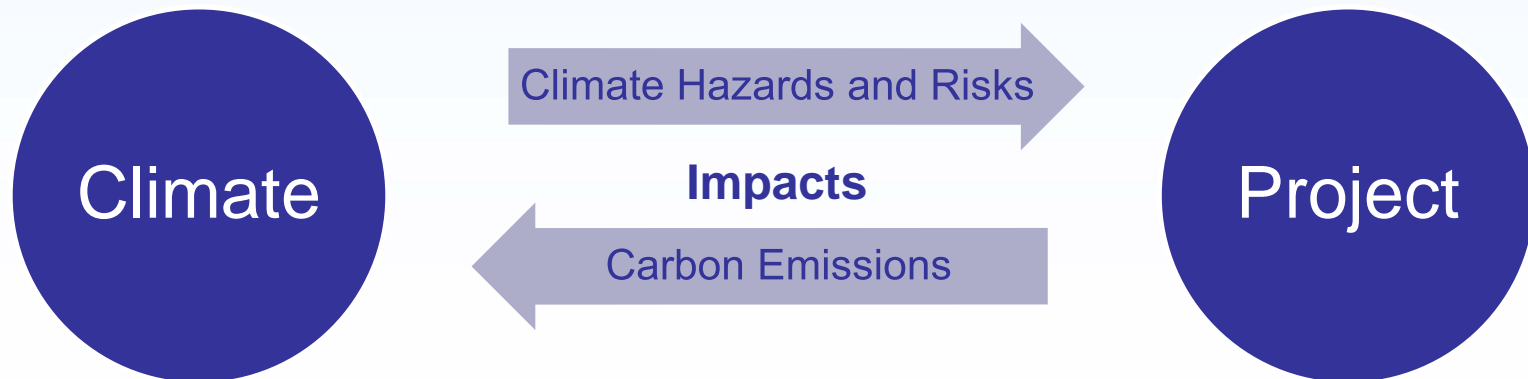


Integrating Climate Change Considerations into Project Development

Ljubljana, 11 September 2017

Adaptation vs Mitigation

- There are two main components in dealing with climate change: mitigation and adaptation. **Mitigation** is about dealing with the causes of climate change, by reducing greenhouse gas emissions (GHGs). **Adaptation** is about dealing with the inevitable consequences of climate change and attempting to lower the risks.



Integration into Project Development

- Climate change considerations (adaptation and mitigation) need to be an integral part of the overall project development cycle.
- It is not just an add-on in one stage of the process.
- It is not just a report or a permit.

Integration into Project Development

Outline of the integration of climate change requirements into the development stages of major projects

Project development cycle

Strategy

- Programming (B.4)
- Sector strategies ((B.4)
- Environment and climate change policy (F.1, F.8.1)
- Strategic site and technology selection (D.3, F.8)
- Pre-feasibility studies
- Business Model Development
- SEA (F.2)

Feasibility

- Demand analysis (D.1)
- Option Analysis (D.2, F.8)
- Feasibility studies (D.3, F.8)
- Site selection (D.3, F.8)
- Technology (D.3, F.8)
- Conceptual design (B.3)
- Financial analysis (E.1)
- Economic analysis (E.2)
- Risk and sensitivity (E.3)
- EIA Screening (F.3, F.8)
- CBA (E.2)

Design

- Main/Final Design (B.3)
- EIA (F.3) + (F.4-7)
- Development consent (F.3)

Procure/build

- Timetable, main categories of work (H.1)
- Project maturity, public procurement (H.2)

Operate

- Asset management
- Operation & maintenance
- Monitoring and control

Decommission

- Decommissioning
- End of asset life

Adaptation - vulnerability and risk assessment - enhancing the resilience to the adverse impacts of climate change

Strategy

- Strategic climate vulnerability screening - using the same principal steps as for the detailed vulnerability and risk assessment

Feasibility, Design

- Vulnerability and risk assessment as outlined in this fact sheet
- Option analysis, climate risk and adaptation (F.8.2, D.2.1-2)
- Measures ensuring resilience to current/future climate (F.8.3)
- Technical aspects e.g. location and design (B.3, D.3.2)
- Environment and climate change aspects (D.3.3, F.1.1)
- Economic analysis (E.2.1)
- Risk assessment and sensitivity analysis (E.3.1-4)

