European Commission

Integrating the environment and climate change into EU international cooperation and development: Towards sustainable development

SECTOR NOTE: ENERGY





This sector note has been prepared to complement the European Commission (EC) Guidelines on *Integrating the environment and climate change into EU international cooperation and development: Towards sustainable development* (EC, 2016a; hereafter referred to as 'the Guidelines'). It provides specific guidance for actions in the energy sector. The Guidelines and other mainstreaming tools are available on Capacity4Dev.

Part 1: Policy basis

A growing body of evidence points to the importance of the energy sector in economic growth and poverty alleviation. The United Nations Sustainable Energy for All (SE4All) initiative launched in 2011 recognises energy as central to social and economic well-being. More work is needed to ensure universal access to affordable, reliable, sustainable and modern energy, avoiding the drawbacks of conventional energy sources and reduced negative impacts on human and environmental health.

At the global level, the European Union (EU) has made strong commitments to supporting the implementation of both the **2030 Agenda for Sustainable Development** (UN, 2015) and the **Paris Agreement on Climate Change** (UNFCCC, 2015), adopted in 2015. Achieving their objectives demands a radical acceleration of environment and climate change mainstreaming into development policies, plans and programmes.

The 2030 Agenda is a commitment by world leaders to balance economic, social and environmental objectives. It puts environmental sustainability and climate change at the heart of development. Mainstreaming environment and climate change into energy sector development is essential to achieving many of the Sustainable Development Goals (SDGs), particularly the following.

- **Goal 7 — Affordable and clean energy.** Mainstreaming supports the targets associated with substantially increasing the share of renewable energy in the global energy mix (Target 7.2), doubling the global rate in improvement of energy

'Doubling the share of renewable energy by 2030 could deliver around half of the required emissions reductions and, coupled with energy efficiency, keep the average rise in global temperatures below 2°C and prevent catastrophic climate change'.

— IRENA, 2015B

efficiency (Target 7.3), facilitating access to clean energy research and technology (Target 7.a), and expanding infrastructure for supplying modern and sustainable energy services (Target 7.b).

- **Goal 12 — Responsible consumption and production.** Mainstreaming in the energy sector can contribute to achieving sustainable management and efficient use of natural resources (Target 12.2), and rationalising inefficient fossil fuel subsidies which encourage wasteful consumption (Target 12.c).

- **Goal 13 — Climate action.** Moving towards low-carbon energy systems and improving energy efficiency is crucial to achieving climate change mitigation objectives.

Mainstreaming environment and climate change in the energy sector can also contribute to **Goal 9 — Industry, innovation and infrastructure**; **Goal 11 — Sustainable cities and communities**; and **Goal 15 — Life on land**.

The Paris Agreement on Climate Change, adopted in the context of the United Nations Framework Convention on Climate Change (UNFCCC), is the first-ever universal, legally binding global climate agreement. It outlines a strong shared vision and ambition to combat climate change and undertake actions and investment that promote low-carbon, resilient and sustainable development. Mainstreaming environment and climate change into energy sector development contributes to the achievement of the agreement, as sector activities — specifically, the extraction and burning of fossil fuels and the unsustainable use of biomass fuels in many countries, with its concomitant deforestation — are by far the largest source of greenhouse gas (GHG) emissions. The sector is also key to climate change adaptation, as energy systems and infrastructure need to be climate-proofed, and improved access to energy services can make a significant contribution to the resilience of both individuals and economic systems.

Most developing countries have identified energy as a key sector for implementation of their intended nationally determined contributions (INDCs; C2ES, 2015). These INDCs are a central feature of the Paris Agreement and become nationally determined contributions (NDCs) upon country ratification of the agreement. The enhancement of energy efficiency across key economic sectors, the adoption of clean energy technologies to reduce reliance on woodfuels, and/or the shift to renewable energies to decrease dependence on imported fossil fuels feature prominently in developing country (I)NDCs. Some countries also identify increased access to energy as a means of adaptation and vulnerability reduction.

At the EU level, providing access to sustainable energy and addressing climate change are at the heart of the 'Proposal for a new European consensus on development: Our world, our dignity, our future' (EC, 2016b), which recognises that

> Access to sustainable and affordable energy and tackling climate change are two challenges to be addressed in close coordination to achieve sustainable development in its three dimensions. Developing countries need energy to promote inclusive growth and further improve standards of living in an environmentally friendly manner.

The EC proposes that

> The EU and its Member States will increase cooperation with all relevant parties, including the private

DID YOU KNOW THAT...?

The energy sector is the largest source of GHG emissions, accounting for more than two-thirds of total such emissions in 2010 (IEA, 2013)

Fossil fuel consumption subsidies worldwide amounted to USD 493 billion in 2014 — over four times the value of subsidies to renewable energy (IEA, 2016)

Close to 80 % of electricity generation in East Africa is dependent on hydropower, which is highly vulnerable to climate change–induced water shortages (AFREPREN/FWD, 2009)

sector, on energy demand management, energy efficiency, renewable energy generation and clean technology development and transfer.

Two further EU commitments entail increased attention to and spending on actions related to climate change and biodiversity.

- 'A budget for Europe 2020' (EC, 2011a) stipulates that 'Climate action objectives will represent at least 20% of EU spending in the period 2014–2020'. In the energy sector, this implies a general preference for investments in renewable energy and energy efficiency. Increasing the share of the external cooperation budget dedicated to climate change–relevant actions — notably through support for access to sustainable energy and energy efficiency — is one way for the EU to contribute to the international objective of mobilising USD 100 billion per year by 2020 to help developing countries respond to climate change.

- The EU has endorsed the Hyderabad objective to 'double total biodiversity-related international financial resource flows to developing countries by 2015 compared to an agreed average from 2006–2010 and to at least maintain support at that level until 2020' (UNEP, 2014). The energy sector offers opportunities to contribute to meeting this pledge.

A variety of other **policy commitments** require an increasing focus on mainstreaming environment and climate change into energy sector interventions, including the following.

- 'EU development policy in support of inclusive growth and sustainable development: Increasing the impact of EU development policy' (EC, 2010b) recognises the importance of access to energy in lifting people out of poverty. To mitigate the attendant increase in GHG emissions, it asserts that 'sustainable development needs to be at the core of both our development and climate change policy to ensure that action to combat climate change benefits, rather than increases the risk to, the growth potential of the world's poorest citizens'.

- 'The EU energy policy: Engaging with partners beyond our borders' (EC, 2011d) makes improving access to sustainable energy for developing countries one of its priorities. It identifies energy as a key driver of poverty eradication and inclusive growth, notably in least developed countries and small island developing states.

- 'Increasing the impact of EU development policy: An agenda for change' (EC, 2011c) seeks to 'reduce developing countries' exposure to global shocks such as climate change, ecosystem and resource degradation, and volatile and escalating energy and agricultural prices, by concentrating investment in sustainable agriculture and energy'. It states that 'EU development policy should promote a 'green economy' that can generate growth, create jobs and help reduce poverty', notably by supporting energy and resource efficiency and low-carbon development.

