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## C International approaches

This appendix highlights the international context within which Australia’s climate change adaptation occurs. It provides an overview of the approaches taken by selected international organisations and countries on adaptation to climate change. The focus is on frameworks and broad-level policies that have been used to guide government actions and facilitate adaptation more widely. The appendix summarises general approaches that have been used rather than providing a comprehensive list of policies or an evaluation of the effectiveness of each approach.

To date, international approaches have been of varying levels of specificity. They range from those that provide high-level guidance to governments, businesses and households on adaptation options and managing climate-related risks, to those that impose specific regulatory requirements.

In some cases, stand-alone adaptation programs have been implemented. In others, adaptation has been incorporated into existing activities (such as international development assistance or government procurement). Along with the frameworks and broad-level policies outlined here, some countries have also implemented a range of sector-specific and region-specific adaptation policies — for example, covering agriculture, building regulation or land-use planning. Due to the large number of such policies they are not covered in this appendix.

### C.1 International institutions

Adaptation to climate change has been incorporated into the activities of many international institutions of which Australia is a member. This section briefly discusses several institutions that focus explicitly on adaptation. Other international organisations and agreements more broadly may also relate to, or affect, adaptation to climate change — such as trade agreements under the World Trade Organization, the United Nations Convention on Biological Diversity, and the Reducing Emissions from Deforestation and Forest Degradation scheme.

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## Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) is a scientific body that was established by the World Meteorological Organization and the United Nations Environment Programme. It draws on contributions from many scientists worldwide to review and assess scientific research on climate change. In 2007, part of its *Fourth Assessment Report* examined climate change impacts, adaptation and vulnerability (IPCC 2007a). This work drew on a range of research and examples to assess adaptation to date and future vulnerability to climate change across a number of countries and regions. It will be updated for the *Fifth Assessment Report*, expected to be released in 2014.

While the IPCC does not make recommendations on government policy — and thus does not put forward a policy framework — it has been widely cited and has had a significant influence on the understanding of climate change, regional climate projections and adaptation in Australia and other countries. It has also identified types of potential financial, informational and social barriers to adaptation (IPCC 2007a).

## United Nations

### *United Nations Framework Convention on Climate Change*

The United Nations Framework Convention on Climate Change (UNFCCC) is an international convention, first signed in 1992, under which 195 countries have agreed to develop and implement ‘measures to facilitate adequate adaptation to climate change’ (UN 1992b, p. 5) and to ‘take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions’ (UN 1992b, p. 6). The convention also commits developed countries to provide funding and technologies to developing countries to facilitate adaptation.

These agreements are reflected in the Cancun Adaptation Framework, adopted in 2010, under which member countries made a number of commitments to facilitate adaptation (box C.1). A framework was also established for the least-developed countries to form and implement National Adaptation Plans and for developed countries to support them with financial, technological and other assistance. These National Adaptation Plans build on earlier processes to report on, and plan for, adaptation needs in developing countries, covering activities such as improved water management, crop diversification and disaster-warning systems. Activities under the Cancun Adaptation Framework are to be facilitated by the UNFCCC’s Adaptation Committee, which will provide information and advice to countries.

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### **Box C.1 The Cancun Adaptation Framework**

Under the Cancun Adaptation Framework, parties to the United Nations Framework Convention on Climate Change committed to:

- plan, prioritise and implement adaptation measures
- conduct impact, vulnerability and adaptation assessments, including the economic, social and environmental evaluation of adaptation options
- strengthen institutional capacities for adaptation
- improve the resilience of socioeconomic and ecological systems
- enhance disaster risk-reduction strategies, including early-warning systems, risk management and insurance
- enhance understanding and coordination of migration induced by climate change
- research, develop and deploy technologies and processes for adaptation
- strengthen information systems and public awareness
- improve climate research, observation and modelling.

*Source:* UNFCCC (2011a).

Several institutions facilitate funding for developing countries under UNFCCC agreements. Funding arrangements generally aim to facilitate adaptation in addition to achieving other objectives, such as greenhouse gas mitigation, economic development or improved environmental management. The main sources of financial assistance are the Global Environment Facility (2011), along with the Adaptation Fund that was established to finance adaptation projects in some countries (financed by a share of ‘carbon offset’ revenues through the Clean Development Mechanism) (Adaptation Fund 2010). In Durban in 2011, member countries agreed to establish the Green Climate Fund to provide financial resources and assistance to developing countries for adaptation (UNFCCC 2011b).