Construction, operation, decommission

- Implementation of adaptation measures in construction and operation
- Monitoring of critical climate hazards
- Regular review of the climate hazards (which may change over time) updating of the risk assessment, review of the structural and non-structural adaptation measures, and reporting to the project owner and other as required

Mitigation - reducing the emission of greenhouse gas - EIB Carbon Footprint methodology and carbon shadow prices in CBA

Strategy

- Link to climate policy and GHG emission targets
- Less carbon intensive solutions in planning

Feasibility, Design

- EIB Carbon Footprint methodology, CO₂ shadow prices (E.2)
- Contribution to climate targets in EU2020 Strategy including the national targets of the Efforts Sharing Decision (F.8.1)
- Consideration of less carbon intensive options (F.8.2, D.3)
- Environment and other aspects (D.3.3, D.3.4, F.1.1)
- Economic analysis (E.2.1)

Construction, operation, decommission

- Reduction of GHG emissions in construction and operation
- Verification of actual GHG emissions

The text in brackets, e.g. (B.4) refer to the corresponding section in 'Format for submission of the information on a major project', Annex II, Commission Implementing Regulation (EU) 2015/207. The diagram is indicative and entails some flexibility as to when certain activities should be undertaken in the project cycle.

Integration into Project Development

Project Development Cycle – Feasibility Studies – Option Analysis

Climate Change Adaptation

- Relative vulnerability of options - assess whether one option is more or less vulnerable than another option.
- Relative sensitivity of technical options.
- Relative exposure of location options.
- Based on expert judgement and understanding of current and future climate

Climate Change Mitigation

- Carbon footprint of each project alternative / option calculated and these figures used in the assessment of options

Integration into Project Development

Project Development Cycle – Design

Climate Change Adaptation

- Full Risk Assessment for all vulnerabilities – assessing probability and severity
- Part of an overall Risk Assessment
- Based on expert judgement and sound data regarding current and future climate
- Integration of adaptation measures into design and operation
- Reduce risk to acceptable level

Climate Change Mitigation

- Attempt to reduce GHG emissions through design
- Carbon footprint of final technical solution
- Using shadow price of carbon, monetise emissions and include in the CBA

Integration into Project Development

Project Development Cycle – Implementation

Climate Change Adaptation

- Implementation of adaptation measures during construction and operation
- Monitor changes in climate
- Review effectiveness of measures
- Manage risks

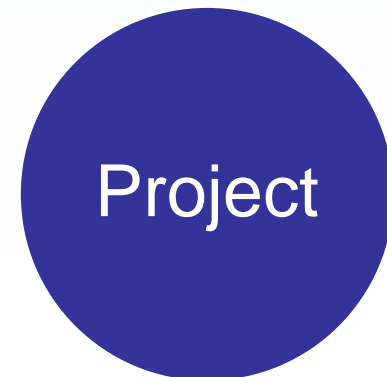
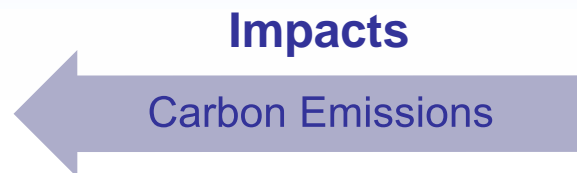
Climate Change Mitigation

- Attempt to reduce GHG emissions during construction and operation
- Verification of ex-ante carbon footprint with actual emissions figures

Climate Change Mitigation

Evaluation of GHG emissions – Carbon Footprint

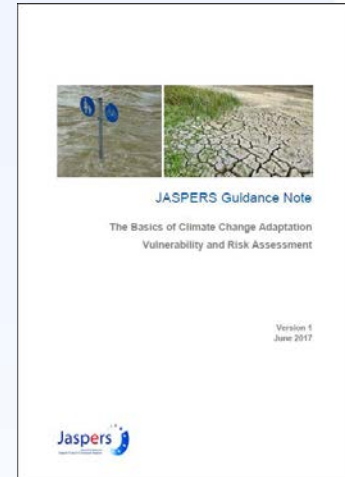
- EIB Methodologies “*European Investment Bank Induced GHG Footprint – Methodologies for the Assessment of Project GHG Emissions and Emission Variations, Version 10.1*”, EIB, April 2014
- Assessment of absolute and relative GHG emissions
- All 7 GHGs under Kyoto Protocol
- An average year of operation