These commitments are fully aligned with the EU's ongoing reflection on its **own energy future**, as evidenced by the Climate and Energy 2020 package (EC, 2010a), the Energy Roadmap 2050 (EC, 2011b), the 2030 Climate and Energy Policy Framework (EC, 2014) and the EU's NDC (EU, 2015b). These documents

DID YOU KNOW THAT...?

positive trends

'Bangladesh is the world's largest market for solar home systems, and other developing countries (...) are seeing rapid expansion of small-scale renewable systems, including renewables-based mini-grids, to provide electricity for people living far from the grid' (REN21, 2016)

Renewables accounted for **nearly half** of all new power generation capacity in 2014 (IEA, 2015a)

Doubling the share of renewables in the global energy mix by 2030 could save up to **USD 4.2 trillion** per year worldwide in avoided pollution costs and climate impacts — 15 times the cost of the required investment (IRENA, 2016)

emphasise the need for low-emission development strategies, sustainable energy production, efficient energy use, research and innovation on climate-friendly and clean technologies, the removal of trade and investment barriers to investment in sustainable energy, and investment in modern and adequate infrastructure to ensure a match between production and consumption. The recent Framework Strategy for a Resilient Energy Union (EC, 2015b) calls on the EU to be the world leader in developing the next generation of renewable energy technologies, and to work towards an improved global governance system for energy. The 'Road from Paris' communication (EC, 2016c) reiterates the EU's commitment to a clean energy transition, calls for the removal of fossil fuel subsidies, and stresses the importance of climate diplomacy and enhanced support to developing countries in implementing the Paris Agreement.

In line with the above policies, the EU is contributing to the **Sustainable Energy for All** (SE4ALL) initiative, whose objectives — now integrated in the SDGs — are to ensure universal access to modern energy services, double the rate of improvement in energy efficiency and double the share of renewable energy in the global energy mix by 2030. The Energising Development initiative aims to provide access to sustainable energy for an additional 500 million people in developing countries by 2030 (EC, 2012); this aim was reiterated as part of the EU contribution to the implementation of Agenda 2030 (EC, 2015a). To this end, the EU has set up a Technical Assistance Facility for SE4All, which assists partner countries in fine-tuning their energy policies and regulatory frameworks and developing their capacities to allow for increased investments in the energy sector.

The EU has also kick-started two **political initiatives** to contribute to sustainable energy as a driver of inclusive and sustainable growth: the European Union Energy Initiative and the Africa-EU Energy Partnership. Further, it has put in place **practical instruments** to facilitate of developing country access to low-carbon and climate-resilient technologies — including blending instruments and initiatives aimed at increasing the private sector participation, such as the Electrification Financing Initiative (ElectriFI).

Increasingly, the EU is using and implementing an approach based on the **water-energy-food nexus**. This approach supports cross-sectoral analysis of the complex trade-offs and synergies between food security, access to energy and water use. It also promotes a more coordinated and integrated management of natural resources across sectors and scales to manage trade-offs and exploit synergies (FAO, 2014; TAF SE4All and Atkins, 2015).

Part 2: Why mainstream?

The energy sector offers huge opportunities to cut GHG emissions, reduce environmental damage, build resilience and improve capacity to adapt to climate change.

Energy generation and use involving the extraction of fossil fuels and the unsustainable use of woodfuels is the main source of GHG emissions, and is responsible for a large part of atmospheric pollution. It also causes other forms of environmental damage — such as soil acidification, deforestation, land degradation, water pollution and loss of biodiversity; in many places, it remains a significant cause of indoor air pollution. Both outdoor and indoor air pollution cause significant health problems and premature deaths.

Addressing environmental and climate change considerations as an integral part of sector development is a prerequisite for achieving environmental sustainability and curbing climate change. In turn, maintaining environmental integrity is crucial to securing the continued availability of such forms of energy as hydroelectric power and biomass. Renewable energy production must be made resilient and able to adapt to climate change — e.g. by 'hybridising' the various sources of energy and increasing the capacity of power storage systems.

Mainstreaming environment and climate change in the energy sector also offers plenty of opportunities, notably for enhancing livelihoods and development outcomes — e.g. by supporting increased and more reliable access to energy for agricultural uses and other income-generating activities, as well as creating new employment opportunities and value chains in the green economy. Table 1 and Part 4 provide further examples of opportunities.

Table 1 **Why mainstream environment and climate change in the energy sector?**

To address environment and climate–related risks and constraints that could jeopardise achievement of the objectives of partner policies, plans and programmes supported by the EU	• **To anticipate the effects of climate change on energy generation, and ensure that partner policies, plans and programmes and investments in energy infrastructure supported by the EU are resilient to its effects** (e.g. ensuring that energy infrastructure is climate-proofed against extreme weather events and sea level rise) • **To ensure that energy infrastructure and energy supply are not threatened by environmental degradation** (e.g. ensuring that biofuel production is not threatened by land degradation and water resource depletion, and woodfuel supplies by deforestation) • **To anticipate the effects of climate change on energy demand patterns** (e.g. growing baseline and peak demand for electricity for air-conditioning systems associated with higher temperatures) • **To better assess and manage the trade-offs and synergies inherent in the water-energy-food security nexus** (e.g. competition for land and water between biofuel and food production; synergies between access to energy, which can support the pumping of water for irrigation, and food security)
To identify, avoid and mitigate any harmful impacts of EU development cooperation on the environment and climate	• **To ensure that partner policies, plans and programmes supported by the EU do not significantly increase GHG emissions, and do not cause significant environmental damage** (e.g. by promoting consideration of alternatives to fossil fuels and investment in cleaner sources of energy) • **To better assess and manage the environmental trade-offs associated with energy sector policy and specific investments** (e.g. the combustion of sustainably produced woodfuels and biofuels as a substitute for fossil fuels may help reduce net GHG emissions but not air pollution by fine particles)
To realise opportunities for longer-term benefits for socio-economic development	• To exploit the **productivity, efficiency and competitiveness gains** associated with energy efficiency measures and the implementation of some environmentally sustainable, low-carbon options (e.g. waste and by-products which can be used as bioenergy sources such as bagasse in sugar cane factories or landfill-gas-to-energy) • To enhance **rural income opportunities** associated with synergies in the water-energy-food security nexus and sustainable natural resources management (e.g. sustainable woodfuel production in the context of agroforestry plantations also supporting increased yields, livelihood diversification and long-term soil productivity) • To achieve major **gains in public health** (notably from reduced outdoor and indoor air pollution) through a transition to cleaner sources of energy • To **reduce people's vulnerability** to external shocks and threats to their lives and livelihoods (e.g. a secure energy supply which is resilient to natural disasters supports both disaster preparedness and post-disaster recovery) • To support the **creation of green jobs** (e.g. associated with the deployment and maintenance of renewable energy infrastructure, or the retrofitting of buildings for enhanced energy performance), thus contributing to the transition to a **green economy** • To leverage **carbon finance** for enhanced programme/project sustainability, outreach and impact (e.g. access to additional funding from the REDD+ (reducing emissions from deforestation and forest degradation) mechanism, the Global Environment Facility, the Green Climate Fund, etc.)
To realise opportunities contributing to EU policies on environment, climate change and biodiversity	• To increase the share of renewables and energy efficiency, thus helping reduce GHG emissions (**Paris Agreement** implementation, SDGs), curb pollution and environmental degradation and enhance access to sustainable energy (**SDGs**) • To increase developing countries' **access to green economy technology** and the **engagement of the private sector** in related infrastructure development and value chains • To contribute to **global commitments to protect biodiversity and combat desertification** (e.g. through the sustainable intensification of agriculture made possible by improved access to energy for irrigation)

Mainstreaming is defined by the EC as 'the process of systematically integrating a selected value/idea/theme into all domains of the EU development cooperation to promote specific as well as general development outcomes' (EC, 2016a). Mainstreaming involves an iterative process of change in the culture and practices of institutions, aimed at balancing environmental, economic and social objectives and contributing to sustainable development.