Arrangements for sharing research and information have also been established. Principally, the Nairobi Work Programme aims to improve the understanding and assessment of climate change impacts, vulnerability and adaptation in UNFCCC member countries. It is working to disseminate information and resources on adaptation options, projects and technologies (UNFCCC 2011c).

Overall, agreements and activities under the UNFCCC have established a high-level framework for international collaboration on adaptation. Neither the founding convention nor subsequent formal agreements contain an explicit definition of adaptation or specific guidance on how to facilitate adaptation. This may give member countries flexibility in how they interpret and apply their commitments.

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## *United Nations Development Programme*

Other United Nations agencies also facilitate adaptation and have incorporated consideration of the impacts of climate change into their activities. The United Nations Development Programme (UNDP) provides financial and other assistance and runs programs in a number of countries to meet development outcomes. These include reducing global poverty, improving health and education, and protecting human rights. In short, it aims to achieve ‘climate-resilient development’ that supports ‘sustainable economic development and livelihoods’ (UNDP 2007, p. 1). Australia supports some of these activities through its own international development programs and collaboration with the UNDP (appendix B).

The UNDP facilitates adaptation in several ways. It provides guidance and advice for countries to undertake risk assessments, incorporate climate projections into development projects, address climate-related risks, evaluate adaptation outcomes and facilitate adaptation throughout society (UNDP and GEF 2010; UNDP 2007). This includes assistance for countries to form national adaptation programs and source funds for these (UNDP 2012). The UNDP also assists developing countries to implement ‘green, low-emission and climate-resilient development strategies’ that lead to policy frameworks for integrating climate and development policies at national, regional and local scales (UNDP 2011b).

Further, the UNDP facilitates funding for adaptation projects. In 2011, 30 projects in 42 countries received such funding through the Global Environment Facility, with a total of US\$87 million in grants (UNDP 2011a). These covered activities relating to water management, agriculture, drought and coastal hazards.

The general approach taken by the UNDP is set out in its Adaptation Policy Framework, which is based on four overarching principles.

- Adaptation to short-term climate variability and extremes is a starting point for adapting to longer-term climate change.
- Adaptation policies should be assessed in relation to development objectives.
- Adaptation occurs at different levels throughout society.
- Adaptation strategies and their implementation processes are of equal importance, and should include engagement with stakeholders (UNDP 2004).

In addition, the UNDP uses its adaptation programs to address barriers to adaptation (box C.2). This includes revising policies and frameworks, improving technical capacities and skills, encouraging changes to decision-making processes, facilitating coordination among stakeholders, demonstrating technologies and adaptation practices, and collecting and disseminating information (UNDP and GEF 2010).

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### **Box C.2 Types of barriers identified by the UNDP**

The UNDP, in collaboration with the Global Environment Facility, has identified potential barriers to adaptation. Examples are listed below.

#### **Systemic barriers**

- Institutional — an absence of appropriate institutional arrangements or governance structures, a lack of technical and managerial capacity of staff, or ineffective coordination across institutions and society.
- Policy — regulations and policies that affect the management of climate change risks and opportunities in key sectors or regions.
- Behavioural — a lack of awareness, understanding or capacity at the individual and community levels.
- Financial — insufficient allocation of resources through government budgets to reduce climate risks, inappropriate regulatory and fiscal structures, a lack of access to financial and risk transfer mechanisms, and unsustainable funding sources.

#### **Discrete barriers**

- Technological — an absence of climate-resilient technologies and practices, the failure to use these, or a lack of scientific and technical capacity.
- Informational — a lack of access to information necessary to plan and manage climate change uncertainty, including insufficient technical capacity to generate and use climate information and modelling.

*Source:* UNDP and GEF (2010).

### *United Nations Environment Programme*

The United Nations Environment Programme (UNEP) supports developing countries to:

- make adaptation decisions based on the best available information
- strengthen institutional and policy frameworks for adaptation
- integrate adaptation into national development planning and legislative processes
- assess the risks and costs of climate change impacts
- conduct economic analyses of adaptation options (UNEP 2012b).