Climate Change Adaptation

Vulnerability and Risk Assessment

- Process of managing climate risks
- Involves identifying which climate hazards the project is vulnerable to, assessing the level of risk and integrate adaptation measures to reduce that risk to an acceptable level.
- Based on sound data and forecasts
- Cover current climate variability and future climate change
- Ensure climate risks considered as part of general risk assessment



Case Study Examples

Polish Roads Projects

Network of high-class roads (motorways and expressways)



Motorways

1660,55 km out of 2027,15 km completed (81.9%)
56,8 km under construction
18,1 km in tender
2x2, 2x3



Expressways

1506,00 km out of 5765,9 km completed (28.3%)
1091,6 km under construction
504,1 km in tender
2x3, 2x2, 2x1(rare), 2+1

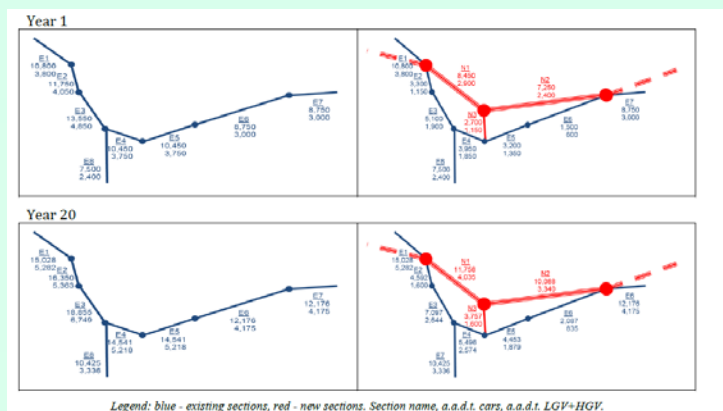
other roads managed by GDDKiA:
about 15,500 km

under construction
under operation



Climate Change Mitigation

- Calculation of GHG emissions (carbon footprint) and economic impact included in Polish National **Cost Benefit Analysis (CBA) Guide for Roads** – The Blue Book.
- Incremental emissions calculated on the basis of **traffic models**.
- Inclusion of national CO2 emission factors.
- National CBA guidelines prepared with JASPERS support
- Consistent with EIB Carbon Footprint Methodology.



Climate Change Adaptation

- Undertaking **Vulnerability and Risk Assessment** as part of **Feasibility Studies**
- Based on data and forecasts from **KLIMADA**:
 - National research project “Development of a strategic adaptation plan for sectors and areas vulnerable to climate change”. Includes assessment of different weather hazards and forecasted climate change impacts on road sector. (<http://klimada.mos.gov.pl/>)
- Assessments undertaken by **in-house multidisciplinary team**.
- Main risks – frost, snow, rain, wind, heat, fog – assessed **in overall project risk assessment**.
- New Climate Adaptation Study launched – data gathering and analysis of operations.
- Continuous cooperation and exchange with JASPERS. Increased awareness from EU requirement to good project practice.



Croatia – Pelješac Bridge Project

The transport connection of the separate territory of the Republic of Croatia with the rest of the country and, in turn, the EU – Pelješac bridge with connecting roads



Climate Change Adaptation

CCA considered in **option analysis** - high level risk assessment of each strategic option.

At detailed design, as **part of feasibility study**, full climate change vulnerability and risk assessment undertaken by project team, in **cooperation** with operator, designer and consultant.

Main risks – increase in extreme temperatures, increase in rainfall, increase in wind speeds, sea level rise, water availability and storms.

Adaptation measures integrated into design and operation / maintenance.

Climate Change Mitigation

GHG emissions of each option calculated and considered in **option analysis**.

GHG emissions and associated benefits included in project **CBA**.

The project is expected to result in an increase in absolute emissions over its lifetime although a **relative decrease in emissions** compared to a reasonable project alternative.

Slovak Transport Projects

Network of high-class roads (motorways and expressways) and rail infrastructure across the country.

Experience of Climate Change considerations in rail projects:

- V Rail corridor - Žilina – Košice – Čierna nad Tisou state border (Feasibility study)
- IV Rail corridor - state border CZ/SR – Kúty – Bratislava – Nové Zámky - Štúrovo/Komárno – state border SR/HU (Feasibility study)
- V Rail corridor - Modernization „Púchov – Považská Teplá“ (project)

Experience also in Roads projects.