Table 1 presents the key reasons for mainstreaming environment and climate change into sector development; the four categories noted in the table provide a structure for presenting opportunities for mainstreaming in this guidance note. Part 4 provides concrete guidance for mainstreaming, identifying risks and opportunities associated with energy sector programmes/projects and activities, and highlighting how they can be addressed or realised.

Part 3: When and how to mainstream?

There are opportunities for mainstreaming throughout the cycle of operations. Table 2 shows entry points and mainstreaming tools and actions that can be used or taken at different stages of the cycle. Policy dialogue (Box 1) occurs at all phases as an ongoing process.

Guidance for each phase and a short explanation about the proposed tools are provided in the text below; also see the Guidelines for definitions of the tools and other key terms.

Programming

Identifying environmental and climate change risks and opportunities early on in the cycle of operations means they will be more effectively addressed, as necessary financial provisions can be made and the framework set for mainstreaming in subsequent phases.

The key elements of EU development cooperation in any given country or region are specified in the programming documents, particularly the Multiannual Indicative Programmes (MIPs) which highlight the overall and specific objectives, expected results and programming indicators in selected focal areas.

Entry point: Country situation analysis

The country situation analysis is the first entry point for mainstreaming in the programming phase. If programming has been completed, the country situation

Table 2 Mainstreaming opportunities throughout the cycle of operations

PHASE	MAINSTREAMING TOOL OR ACTION	
Programming	• Country environmental profile (CEP)	Policy dialogue/capacity development
Identification and formulation	• Environmental and climate change screening and identification of needs for a strategic environmental assessment (SEA), environmental impact assessment (EIA) or climate risk assessment • SEA • EIA • Climate risk assessment (CRA) • Rio markers	
Implementation	• Environmental management plan (EMP) • Climate risk management plan (CRMP) • Monitoring indicators • Results-oriented monitoring (ROM) missions	
Evaluation	• Evaluation indicators	

BOX 1 Policy dialogue: A key element of effective mainstreaming

Experience shows that simply applying environmental impact and assessment tools does not necessarily result in improved environmental and climate-related performance of a sector policy, programme or project, especially if they remain donor-led exercises with little or no national ownership. This is where policy dialogue comes in. Such dialogue can help partner governments and the EU reach consensus on the goals and priorities of development cooperation, and it plays a critical role in the promotion of the environment and climate change mainstreaming agenda.

Policy dialogue takes place throughout the entire cycle of operations. Because of the strong linkages between energy and other key economic sectors, policy dialogue on sustainable energy should be extended beyond the ministry in charge of energy to ministries responsible for agriculture, water and natural resources, forestry, town and country planning, transport and industry — and ideally also engage the private sector and civil society organisations. Environment and climate change should be an integral part of this dialogue, with key points raised including the following:

- **relevance of mainstreaming from a development perspective**, e.g. to raise awareness of the economic costs of environmental degradation associated with sector activities, the economic costs of insufficient integration of environmental and climate change aspects in sector development and investment, and the economic benefits associated with investment in energy efficiency and renewable energy (see Part 4 for examples);
- **need for, and value of, monitoring the sector's environmental performance and climate resilience to allow for informed decision-making**, e.g. to validate progress achieved in reducing deforestation and forest degradation, or in lowering the carbon intensity of energy supply;
- **options for mitigating negative environmental impacts on the sector** (see Part 4 for examples);
- **options for harnessing the social and economic benefits of sustainable energy strategies** (see Part 4 for examples);
- **capacity and institutional needs to enable national stakeholders to engage in these options**, e.g. with regard to the awareness and capacity of industry associations to promote energy efficiency, or the integration of sustainable energy–related skills in academic and technical/vocational education curricula;
- **reflection on lessons learned and environmental performance of the sector**, e.g. the outcomes of pilot or more advanced experiences with biofuel development, the deployment of solar home systems in rural areas and the promotion of efficient cook stoves.

Policy dialogue is most effective when backed up with evidence and information, such as data, studies and examples of previous experiences.

analysis can be updated in preparation of mid-term reviews, where they are planned, or in the preparation of future programming cycles.

Mainstreaming action: **Analyse the country environmental and climate change context.**

The analysis should provide an overview of a country's environmental and climate change issues, as well as of the related institutional, policy and regulatory framework. It should assess these vis-à-vis their relationship to poverty, look at previous and ongoing donor support, and provide recommendations for better mainstreaming. A succinct and proven tool for undertaking this analysis is the country environmental profile (CEP), which identifies and analyses key environmental and climate challenges and opportunities, and informs strategic orientations in light of these. The CEP should also cover the economic opportunities linked to improved environmental management and climate change mitigation and adaptation. Where energy is anticipated to be a focal sector, some aspects that could be addressed include the following:

- **the nature, magnitude and severity of environmental degradation caused by energy generation and use** (see Part 4 for examples);
- **the nature, magnitude and severity of impacts of environmental degradation and climate**

change on the energy sector (see Part 4 for examples);

- **the trade-offs and synergies inherent in the water-energy-food security nexus, and their implications for natural resources management** — e.g. competition for land and water resources between energy sector and agricultural and environmental uses, role of access to energy in improving food security and health;
- **the drivers of unsustainable practices** — e.g. lack of available or affordable alternatives to woodfuels for cooking;
- **obstacles to the transition to more sustainable energy systems and management practices** — e.g. fossil fuel subsidies (consumption and production) removing incentives for investment in energy efficiency and renewable energy, absence of a clear policy and legal framework and economic incentives supporting such investment, weak land use and infrastructure planning processes;
- **options available for a transition to more sustainable energy systems and management practices** — e.g. most suitable sources of renewable energy available nationally or in the broader region, areas where energy efficiency gains could be achieved at a relatively low cost or with a short payback period;
- **opportunities for achieving co-benefits from investments in energy efficiency and renewable energy** (see Part 4 for examples).

If a CEP is not available and cannot be prepared, a range of other documents can be consulted for information on a country's environmental and climate change situation. Part 5 provides a list of possible sources of information. Box 2 provides an example of CEP use in the programming phase.