As part of this, the UNEP has developed a Global Adaptation Network (and a set of regional networks) to help governments and others to access and share information, tools and case studies on adaptation (UNEP 2012a).

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In addition, the Climate Change Adaptation and Development Initiative, run jointly by the UNEP and UNDP, provides technical and financial assistance to sub-Saharan African countries and Small Island Developing States to remove barriers to implementing adaptation policy and to integrate adaptation into decision-making and development frameworks. This involves activities to enable participation by communities, establish suitable policy frameworks, raise awareness and improve communication of the risks and opportunities of climate change (CC DARE nd). The UNEP has also developed frameworks for assessing climate change vulnerability and impacts, and provides policy guidance on incorporating adaptation into national development planning (Poverty-Environment Initiative 2011).

### *International Strategy for Disaster Reduction*

The United Nations International Strategy for Disaster Reduction aims to reduce the damage caused by natural disasters and improve the capacity of governments and communities to respond to these. In particular, it seeks to ensure that disaster risk reduction is incorporated into climate change adaptation programs (UNISDR 2011).

The United Nations International Strategy for Disaster Reduction mainly provides information and guidance to countries to reduce disaster risks and improve resilience to natural hazards. It also facilitates collaboration and information sharing among stakeholders. Specific activities include:

- the Global Platform for Disaster Risk Reduction, a forum for exchanging information between governments and other organisations
- PreventionWeb, a website for distributing information on disaster risk reduction
- the production of Global Assessment Reports that examine natural hazards and risk reduction activities worldwide (UNISDR 2012).

This work is complemented by the Hyogo Framework for Action 2005–2015, an international agreement to reduce losses from natural disasters (which Australia supports through its international aid program). The Framework specifies actions to reduce losses from natural disasters, including:

- ensuring that disaster risk reduction is a national and local priority
- identifying, assessing and monitoring disaster risks
- using knowledge and education to ‘build a culture of safety and resilience’
- reducing risk factors and improving preparedness (UNISDR 2007, p. 6).

Implementation in developing countries is supported by financial assistance from the Global Facility for Disaster Reduction and Recovery (GFDRR 2011).

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## Organisation for Economic Co-operation and Development

The Organisation for Economic Co-operation and Development (OECD) facilitates adaptation by providing analyses, case studies and policy guidance to member governments and the public more broadly. This work ‘supports governments by providing the analytical foundation required to develop efficient and effective policies that promote adaptation to climate change’ (OECD 2011a). The OECD supports the evaluation of the costs and benefits of adaptation actions, and the consideration of adaptation in policy decisions and government processes. It also supports policies to help households and businesses adjust to changing conditions.

Various aspects of adaptation, including policy implications, have been set out in several OECD publications (box C.3). This work is supported by an agreement of member countries to integrate adaptation into economic development decisions, including through development programs that they use to assist other countries (OECD 2009).

### **Box C.3 Key OECD publications on adaptation to climate change**

A number of OECD publications have examined adaptation to climate change. Several examples are listed below.

#### **Economic Aspects of Adaptation to Climate Change**

This report sets out principles for making adaptation decisions and assesses available estimates of the costs and benefits of adaptation in various sectors and countries. It also examines market-based and regulatory instruments that can facilitate adaptation, including insurance, environmental markets and public–private partnerships (Agrawala and Fankhauser 2008).

#### **Private Sector Engagement in Adaptation to Climate Change**

Drawing on a survey of companies in several developed countries (including Australia), this report found that climate-related risks are widely considered by private companies and addressed through existing risk management frameworks, even though these may not always be labelled as ‘adaptation’ (Agrawala et al. 2011).

#### **Integrating Climate Change Adaptation into Development Co-operation**

This policy guidance document examines ways to integrate adaptation into development policies and activities, including by assessing climate change impacts, raising awareness of climate change, improving the flexibility of regulations and systematically evaluating the effectiveness of adaptation measures (OECD 2009).