Climate Change Mitigation

- Calculation of GHG emissions (carbon footprint) and economic impact included CBA of projects.
- Incremental emissions calculated on the basis of **traffic models**. (*Most current Traffic Models already include a module for the calculation of CO2 emissions both at the level of projects corridor or area (for plans)*) .
- Consistent with EIB Carbon Footprint Methodology.
- Same methodology (based on use of traffic models) used to assess GHG emissions in spatial / transport planning to assess strategic options effectiveness.



Climate Change Adaptation

- Commitment in Operational Programme (OP Integrated Infrastructure 2014 - 2020) to duly consider adaptation to climate change and disaster risk prevention.
- Development of a **national methodology** for considering climate change risks within infrastructural planning and project preparation.
- Experience on several projects, identifying and assessing risks as part of feasibility study.
- Phase II – feed project experience back into methodology (for transport sector), development of **practical tool**, binding for project developers, establishing steering board of experts (inc. JASPERS)



Croatian Water Projects

Several projects of water supply and waste water management, applying same methodology of vulnerability and risk assessment embedded into feasibility studies and carbon footprinting included in CBA. Experience from two projects specifically:

- Major Waste Water and Water Supply Project Island Krk
- Cres-Lošinj Water – Wastewater Project

Climate Change Adaptation

CCA considered in option analysis and as part of feasibility study, full climate change vulnerability and risk assessment undertaken by project team.

Methodology based on DG CLIMA non-paper guidelines. Difficulties in quantification of risk.

Main risks – **higher temperatures, lower precipitation** affecting water supply. Sea level rise / saline intrusion risk for coastal projects.

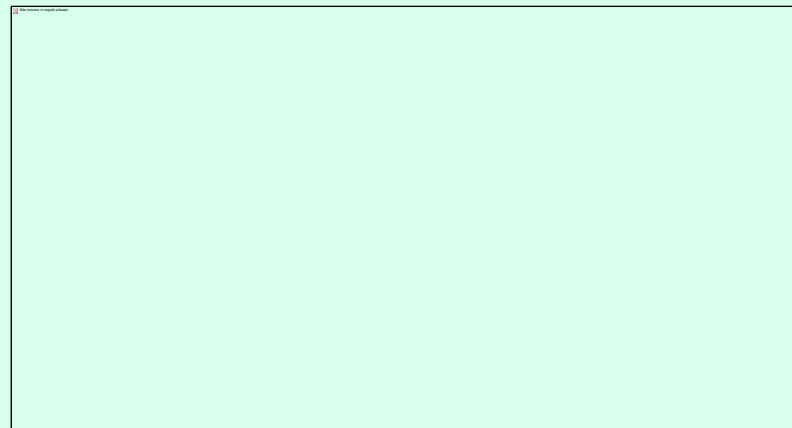
Adaptation measures integrated into design and operation / maintenance.

CCA can be a driver / **justification** for projects.
More to be done at planning level.

Climate Change Mitigation

Greenhouse gas emissions and associated benefits included in project **Cost Benefit Analysis**.

In line with EIB methodology.



UK – Phase One High Speed 2 Rail Project

High Speed Two (HS2) is a new railway network proposed by the UK Government to provide a new link between London, the West Midlands, the East Midlands, South Yorkshire, Leeds and Manchester. Phase One of the proposed HS2 rail network, comprises the first section between London and the West Midlands. The **EIA Environmental Statement** sets out the Proposed Scheme and its likely significant environmental effects.



Climate Change Adaptation

High level climate change risk and resilience assessment undertaken at **interim preliminary design stage**, using UK Climate Projections 2009 (UKCP09). Detailed Flood Risk Assessment carried out. Further detailed review of potential climate change related risks will be an ongoing process throughout the future **design, construction, operation and maintenance stages** and related resilience measures will be reviewed accordingly.

EIA has considered how **climate change, in combination with the impacts** of the Proposed Scheme, may affect communities, business and the natural, historic and built environment.

Climate Change Mitigation

Carbon Footprints calculated in **construction and operation** phases.

Construction – assessed 3 different scenarios, assessed for each construction type and included embedded carbon, transport, labour and plant.

Operation – included 2 project scenarios and covered train operation, train maintenance, station operation, tunnel fans, tree planting, mode shift and released capacity for freight.

Climate Change Mitigation

Other Carbon Footprint Methodologies:

- e.g. ADEME – The French Environment and Energy Management Agency – Carbon Footprint Methodology and Sector Guidelines – covers construction phase as well as operation.