BOX 2 Case study: 2014–2020 National Indicative Programme for Lesotho

Energy is one of the priority sectors for cooperation identified in the 2014–2020 National Indicative Programme (NIP) for Lesotho. The NIP envisages that the energy sector will be supported through a sector reform contract. It refers to and takes account of recommendations made in a 2012 CEP. For example, considering the severe land degradation that affects a large part of the territory, the CEP recommended that support to the energy sector include actions to reduce reliance on wood as a source of household energy and increase the supply of sustainably managed woodfuels. It also recommended supporting alignment of the upcoming Renewable Energy Policy with the National Forestry Policy, and preparing a screening for strategic environmental assessment (SEA) of the energy sector policy.

The NIP integrates these recommendations. A specific objective of support to the energy sector is 'a *more sustainable and cleaner* energy sector providing universal access to modern, affordable and reliable energy with a *reduced reliance on biomass*'. Based on a suggestion made in the CEP, the sector performance framework includes a related indicator: 'Reduced use of biomass for household consumption (cooking) — Baseline 75.6% of rural population (2010)'. Carrying out an SEA for the energy sector and adopting an indicator to monitor progress with regard to reduced reliance on biomass (or 'increased reliance on clean fuels and technology', in line with the proposed SDG indicator) are important structural measures which will ensure long-term, persistent mainstreaming of environment and climate change in EU support for Lesotho's energy sector.

Sources: EU, 2012; EU, 2014.

Entry point: Drafting the programming documents

Mainstreaming action: **Integrate environment and climate change into the Multiannual Indicative Programme.**

Based on the potential harmful effects, risks, challenges and opportunities identified earlier, the next step is to

explore how to mainstream climate change and environment into the cooperation strategy. Opportunities to avoid or mitigate environmental damage, contribute to climate change mitigation and resilience, and support the transition to a green economy should be reflected in the MIP's overall objective, specific objectives, expected results and/or indicators. Part 4 provides examples of specific measures to promote environmental sustainability and address climate change in the energy sector.

In identifying opportunities for mainstreaming, consider the following actions.

- **Develop or strengthen the policy and regulatory framework** (e.g. introduction of fiscal mechanisms to provide incentives for energy efficiency; removal of fossil fuel subsidies for both production and consumption; adoption of building standards to encourage energy-efficient buildings; adoption of long-term support schemes for renewable grid-connected energy sources to enhance the predictability of returns on investment).
- **Build capacity** of public and private sector actors and industry associations to promote/implement environmentally sustainable and climate-resilient practices (e.g. training of energy sector policymakers and planners, training of energy managers in large industries, training of energy auditors).
- **Communicate and raise awareness** (e.g. through targeted seminars as well as television and radio campaigns, for a wider audience) about the environmental and climate-related stakes and opportunities associated with improved energy efficiency and the uptake of renewables).

Mainstreaming action: **Identify the specific environment/climate change assessment tool(s) to be applied during identification and formulation and/or implementation.**

Three tools are available to analyse in detail the relationships between a programme/project and environment and climate change: strategic environmental assessment (SEA; applicable to policies and plans or to programmes and projects that provide strategic-level support), an environmental impact assessment (EIA; applicable to projects) and a climate risk assessment (CRA; applicable to projects).

A note of explanation about strategic-level projects: Often, interventions based on the project modality provide sector support at a strategic level, e.g. through the development of sector policies and plans, enhancement of the sector's institutional set-up and regulatory framework, or support for multiple infrastructure investments. In such cases, an SEA is the relevant tool for mainstreaming environment and climate change.

These tools help analyse the potential impacts of implementing a programme/project on environment and climate and on climate change vulnerability, as well as its exposure and vulnerability to the effects of environmental degradation and climate change. They also help in identifying environmentally friendly options and appropriate measures to minimise risks and impacts and to make best use of opportunities.

Based on the objectives and expected results of EU cooperation in the selected focal sectors, and taking into account the anticipated aid modalities (project and/or programme-based/strategic-level support), conduct preliminary screening in accordance with the process described in Annex 3 of the Guidelines. Either:

- include a commitment in the MIP to undertake an SEA, EIA and/or CRA; or
- if at this stage it looks like no such assessment will be required, provide a justification to this effect (e.g. the existence of a reasonably recent and up-to-date SEA carried out by the government, the EU and/or other donors).

Mainstreaming action: **Include indicators in the programming document that capture key environmental and climate change concerns.**

The United Nations has developed a detailed set of targets and indicators for the SDGs, some of which will be directly relevant for EU-supported policies, plans and programmes within the energy sector. The EC Directorate-General for International Cooperation and Development (DEVCO) has developed an EU Results Framework (EC, 2015c) as well as Sector Indicator Guidance for Programming (EC, 2013), which provides a list of indicators that can be used in each sector, including environment and climate change–relevant indicators for the energy sector. A new 'Methodological note

on budget support operations in the field of sustainable energy' (EC, forthcoming) also includes examples of indicators suitable for monitoring progress towards sustainable energy. Box 3 provides examples of indicators drawn from DEVCO practice and from the list of proposed SDG indicators.

Entry point: Policy dialogue

Mainstreaming action: Include environment and climate change in the policy dialogue agenda, and engage government and key stakeholders including civil society.

Policy dialogue is relevant throughout the programme and project cycle. A clear, simple and realistic agenda for policy dialogue that aims to advance mainstreaming in the energy sector will emerge from the country analysis and from engagement with key stakeholders at programming and at all subsequent phases as experience is gained and issues arise. In the energy sector, this engagement will include many actors, including policymakers and planners from both the energy sector and key energy-consuming sectors (see Box 1), sector regulators and specific agencies, energy utilities and companies, current and potential investors and financial service providers, as well as private sector and civil society organisations representing energy service users.

BOX 3 Examples of environment and climate change indicators for the energy sector in country programming

- Proportion of population with primary reliance on clean fuels and technology (SDG indicator)
- Renewable energy share in total final energy consumption (SDG indicator)
- Renewable energy production supported by the EU
- GWh per year produced from renewable energy sources (including imports)
- Energy intensity measured in terms of primary energy and gross domestic product
- Investments in energy efficiency as a percentage of gross domestic product (SDG indicator)
- Technical losses in power generation, transmission and distribution (measured as percentage of energy generated, transmitted and distributed)
- MWh per year saved through energy efficiency measures
- Enabling legislation and framework for renewable energy production and energy efficiency established

Identification and formulation

Mainstreaming is especially important during identification and formulation. The identification of a programme/project begins with an analysis of the situation, which should cover environmental and climate-related concerns and opportunities. Formulation fleshes out the programme/project design, which must include measures to minimise environmental impacts and climatic risks and make best use of opportunities to enhance the state of the environment and contribute to low-carbon, climate-resilient development.

Figure 1 presents a decision tree showing the sequence of decision-making for mainstreaming during this phase from problem analysis, through screening and assessment, to action formulation.