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## **World Bank**

As a provider of loans and development aid, the World Bank has incorporated adaptation into its activities in a number of ways. It provides information, funding and technical assistance to facilitate adaptation, and supports government policy reforms that create incentives for adaptation. Examples of reforms include removing inefficient subsidies (such as for water-intensive crops), facilitating the take-up of insurance, improving water and ecosystem management, and strengthening institutions (World Bank 2010a). Under the Strategic Framework for Development and Climate Change, the World Bank has committed to support adaptation in development processes; provide research; and facilitate adaptation financing, private-sector involvement and capacity building (World Bank 2010b).

The World Bank also finances adaptation projects in developing countries, partly in conjunction with the Global Environment Facility. Other funding sources include the Strategic Climate Fund (in collaboration with other international agencies), which funds pilot and demonstration programs that integrate climate risks into development planning.

Further, the World Bank contributes to the Consultative Group on International Agricultural Research, a consortium of governments and other bodies that supports agricultural research to reduce poverty, improve human health and enhance the resilience of ecosystems (CGIAR 2012). This includes research to facilitate adaptation to climate change.

## **C.2 National adaptation policy**

Governments have implemented a range of policies and measures to facilitate adaptation to climate change. This section examines the broad-level arrangements in several countries, focusing on overarching policy approaches, schemes that provide information and guidance to facilitate adaptation (for example, by individuals and businesses), and the incorporation of adaptation into government processes (such as infrastructure decisions or the delivery of government services).

### **Policy approaches**

Broad frameworks have been established to guide adaptation policy or government processes in some countries. These range from explicit and binding legislative arrangements (as in the United Kingdom) to reports on climate change that have been commissioned to inform policy responses (as in the United States and Canada). A number of OECD countries have developed national adaptation

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strategies and undertaken climate change risk assessments. These countries have generally focused on considering climate change risks in a range of policy areas, with some variation in the policy instruments used and assignment of responsibilities between levels of government (OECD 2012).

However, not all countries have adopted an explicit policy framework for adaptation. For example, the New Zealand Government mainly provides information and guidance to facilitate adaptation by local governments and others (discussed below).

### *United Kingdom*

The United Kingdom uses several policy tools to facilitate adaptation to climate change, including an explicit legislative framework. Under the Climate Change Act (UK) 2008, the Government must undertake a Climate Change Risk Assessment for the United Kingdom every five years and implement a National Adaptation Programme to manage the identified risks (DEFRA 2011e).

The first such assessment was released in January 2012 and examined the potential risks and opportunities of climate change to the United Kingdom until 2099 (absent future adaptation). This included assessing current exposure to climate-related risks. It focused on five areas: agriculture and forestry, business, health and wellbeing, buildings and infrastructure, and the natural environment (DEFRA 2012c).

The UK Government has stated that it will release a National Adaptation Programme in 2013 to respond to the risks identified in the Assessment. This will cover a number of sectors; include adaptation policies and actions by government; and set out the roles and responsibilities of government agencies, the private sector and others (DEFRA 2012b; HM Government 2012). The overall principles for the UK Government will be:

... to act mainly where the market is unlikely to act, to help others make good decisions on climate risks and opportunities ... and to promote risk-based decision approaches ... (HM Government 2012, pp. 7–8)

In addition, an Adaptation Economic Analysis is being developed to assess the costs and benefits of adaptation options and identify priority areas for government (DEFRA 2011a).

The Climate Change Act also established the Committee on Climate Change to provide independent advice and analysis to the UK Government (DEFRA 2011e). Part of this is the Adaptation Sub-Committee, which advises the development of the five-yearly Climate Change Risk Assessments, assesses how prepared the United

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Kingdom is for climate change, and promotes action to adapt to climate change (Adaptation Sub-Committee 2009). It will also evaluate the implementation of the National Adaptation Programme.

The Sub-Committee has identified several barriers to adaptation in its progress reports. These include:

- insufficient capacity of local governments to address climate-related risks
- inadequate transparency and accountability of local authority decisions when approving development on floodplains
- underinvestment in flood-protection works by governments
- split incentives, where property owners or developers underinvest in property-level flood protection that would benefit occupiers
- weak price signals to reflect the relative scarcity of water and a lack of water metering for many households
- inappropriate investment processes in the water sector
- insufficient information on options for households to manage exposure to risks
- a perception by some households that managing flood risk is not their responsibility
- the unaffordability of some flood protection measures for low-income households (Adaptation Sub-Committee 2011, 2012).