GHG reduction and Sustainability:

Infrastructure Projects:

- Sustainability Assessment, rating and awards scheme – CEEQUAL www.ceequal.com
- Institution of Civil Engineers (ICE) Carbon Reduction in Infrastructure - <https://www.ice.org.uk/knowledge-and-resources/best-practice/low-carbon>

Buildings and Urban Projects:

- BREEAM communities <http://www.breeam.com/communities> and refurbishment and fit out <http://www.breeam.com/refurbishment-and-fit-out> (covering both mitigation and adaptation.

Climate Change Adaptation

Climate Data Services:

- Copernicus Climate Services – provide data related to climate change impacts on the infrastructure sector - <https://climate.copernicus.eu/resources/information-service/climate-change-impact-infrastructure-sector>

UK Guidance:

- Infrastructure, engineering and climate change adaptation – <https://www.gov.uk/government/publications/infrastructure-engineering-and-climate-change-adaptation-ensuring-services-in-an-uncertain-future>

Buildings and Urban Projects:

- BREEAM Climate Change and buildings
<http://www.breeam.com/filelibrary/Briefing%20Papers/98689-BREEAM-Resilience-Briefing-Note-v6.pdf>
- CEDR (Conference of European Directors of Roads) Climate Change Adaptation Working Group:
http://www.cedr.fr/home/fileadmin/user_upload/Publications/2013/T16_Climate_change.pdf

Further Guidance Documents

**Climate Change and Major Projects in the 2014-2020 Programming Period:
Framework of Available Guidance**

Overview of Requirements for Addressing Climate Change in Major Projects

DG CLIMA - Publication on Climate Change and Major Projects
[Click link](#)

This 16 page publication released by DG Climate Action in 2016, provides Major Projects developers with an outline of the climate change related requirements and guidance for major projects in the 2014-2020 programming period. This fact sheet is first and foremost intended for those involved in the various development stages of major projects. However, the methodology presented is not limited to major projects: it has a broader scope and can be usefully applied for a wider range of projects.

JASPERS Guidance – Compilation of Climate Change Related Requirements – V.1
[Click link](#)

This 3 page document from JASPERS summarises the climate change related requirements for Major Projects that come from the hierarchy of legislation (see below) and provides some guidance as to what those requirements mean for projects. This document is intended as an initial overview of the requirements, summarised into contribution to policy objectives, mitigation and greenhouse gases, and adaptation and resilience. This is then further supported by more in-depth guidance documents describing how these requirements should be met.

Contribution of the Project to Climate Change Policy Objectives

Commission Implementing Regulation (EU) No 215/2014
[Click link](#)

In order to adopt a common methodology for determining the level of support for climate change objectives from each of the five ESI Funds, the Commission established weightings to be applied to each category of investment. These weightings are either 0%, 40% or 100% according to the intervention code(s) for the project. The standard weightings should be used to ensure a harmonised approach to tracking climate change related expenditure. The intervention codes and weightings are set out in CIR No 215/2014 (specifically Article 1.3 and Annex I).

EU 2020 Strategy
[Click link](#)

Europe 2020 is the EU's growth strategy for the coming decade. It sets out 3 targets relevant to climate change, related to the reduction of greenhouse gases, increasing the share of energy from renewables and increasing energy efficiency. Country-specific targets can be found on the European Semester website ([link](#)).

National / Regional Climate Change Adaptation Strategies
[Click link](#)

The most up-to-date versions of National and/or Regional Climate Change Adaptation Strategies can be obtained from the national authorities responsible for their production. In addition the European Climate Adaptation Platform Climate-ADAPT has information about adaptation policies, impacts and vulnerabilities from the local to transnational level. For more information see the Climate-ADAPT website ([link](#)).

Mitigation and Greenhouse Gases

EIB – Methodologies for the Assessment of Project GHG Emission Variations – V10.1, 2014
[Click link](#)

EIB Project Carbon Footprint Methodologies presents a detailed approach to calculating the GHG emissions of projects. The EIB methodology is the recommended methodology to follow.

JASPERS Working Paper – Calculation of GHG Emissions in Waste and Waste-to-Energy Projects 2013
[Click link](#)

The paper describes a methodology for the quantification of GHG emissions in projects developing individual facilities or groups of facilities for municipal waste management.

Adaptation and Resilience

JASPERS Working Paper – The Basics of Climate Change Adaptation Vulnerability and Risk Assessment – V.1
[Click link](#)

This JASPERS Working Paper provides advice about the basic principles of Climate Change Adaptation Vulnerability and Risk Assessment for projects and what is expected in good practice.