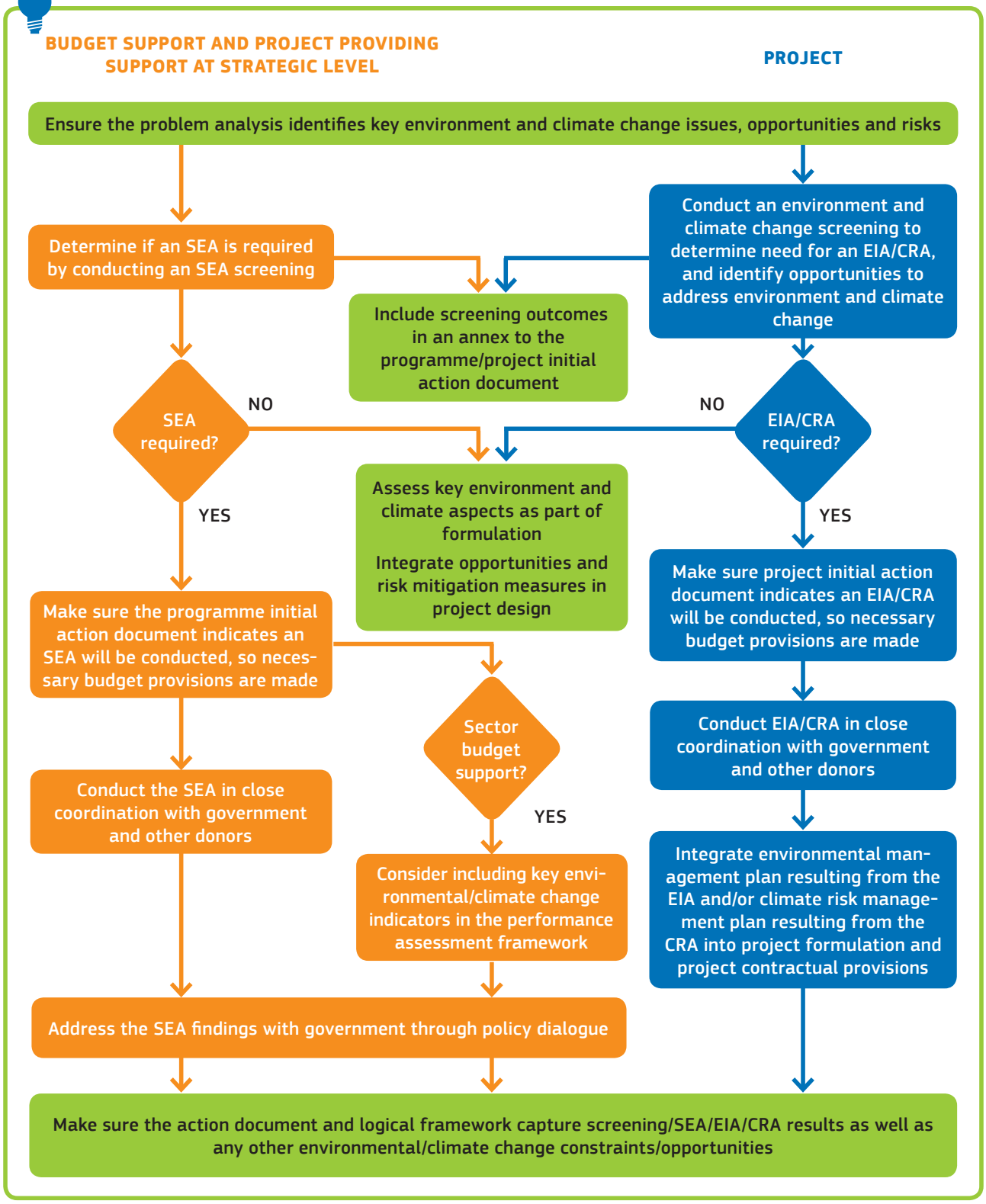
Entry point: Problem analysis

Mainstreaming action: Ensure the problem analysis identifies environment and climate change issues.

Part 4 provides some insight into the environmental and climate change risks and opportunities in the energy sector. These issues and linkages can also be identified by reviewing certain key documents.

- **Policy documents** — such as sector policies, strategies and plans for the environment, climate change, the energy sector and key energy-consuming sectors — may provide an overview of environmental and climate change challenges in the country with regard to energy. They may also include specific environmental protection and climate change adaptation/mitigation objectives or measures relevant to the sector (e.g. commitments, targets or measures

FIGURE 1 **Steps during identification and formulation**



Note: An SEA is normally required for support programmes in the energy sector.

for increasing the share of renewable energy in total energy production or consumption; improving energy efficiency; reducing pollution, forest degradation and GHG emissions).

- The **national communications to the UNFCCC** provide an overview of the country's vulnerability to climate change by sector, as well as overall and sector-specific GHG emissions. The INDCs set country objectives in the fight against climate change. Similarly, national reports to the Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD) provide overviews of important environmental issues (respectively, biodiversity and land degradation) which are closely related to energy generation and use.

See Part 5 for additional documents with useful information and analyses.

Because the identification of programmes and projects is undertaken in close coordination with the partner government, ensure that environmental and climate change aspects are addressed through policy dialogue (see Box 1). Similarly, make sure to identify and engage relevant environment and climate change–related stakeholders in programme/project identification and formulation.

Entry point: Environmental and climate change screenings and assessments

Mainstreaming action: Undertake environmental and climate change risk screenings to determine if the programme/project is environmentally or climatically sensitive, thus requiring a detailed assessment.

An environment and climate change screening is required for all actions at the identification stage.

The formulation phase involves fleshing out the programme/project as well as analysing its feasibility. Environmental and climatic factors may compromise this feasibility and thus deserve careful attention. In the case of **more environmentally and/or climatically sensitive interventions**, SEAs (for programmes or projects that provide strategic-level support) and EIAs and CRAs (for projects) can be used to help explore linkages to environment/climate change; identify appropriate measures to address them; and guide decision-making to policies or technologies that contribute to low-carbon, environmentally sustainable development.

The need for undertaking a dedicated EIA or CRA is determined by a screening process described in Annex 3 of the Guidelines. For projects, the need for an EIA is usually determined by national legislation. Screening should be carried out during the identification phase (if not before); the actual SEA, EIA and/or CRA is ideally prepared during formulation. (It may also be undertaken during implementation, with a view — especially in the case of an SEA — to improving implementation and/or informing the next phases or future policies.) If no ad hoc study is required, screening will help identify issues and opportunities to consider in the identification and formulation studies. The summary of the screening process must be submitted together with the initial action document to the quality support group. Box 4 provides an example of the use of an EIA to inform the formulation and implementation of an energy project.

Because of the strong relevance of environmental and climate change issues to energy sector development, it is highly recommended an SEA be carried out to inform the development of sector support programmes and associated projects; implementation of an EIA is generally a legal requirement for all large energy infrastructure projects.

Entry point: Preparation of the action document

Mainstreaming action: Ensure that environmental and climate change concerns and opportunities are reflected in programme/project specifications, necessary budget provisions are made and relevant indicators are included.

