adaptation principles and standards. However, private capital is not an adequate substitute for public investment. National investment projects that have been submitted to the EFSI within the EU Investment Plan framework do not properly and explicitly address adaptation to climate change. Under the new phase of the EFSI framework, the links between the EFSI and the Energy Union need to be strengthened in order to deliver the EU's 2030 and 2050 climate goals.

The general aim of the EU Adaptation Strategy is to make Europe climate-resilient by ensuring that adaptation objectives are integrated into all relevant EU policies. It is designed as a 'framework strategy' analogous to the framework directives that set general goals without regulating on all the specific details. It is built around the idea that specific policy areas and sectors will take on the real climate adaptation 'work'. The crucial role of the public sector in adaptation is not mentioned and the challenges facing public services are not specifically addressed. This approach promotes only soft policy instruments in efforts to integrate climate adaptation into different policy areas.

A meaningful EU-level climate adaptation initiative should not be based only on recommendations and providing tools for exchanging information and good practice. Instead, any initiative should define binding targets and standards for member states in terms of climate-resilient infrastructure, building codes and regulations, monitoring systems and financing. Climate change-related risks and threats do not recognise national borders, in particular for floods and wild fires, and cascade effects play a central role. In order to tackle these risks at EU level, cross-border initiatives are needed, not just an exchange of information and experience. Such cross-border initiatives need to have a dedicated priority status for EU funds and for the EU Investment Plan.

Following the review of a large number of National Adaptation Plans (NAPs), the following main conclusions can be made. NAPs need better monitoring and should be subject to standardised evaluation criteria. This should include the content, structure and procedure in relation to the following factors:

- involvement of the social partners and stakeholders;
- reporting obligations on implementation and monitoring;

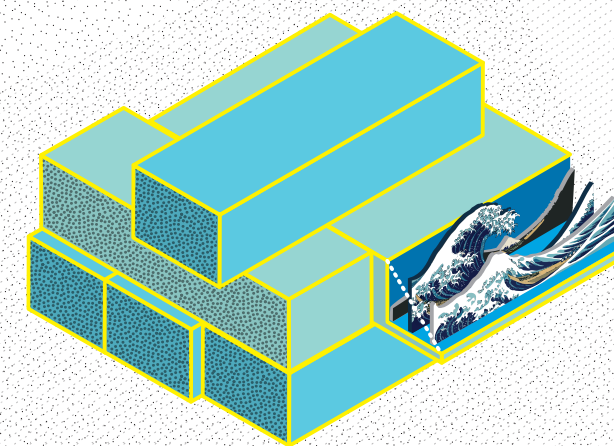
- distribution of responsibilities between different levels of the administration; and
- financial planning and an adequate financing framework.

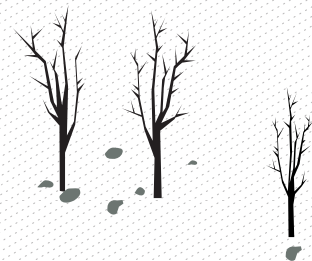
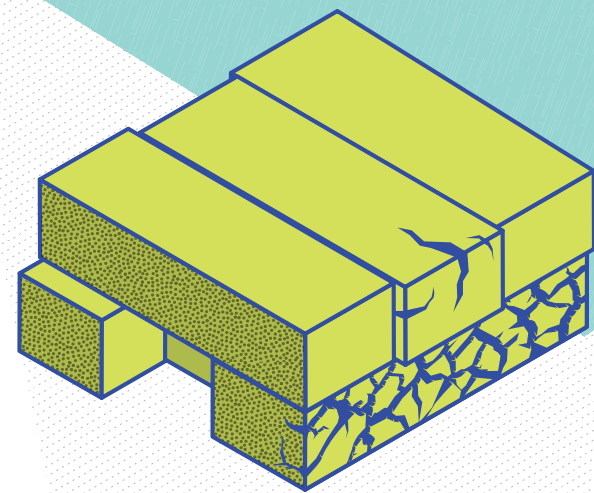
Some of the sectors or subsectors that have been given priority in national adaptation strategies are public, such as coastal infrastructure, flood protection and general public infrastructure. However, in the overwhelming majority of national strategies this is not specifically addressed and no special financial arrangements are specified. Only in a minority of cases, where the level of governance and intervention is well-defined and where financial instruments are also attached, is this crucial differentiation made.

Adaptation to climate risks and disaster reduction requires an enhanced regulatory capacity for governments. Public services need to be strengthened in line with the growing adaptation challenges. This includes recruiting new staff and equipping public sector workers such as nurses and doctors, firefighters and other emergency workers with the skills required to ensure risk preparedness in order to cope with enhanced climate risks. It is symptomatic that only three national adaptation strategies specifically address emergency services (Denmark, Germany and Latvia). More focus is needed to ensure that there is appropriate recognition for public sector workers in the European framework of Civil Protection and Disaster Risk Reduction.

Although 'stakeholder involvement' is often mentioned in general terms (from the EU adaptation framework to most national strategies) there is no specific reference to the involvement of the social partners. The French NAS makes reference to employers organisations in the context of financing, but in most cases trade unions did not get a mention.

All these shortcomings need to be addressed in the forthcoming review process of national adaptation strategies by the Commission in 2017.





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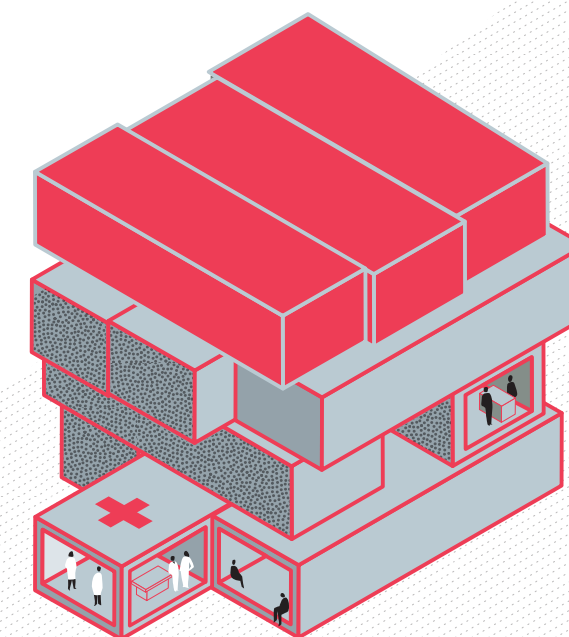
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EPSU is the European Federation of Public Service Unions. It is the largest federation of the ETUC and comprises 8 million public service workers from over 260 trade unions across Europe. EPSU organises workers in the energy, water and waste sectors, health and social services and local, regional and central government, in all European countries including the EU's Eastern Neighbourhood. It is the recognised regional organisation of Public Services International (PSI).

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