The Sub-Committee has recommended that the UK Government set out steps to remove barriers to adaptation as part of its National Adaptation Programme (Adaptation Sub-Committee 2012).

Other policies in the United Kingdom, discussed later in this appendix, include requirements for large utilities (including those owned privately) and their regulators to report on how they are addressing climate change risks, guidelines for considering climate change in government investment decisions, and the dissemination of information and guidance to facilitate adaptation.

### *United States*

Adaptation policies in the United States have been formed at federal, state and local levels of government. Policies at the federal level include the provision of climate research and information, along with the identification and management of some climate-related risks by government agencies (discussed later in this appendix).

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In addition, some states and local governments (such as cities and municipalities) have adopted adaptation strategies, plans and/or policy frameworks. For example, as of August 2012, 14 states had an adaptation plan in place (CCES 2012).

The approaches used differ across states. For example, the Adaptation Strategy for California is based on giving priority to adaptation policies that:

- enhance existing efforts to improve economic, social and environmental outcomes
- modify existing policies without requiring new funding or staffing
- are flexible and can be effective in circumstances that are not fully predictable (California Natural Resources Agency 2009).

More broadly, the adaptation frameworks in several states — including California, Florida, New York and Alaska — are based on common themes, including improving information provision, incorporating climate change in public infrastructure decisions, using planning instruments to reduce the exposure of property and infrastructure to climate risks, and improving the management of water resources and ecosystems (Alaska Department of Environmental Conservation 2010; California Natural Resources Agency 2009; GATECC 2008).

### *European Union*

The European Commission has released a white paper that sets out a framework for EU-wide policy on adaptation. According to this paper, ‘autonomous adaptation’ (responses by individuals and businesses to market signals or environmental changes) may not occur to the optimal extent because of uncertainty, imperfect information or financial constraints (EC 2009). As such, it set out a role for the European Union to facilitate adaptation in sectors that are covered by EU-wide policies (such as agriculture, water, fisheries and energy networks) and where the impacts of climate change occur across the borders of member states. It recommended that priority be given to adaptation measures that have benefits regardless of uncertainty about future climate change, along with those that also reduce greenhouse gas emissions (EC 2009).

The white paper identified several options for the European Union and its member states to review existing policies — for example, by factoring climate change into rural-development, river-basin and flood-management plans. It also recommended that member states consider requirements that climate change impacts be assessed for public and private infrastructure and incorporated into construction standards (EC 2009).

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The white paper also set out a broader EU Adaptation Framework to inform an EU adaptation strategy that is to be implemented by 2013 (EC 2009). This framework is designed to improve understanding of climate change impacts, integrate adaptation into EU policies and support international cooperation to facilitate adaptation. It is based on the principle of subsidiarity, where higher levels of government (such as the European Commission) only make decisions that cannot be effectively handled by lower levels of government (such as member states or sub-national governments).

More broadly, the European Commission has indicated that it can support adaptation by promoting coordination and information sharing among member states and ensuring that climate change risks are considered in relevant EU policies (EC 2010a). This suggests that it considers adaptation within a range of policy measures, rather than as a stand-alone policy area.

### *Canada*

The Canadian Government facilitates adaptation to climate change mainly by providing information and guidance on adaptation options and ways to factor climate change into risk management. It has also committed to develop an adaptation policy framework to consider climate change risks in the decisions and activities of Federal Government agencies (Commissioner of the Environment and Sustainable Development 2010).

Natural Resources Canada funds research on climate change impacts and adaptation, and provides resources for considering adaptation in decision making. This includes guidelines for local governments to create adaptation plans and incorporate adaptation into their risk management processes, and for designers and owners of infrastructure to assess climate risks and incorporate adaptation into infrastructure decisions (Natural Resources Canada 2011b). Natural Resources Canada (2011a) also facilitates collaboration between each level of government, the private sector and community organisations on adaptation.

In addition, reports have identified barriers to adaptation in Canada, including insufficient access to information, a lack of guidance for land-use planners, societal expectations, financial and technological constraints, governance arrangements, and some planning and environmental regulations (Lemmen et al. 2008; NRTEE 2009).