Environmental and climate-related considerations identified in the context of problem analysis and screening and through specific assessments need to be reflected in programme/project objectives, expected results, indicators (see Box 5 for examples of relevant indicators) and/or activities, as appropriate. For specific suggestions on opportunities for mainstreaming

BOX 4 Case study: Mount Coffee hydropower plant rehabilitation, Liberia

Mount Coffee hydropower plant, located on the Saint Paul river upstream of Monrovia, provided renewable electricity for the Liberian capital between 1967 and 1990 before being damaged in the context of the civil war. With the financial support of the European Investment Bank and other donors, it is undergoing a major rehabilitation programme aimed at re-establishing the reservoir (drained following a dam breach in 1990), replacing generating equipment and constructing two transmission lines to Monrovia.

A technical assistance grant from the EU African Infrastructure Trust Fund was used to undertake technical studies as well as environmental and social impact assessments and resettlement action plans for the power plant and the transmission lines, respectively. The impact assessment studies identified both positive and negative impacts, and suggested a range of measures to mitigate the negative ones and enhance the positive ones. Environmental and social management plans (ESMPs) were prepared to establish concrete guidelines for the safeguard measures to be put in place during construction and operation of the infrastructure.

Overall, the study on the hydropower plant found that negative impacts would be rather limited and manageable. The reservoir's size means it cannot be used to compensate for large seasonal fluctuations in rainfall and river discharge. Thus, the power plant will be operated basically as a run-of-river structure, with little impact on downstream water discharge. Surplus water (in excess of what the turbines can take) will be spilled during the wet season; during the dry season, a small residual flow will be released from the dam at a level that was calculated to maintain the river's habitat function and preserve downstream socio-economic water uses, while minimising loss in energy production.

Most of the proposed impact mitigation measures are good environmental practice for construction works and the operation of power infrastructure. These include (i) measures to protect, enhance and monitor local fisheries, which could see their productivity enhanced by up to 40% as a result of re-impoundment of the reservoir (although at the cost of lower biodiversity); and (ii) the precautionary clearing of vegetation from the reservoir area prior to re-impoundment, which will help avoid GHG emissions associated with the degradation of submerged vegetation.

The ESMP recommends re-vegetation of reservoir banks with native shrubs and trees (to reduce soil erosion and reservoir sedimentation); and, if needed, the establishment of a charcoal plantation programme and the development of alternative livelihoods (to reduce the pressure on local forests resulting from the displacement of farming and woodfuel production activities from the reservoir to new areas). ESMP provisions — including mitigation measures data sheets — have been included in tender and contractual documents. The management plan also identifies institutional requirements and responsibilities for implementation and monitoring of mitigation measures. In line with its recommendation, a panel of experts has been set up to supervise project implementation, including environmental and social impact mitigation.

One area not addressed by the study is the potential impact of climate change on rainfall patterns and the future water available for hydropower generation — an important aspect in hydropower infrastructure planning.

Sources: EU-Africa Infrastructure Trust Fund, www.eu-africa-infrastructure-tf.net; Mount Coffee Project Implementation Unit, http://mtcoffeeliberia.com; WAPP/Pöyry Energy, 2012; WAPP/Pöyry Energy, 2013.

environment and climate change which can be reflected in sector programme/project objectives and activities, see Part 4.

Even in the case of programmes and projects that do not require an SEA, EIA or CRA (either because they are less sensitive or because their scale is insufficient to justify undertaking a dedicated assessment), environment and climate change should be considered. The Guidelines (Annex 4) provide specific guidance on integrating related considerations into formulation studies.

Budget allocations for the programme/project should take into consideration any additional costs that pertain to environmental and climate change mainstreaming (e.g. for conducting further assessments as part of programme/project implementation, for implementing an environmental management plan, or for undertaking specific climate change adaptation measures).

BOX 5 Examples of environment and climate change relevant indicators for monitoring performance of sustainable energy programmes and projects

Development outcome indicators:

- Additional number of people having access to electricity and to clean cooking facilities (defined as access to clean cooking fuels and stoves, advanced biomass cook stoves and biogas systems)
- Number of solar home systems installed in areas without access to electric grids
- Renewable energy production/consumption as a proportion of total energy production/consumption multiplied by household average composition
- GWh generated from renewable energy sources (including imports)
- Percentage of population with primary reliance on clean fuels and technology
- Rate of net forest cover change (a relevant indicator in countries where woodfuel extraction is a significant cause of deforestation)
- Carbon intensity of energy supply (grammes of carbon dioxide–equivalent emissions per megajoule of total primary energy supply)
- Reduction in technical losses in power transport and distribution (in %)

Development output indicators:

- Proportion of annual wood demand that is sustainably met locally
- Status of renewable energy strategy and master plan for implementation at sub-national, national and regional levels
- Status of renewable energy and energy efficiency laws and regulations
- Status of regulation for the construction of energy-efficient buildings
- Number of buildings audited/rehabilitated for energy performance

Source: EC, forthcoming.

The tools and opportunities for mainstreaming environment and climate change in budget support programmes differ from those typically used in the case of projects. Box 6 provides a brief description of the key mainstreaming approaches available in energy sector reform contracts; Box 8 provides a concrete example.

Mainstreaming action: **Assess whether the action requires a Rio or aid to environment marker and contributes to climate change or biodiversity financing.**

On the cover page of the action document, policy markers — including Rio convention markers — must be selected to support statistical reporting by the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD). The Rio markers were developed to measure the contribution of donors to fulfilling their pledges at the Rio Conference of 1992. The EU uses Rio markers to track financial contributions to biodiversity, desertification and climate change (both mitigation and adaptation). Markers should be selected consistently and rigorously. If a theme is marked as either a significant programme/project objective (marker value = 1) or a principal programme/project objective (marker value = 2), 40 % or 100 %, respectively, of the action's budget is accounted for as relevant to the theme. Annex 8 of the Guidelines provides detailed information on Rio markers and their use.

In energy sector interventions that promote energy efficiency and/or renewable energy development, the **climate change mitigation marker** (one of the Rio markers) and the **aid to environment marker** will always be justified. Climate change mitigation is indeed part of the overarching goals of EU support in these areas — even if for a specific intervention, other objectives (such as improved access to energy or energy independence) are more prominent from the partner's perspective. A climate change adaptation marker may also be justified where the action is expected to contribute to increased resilience to climate risks and/or to adaptation services (e.g. protection or restoration of forest ecosystems). The OECD DAC's 'Indicative table to guide Rio marking by sector/sub-sector: Climate change adaptation and climate change mitigation' provides the rationale for attributing a climate marker

BOX 6 Mainstreaming in energy sector reform contracts

The selection and use of appropriate indicators comprise the main avenue for mainstreaming in budget support. Indicator selection is critical under budget support, as the sector performance assessment framework is the primary tool available to the EC to ensure the support it provides is delivering results. Considering the prominence of environmental and climate change issues associated with energy sector development and their importance in sustainability, the performance assessment framework and the criteria which determine the disbursement of variable tranches of energy sector reform contracts should always include one or more indicators that capture related concerns (see example in Box 8).