DG CLIMA – Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient
[Click link](#)

The DG CLIMA "non-paper" sets out a detailed methodology for Climate Change Adaptation Vulnerability and Risk Assessment and provides guidance as to how this can be undertaken.

EUHWACC – Integrating Climate Change Information and Adaptation in Project Development
[Click link](#)

This note has emerged as a result of the experience of practitioners and provides lessons learnt with regard to integrating climate change adaptation considerations into the development of projects.

Other Related Documents

DG REGIO – Guide to Cost Benefit Analysis of Investment Projects
[Click link](#)

The DG REGIO CBA Guide provides practical guidance on Cost Benefit Analysis for Major Projects. It illustrates common principles and rules for application of the CBA approach into the practice of different sectors. It also includes references to climate change mitigation and adaptation and how they can be considered in CBA.

DG ENV – Guidance on Integrating Climate Change and Biodiversity in SEA
[Click link](#)

Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment ('Strategic Environmental Assessment' – 'SEA Directive') requires certain public plans and programmes to undergo an environmental assessment before they are adopted. The aim of this Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment is to improve the consideration of these issues in strategic environmental assessments (SEAs) carried out across the EU Member States.

DG ENV – Guidance on Integrating Climate Change and Biodiversity in EIA
[Click link](#)

The Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, produced by DG Environment in 2013, aims to help Member States improve the way in which climate change and biodiversity are integrated in Environmental Impact Assessments (EIAs) carried out across the EU.

Selected References from the Legal Basis

Common Provisions Regulation (EU) No 1303/2013
[Click link](#)

Commission Delegated Regulation (EU) No 480/2014
[Click link](#)

Commission Implementing Regulation (EU) No 1011/2014
[Click link](#)

Commission Implementing Regulation (EU) No 2015/207
[Click link](#)

Framework of Available Guidance Documents (not exhaustive)

Includes Guidance from various sources – European Commission, EIB, JASPERS, etc.

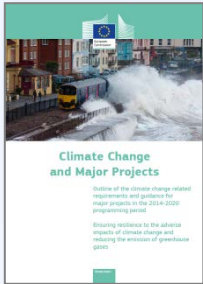
Links to selected references from the legal basis

Two new Guidance Documents from JASPERS:

Compilation of Climate Change Related Requirements

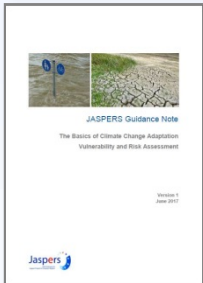
The Basics of Climate Change Adaptation Vulnerability and Risk Assessment

Further Guidance Documents



DG Climate Action – Climate Change and Major Projects

https://ec.europa.eu/clima/sites/clima/files/docs/major_projects_en.pdf



JASPERS Guidance – The Basics of Climate Change Adaptation Vulnerability and Risk Assessment

<http://www.jaspersnetwork.org/plugins/servlet/documentRepository/displayDocumentDetails?documentId=381>



DG Climate Action – Non-Paper – Guidelines for Project Managers – Making Vulnerable Investments Climate Resilient

http://ec.europa.eu/clima/policies/adaptation/what/docs/non_paper_guidelines_project_managers_en.pdf



EUFIWACC – Integration of Climate Change Information and Adaptation in Project Development

https://ec.europa.eu/clima/publications/docs/integrating_climate_change_en.pdf



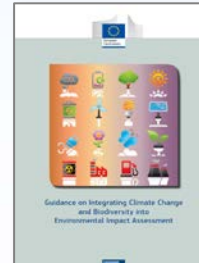
EIB Carbon Footprint Methodologies

http://www.eib.org/attachments/strategies/eib_project_carbon_footprint_methodologies_en.pdf



DG Regional Policy – Guide to Cost Benefit Analysis of Investment Projects

http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/cba_guide.pdf



DG Environment – Guidance on Integrating Climate Change and Biodiversity in EIA

<http://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf>



DG Environment – Guidance on Integrating Climate Change and Biodiversity in SEA

<http://ec.europa.eu/environment/eia/pdf/SEA%20Guidance.pdf>

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JASPERS Website:

<http://www.jaspers-europa-info.org/>

JASPERS Networking Platform

<http://www.jaspersnetwork.org/>