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## Providing information and guidelines

Information provision plays a central part in adaptation policy across countries. Many governments have funded research on the impacts of climate change and have established arrangements to disseminate information. Governments also provide guidelines for households, businesses and other organisations to manage climate change risks and impacts. In a number of OECD countries, governments primarily facilitate adaptation by providing information on climate risks, typically through web-based information portals. This is often accompanied by resources and guidance for identifying, evaluating and mitigating these risks (OECD 2012).

In most cases, research on the impacts of climate change is undertaken by a central government agency. For example, detailed research on climate change impacts, projections of climate-related variables and detailed mapping of these has been coordinated and funded in the United Kingdom by the Department of Environment, Food and Rural Affairs (DEFRA 2011f), and in Canada by Environment Canada and Natural Resources Canada (CCCSN 2011; Lemmen et al. 2008).

In the United States, a number of government research organisations focus on climate change. At the federal level, both the National Oceanic and Atmospheric Administration and the National Aeronautics and Space Administration conduct climate observation, data analysis and climate projections, as well as research climate change impacts (NASA 2011; NOAA 2011). Additional climate change information is provided by the Global Change Research Program, which undertakes and coordinates research on climate science and impacts across a number of Federal Government agencies. Every four years this program conducts assessments of the impact of climate change on natural and human systems. The next assessment, due in 2013, will also report on adaptation progress (USGCRP 2011).

State governments also provide climate information and mapping in the United States. For example, the Government of California disseminates information and maps on natural hazards, including projections of climate change impacts at local scales (California Energy Commission 2011).

Along with research, governments provide resources and guidelines to support adaptation. These often include advice on identifying climate change impacts, guidelines for risk management and strategic planning, case studies and adaptation options. For example, the European Climate Adaptation Platform website (maintained by the European Commission) compiles information on expected climate change impacts and the vulnerability of specific regions, along with adaptation strategies and planning tools (EC 2012). The New Zealand Government

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provides an online Climate Change Adaptation Toolbox for identifying and responding to climate-related risks (NZ Ministry of Agriculture and Forestry 2010).

In the United Kingdom, a number of resources are made available through the Climate Impacts Programme (box C.4), which are to be supplemented in future by further resources provided by the UK Environment Agency (2012). More broadly, environmental research and adaptation resources are provided in the United Kingdom through the Living With Environmental Change Partnership, a collaboration between several public-sector organisations (including government agencies, local governments and research councils) (LWEC 2011).

#### **Box C.4 Tools provided by the UK Climate Impacts Programme**

The UK Climate Impacts Programme provides resources and tools to assist local governments, businesses and others to adapt to climate change. These include:

- *Adaptation Wizard* — a tool that can be used to assess exposure to weather events and climate change, the risks of key climate change impacts, and various options to address these. Such options include bearing losses, spreading risks through insurance, reducing exposure to hazards and exploiting new opportunities
- *AdOpt* — guidelines for identifying and selecting adaptation options. These favour a flexible approach for dealing with uncertainty by identifying options to delay some decisions until better information is available. Types of options are also set out, including ‘no regrets’ strategies (that have benefits regardless of climate change) and flexible or incremental measures
- *Costing the Impacts of Climate Change* — a methodology to estimate the costs of climate change impacts and adaptation measures. This includes guidance for valuing social and environmental impacts and assessing the value of options that allow decisions to be delayed, as well as detailed case studies covering crops, road maintenance, and the overheating and flooding of dwellings.

*Source:* UKCIP (2011).

### **Incorporating adaptation in government processes**

Several governments have introduced processes to consider climate change in their operations. In some cases, this has been through planning processes at the departmental or agency level and/or the use of explicit adaptation guidelines.

Government departments and agencies must develop adaptation plans in both the United Kingdom and United States (at the federal level). These involve identifying the risks that climate change may have for the operations of each agency — including the provision of infrastructure and services — and implementing

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strategies to manage those risks, such as considering climate change in procurement decisions or undertaking further risk assessments (DEFRA 2011d; ICCATF 2011).

In the United States, this process is supported by the Interagency Climate Change Adaptation Task Force, which recommends changes to government policies and programs to facilitate adaptation (ICCATF 2011). The Task Force has compiled a set of ‘guiding principles’ for adaptation (box C.5).