Other mainstreaming options in relation to budget support follow.

- Include discussions on the environment and climate change in sector policy dialogue, highlighting the importance of reducing climate-related risks and adverse environmental impacts and stressing the opportunities and development benefits of environmentally sustainable, climate-smart approaches to sector development (see Box 1).
- Support implementation of an SEA of the energy sector (if not yet available) to inform future policies, plans or programmes and favour low-carbon, environmentally sustainable choices. This can be done as part of the implementation of support measures that generally accompany the provision of budget support.
- Support capacity development for national stakeholders in relation to environment and climate change (also as part of support measures). For instance, assistance can be provided to build capacities for calculating the GHG emissions factor of the national power system; for assessing the cost-effectiveness of various renewable energy options, and developing a sustainable energy master plan with a renewable energy component; or for developing and implementing an energy efficiency action plan.

Further guidance on mainstreaming under budget support is provided in Section 3 of the Guidelines.

and examples of qualifying activities in various sectors, including energy (OECD DAC, n.d.).

The OECD DAC's statistical reporting directives specify that an activity arising from a national action plan linked to a Rio convention — such as national adaptation programmes of action (NAPAs), national adaptation plans (NAPs), nationally appropriate mitigation actions (NAMAs) and (I)NDCs — 'automatically qualifies as principal objective, as the Conventions provide the motivation for the design of the activity' (OECD DAC, n.d., p. 8).

Implementation

During implementation, the programme/project has to be steered and monitored to ensure it does not cause harmful environmental and climate impacts and that its results are not jeopardised by climate change or environmental degradation — and to enable appropriate remedial action to be taken as necessary. During this phase, strategic or technological options can be chosen and new activities or measures identified to further enhance positive environmental and climate impacts. New opportunities to strengthen environmental and climate-related performance will arise throughout implementation (see Box 7 for examples).

Entry point: Preparation of contractual documents

Mainstreaming action: Further integrate environmental and climate change considerations and incorporate environmental management plan/climate risk management plan and other measures into contracts/agreements.

Where substantive and sufficient mainstreaming has occurred during identification and formulation, implementation translates these intentions into concrete action. During this phase, it is essential to (i) track the relevant measures that were integrated in the programme/project design; (ii) promote environmental sustainability in contract specifications; and (iii) when dealing with a project that was subject to an EIA or a CRA, make sure the corresponding environmental management plan (EMP) and/or climate risk management plan (CRMP) is implemented and monitored. This

BOX 7 Examples of mainstreaming opportunities in an ongoing energy programme/ project

Programme/project activities:

- Promote policy dialogue and exchange of experience among stakeholders on policies in the energy and energy-intensive sectors that encourage energy efficiency, increase the share of renewables, minimise pollution including GHG emissions, optimise management of natural resources and enhance resilience to the effects of climate change
- Support institutional reforms that contribute to improved ability to achieve sustainable energy systems and services, such as the establishment of a dedicated energy efficiency and/or renewable energy agency with a clear cross-sectoral mandate
- Promote the integration of the energy-related component of the INDC into energy and other relevant sector and national strategies and plans (as a step towards their operationalisation)
- Screen options for enhancing access to energy, developing renewable energies and improving energy efficiency, identifying and promoting those with a lower environmental and carbon footprint or which are likely to generate climate change adaptation benefits
- Based on the above, consider adjusting the nature or modalities of some originally planned activities (e.g. opting for diversified agroforestry rather than mono-species wood lots for the production of sustainable woodfuels; developing a recycling scheme for used home solar system batteries), but ensure the new or adjusted activities contribute to the intervention's objectives and expected results; and that changes can be justified by improvements in relevance, effectiveness, efficiency or sustainability
- Build the capacities of energy sector and energy-consuming stakeholders with regard to the identification, assessment (technical, economic, environmental, social), budgeting, implementation and monitoring of options and measures for improving the environmental and climate-related performance of energy generation and use
- Support awareness raising (among policymakers and planners, energy utilities and companies, government and industrial energy users, and the general public) about the benefits associated with access to sustainable energy, the development of renewable energies and improvements in energy efficiency

Programme management and operations:

- Adopt a green procurement policy (e.g. purchase/use fuel-efficient vehicles, energy-efficient lighting and appliances, recycled/certified paper, certified or Forest Law Enforcement, Governance and Trade (FLEGT) licensed wood for construction, biodegradable cleaning products, recycling and waste sorting)
- Promote supply of goods and services from the local community and train community members to be able to deliver quality goods and services, e.g. to reduce carbon footprint from transport and shipping of imported goods

tracking should be integrated into the action's overall monitoring system.

The EMP prepared as part of an EIA specifies how the mitigation measures identified will be implemented (by whom, when, where) and how these will be monitored to verify their effectiveness to contain adverse environmental impacts. The CRMP prepared as part of a CRA identifies the actions needed to implement the CRA recommendations in the form of an operational plan. EMP/CRMP recommendations need to be incorporated in the contractual documents linked to project implementation (e.g. contracts for energy infrastructure construction or rehabilitation works; service contracts for institutional and capacity-building support for energy sector planners and regulators).

For ongoing programmes/projects where environment and climate change were not integrated at all or sufficiently into the design, options still exist for enhancing their environmental and climate performance. Existing activities can be assessed to identify opportunities for improving their environmental and climate change performance, and activities reoriented or complemented accordingly. Box 7 presents a number of opportunities specific to the energy sector.

Entry point: Monitoring and steering mechanisms

Mainstreaming action: Ensure relevant environmental and climate change indicators are included in the action's monitoring system, plans and reports, results-oriented monitoring and other reviews (e.g. joint sector or budget support reviews), and ensure environmental and climate change results are regularly discussed by relevant stakeholders and the steering body.

Programme/project monitoring should include appropriate indicators that can (i) help identify if key environmental and climate change concerns and opportunities are being addressed; (ii) track the efficiency and effectiveness of mainstreaming measures; and (iii) allow prompt identification of adverse environmental impacts that may arise, thereby enabling the programme/project to be adapted or revised accordingly. The participation of relevant stakeholders during monitoring should be encouraged. Boxes 3 and 5 give examples of indicators relevant for the energy sector.

Building on the monitoring and results reporting, regularly assess the situation with regard to the four objectives in Table 1. Depending on the programme/project stage of implementation, a more in-depth assessment can be done as part of the mid-term evaluation, which offers a unique opportunity for reorienting a programme/project if needed (see below); as part of a results-oriented monitoring mission; or through independent assessment of the programme/project environmental footprint. The findings may indicate a need to reorient existing activities, add some complementary activities, and/or add environmental and climate change–related indicators to the monitoring system.

Box 8 provides an example of environmental and climate change mainstreaming in the implementation of an energy project.