**Box C.5 US Interagency Task Force ‘guiding principles’**

The US Interagency Climate Change Adaptation Task Force has developed a set of principles to guide activities by Federal Government agencies to facilitate adaptation.

- Adopt integrated approaches — integrate adaptation into core policies and programs where possible.
- Prioritise the most vulnerable — give priority to people, places and infrastructure that are most vulnerable to the impacts of climate change.
- Use the best-available science — use the best-available scientific understanding of climate change risks and impacts.
- Build strong partnerships — coordinate across sectors and scales, and build on the existing efforts and knowledge of public and private stakeholders.
- Apply risk-management methods and tools — incorporate risk management methods and tools into adaptation planning.
- Apply ecosystem-based approaches — take into account strategies to increase ecosystem resilience and protect ecosystem services.
- Maximise mutual benefits — use strategies that complement or support other climate and environmental initiatives (such as those to improve disaster preparedness or promote sustainable resource management).
- Continuously evaluate performance — use measurable goals and performance metrics to continually assess whether desired outcomes are being achieved.

*Source:* ICCATF (2011).

More broadly, under the Adaptation Reporting Power in the United Kingdom, some government-owned companies and statutory authorities — as well as some private companies — must report on the current and predicted impacts of climate change on their functions, and their approach for adapting to these impacts (DEFRA 2011b). This requirement covers most large utilities and their regulators, including water providers, electricity generators and distributors, gas distributors, and transport infrastructure operators (airports, ports, road and rail). According to the UK Government, reports submitted to date show that these organisations are assessing the risks of climate change and many are taking steps to manage those risks. The

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reporting process also helped to identify several informational, technical, financial and regulatory barriers to adaptation (DEFRA 2012a).

Further, the United Kingdom has produced specific guidelines for the consideration of climate change impacts in government policy and project decisions (box C.6) (as part of broader guidelines that generally must be considered in all government expenditure and policy decisions). These guidelines outline ways to deal with uncertainty and increase the flexibility of policies and projects. An additional guide has been produced to assist government agencies to incorporate climate-related risks into procurement decisions and minimise these risks over the lifetime of long-lived assets (OGC and DEFRA 2010).

#### **Box C.6 ‘Green Book’ guidance in the United Kingdom**

In the United Kingdom, government policies and projects must undergo economic assessment according to the Green Book. This includes guidelines for addressing the risks of climate change for long-lived projects that may be affected by weather and climate. The guidelines set out three broad strategies to deal with uncertainty about future climate change.

- Incorporating flexibility in an activity, such as by allowing for future adjustments.
- Designing an activity to tolerate a wider range of climatic conditions.
- Using measures that have relatively low costs but large benefits (‘low regrets’) or that reduce climate risks as well as having wider benefits (‘win win’).

The guidelines identify ways that adaptation measures can be flexible, including by:

- addressing market failures and providing incentives for effective adaptation (through changes to regulatory instruments and the use of market-based instruments)
- providing information to inform decisions by individuals and organisations
- bearing losses and managing impacts where the costs of preventing a risk exceed the benefits
- spreading risks, such as through diversification, insurance and ensuring that contracts accurately reflect risks
- preventing losses or reducing their consequences — for example, using engineering methods, the choice of location, or regulatory instruments (such as standards)
- exploiting opportunities that arise from positive effects of climate change.

The guidelines also recommend the use of ‘real options’ or flexible management approaches by designing activities with the flexibility to be adjusted in the future when more information about climate change becomes available.

*Source:* HM Treasury (2009).

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Approaches in other countries vary. For example, in Canada, the provincial governments of Alberta, Manitoba and Saskatchewan have formed the Prairies Regional Adaptation Collaborative to incorporate climate change considerations into their water, drought and ecosystem policies (PARC nd). In Europe, government agencies and other organisations have collaborated to research the impacts of climate change and options for managing these impacts (EC 2010b). In New Zealand, the central government provides guidelines for local governments on ways to assess and manage climate change impacts. These guidelines cover the provision of services and planning activities, and the management of coastal hazards and flood risks (NZ Ministry for the Environment 2008a, 2008b, 2010). In addition, climate change risks must be taken into account in coastal planning and freshwater management in New Zealand.