Evaluation

The evaluation phase looks at the relevance, effectiveness, efficiency, impact and sustainability of the programme/project, so as to draw lessons to inform the next cycle of operations. There are two main points at which evaluation takes place: during the **mid-term**

BOX 8 Case study: Sector reform contract to increase performance of Rwanda's energy sector

Energy is one of the top priorities for the Government of Rwanda, which understands that access to modern energy is a prerequisite for achievement of its main development goal: becoming a middle-income country by 2020. The EU, through the 11th European Development Fund, supports implementation of Rwanda's 2015 National Energy Policy and Energy Sector Strategic Plan through a sector reform contract (i.e. sector budget support). Expected results include (i) increased electricity access (on- and off-grid) and energy supply for rural communities, (ii) improved energy efficiency in the use of modern and traditional sources of energy, (iii) increased share of renewable energy sources and (iv) increased institutional capacity of energy institutions and bodies.

While initial discussions with the authorities focused mainly on electricity, commitments made by Rwanda in the framework of SE4All as well as its energy strategy led to the inclusion of biomass (a form of renewable energy) and energy efficiency in the scope of the intervention. This offered the opportunity to strengthen cooperation among the different public services in charge of natural resources management, forestry, electricity, and energy efficiency and to support sustainable management of natural resources.

The strong focus on sustainability aspects both in the national policy and strategy and in the policy dialogue between the EU and the Government of Rwanda is reflected in the programme's action document. Selected performance indicators cover cook stove efficiency, energy efficiency (based on policy actions), increased share of electricity generated from renewable sources, sustainability of the biomass sector, and sustainable forestry balancing the demand/supply gap in biomass use for cooking. These indicators will be used throughout programme implementation to monitor progress and determine the rate of disbursement of the variable tranche of budget support.

Sources: EU, 2015a; EC, forthcoming.

review and at the end of a programme/project. The mid-term evaluation results inform the continuation of the programme/project; the **final evaluation** results inform the next programming period.

Entry point: Mid-term and final evaluations

Mainstreaming action: **Ensure the evaluation criteria selected capture the key environmental and climate change concerns.**

The indicators suggested in Boxes 3 and 5 for incorporation in the programming document and the logical framework or performance assessment framework can be useful in evaluation. Evaluation can also address the following environmental and climate change–related aspects:

- whether an SEA, EIA and/or CRA was required and, if so, whether it was carried out
- whether and to what extent the environment and climate change–related measures recommended (e.g. by the above-mentioned assessments or the mid-term evaluation) were implemented — and, if so, how successfully
- whether the programme/project has addressed the environmental/climate change issues in a **relevant** manner (i.e. the most important environmental issues and options were identified in the problem analysis and activities were appropriately designed to address them)
- whether programme/project actions were **effective** in promoting environment-friendly and climate-resilient practices (e.g. successful introduction of sustainable land and ecosystem management practices in the production of biofuels)
- whether the programme/project made environmentally **efficient** use of means (e.g. minimising water use in the operation of thermal and concentrated solar power plants)
- whether the programme/project has had any **positive impact** by contributing to sustainable development, including environmental sustainability, low-carbon development and climate resilience (e.g. reduction in GHG emissions and/or ambient air pollution, creation of a new value chain and green jobs around the installation of solar home systems in areas not served by the grid)
- whether the programme/project has had a direct or indirect **negative impact** on the environment and climate resilience (e.g. loss of biodiversity due to mono-cropping associated with biofuels, dwindling productivity of fisheries downstream of a hydropower dam)
- whether the programme/project's **sustainability** is threatened by environmental degradation and/or climate change (e.g. hydroelectric power supply threatened by reduced water flows, fast siltation of reservoirs or invasive species clogging turbines)

To ensure the above points are adequately addressed in evaluations, (i) environment and climate change–related key points should be clearly reflected in the evaluation terms of reference, and (ii) the evaluation team should have relevant environment and climate change expertise. Experience shows that if these factors are lacking, evaluation coverage of environment and climate change aspects tends to be shallow and unlikely to adequately capture associated issues and opportunities.

Mainstreaming action: **Ensure the evaluation results inform continuation of the programme/project and of future programmes/projects.**

The results of the **mid-term evaluation** should be discussed and necessary changes integrated in the programme/project to enhance its environmental and climate change performance. Lessons from the **final evaluation** regarding environmental and climate change performance should be drawn and disseminated to inform the design of future programmes/projects. Moreover, evaluation results can inform policy dialogue.

Part 4: Environment and climate change risks, hazards and opportunities for sector activities

The contents of this part draw, in particular, on recent publications of the International Energy Agency (IEA, 2014, 2015a, 2015b, 2016b) and the International Renewable Energy Agency (IRENA, 2015b, 2016), as well as the EU *Sustainable Energy Handbook*.

A. INCREASING ACCESS TO ENERGY		
Areas of intervention	• Grid extension • Setting up local grids to enhance access in remote areas • Building up energy generation capacity (on-grid, mini-grids, stand-alone systems) • Improvements in policies, regulations and institutional framework	
	WHAT THEY ARE	**HOW TO ADDRESS/AVOID/MINIMISE**
Key risks and hazards	• Vulnerability of energy generation, transmission and distribution infrastructure to extreme weather events and other effects of climate change (e.g. storms, forest fires, landslides, floods, extreme temperatures, long-term changes in rainfall patterns, sea level rise, storm surges, coastal erosion), exacerbating the risks already associated with environmental degradation (e.g. watershed degradation, degradation or destruction of mangroves and coral reefs) • Limitations in power generation capacity (hydropower, thermal power plants, concentrated solar power) or the ability to produce biofuels arising from water scarcity and/or competition among water uses	• Help governments, regulators and energy utilities/companies **assess climate change resilience and adaptation challenges**, identify actions needed to address them and create an enabling framework for resilience building (including adoption and implementation of energy sector emergency preparedness and response plans) • **Climate-proof energy infrastructure** (against both extreme and slow-onset events), and consider insurance-based solutions for residual risk • Support energy utilities/companies in implementation of **risk prevention and climate change adaptation measures** • Use SEA combined with a water-energy-food security nexus approach to **inform policy and strategic decisions** regarding energy mix, location of power generation infrastructure and design of transmission and distribution networks

A. INCREASING ACCESS TO ENERGY

	WHAT THEY ARE	HOW TO ADDRESS/AVOID/MINIMISE
Potential impacts of sector development	• Increased GHG emissions resulting from reliance on fossil fuels to increase access to energy • Pollution and environmental degradation due to extraction, transformation, transport and combustion of fossil fuels (e.g. pollution of air, water sources and land; soil acidification; damage caused by accidents and spills) • Pollution and environmental degradation due to development of renewable energy sources with insufficient attention to mitigation of adverse environmental impacts (see Table C) • Groundwater resource depletion due to improved access to energy for pumping/irrigation • Forest and land degradation due to continued, unsustainable exploitation of woodfuels	• Use **SEA** combined with a water-energy-food security nexus approach • **Undertake systematic, high-quality EIAs** for major energy infrastructure and energy-enabled irrigation projects (consider an SEA for small-scale projects where significant cumulative environmental impacts are expected); **monitor compliance** with recommendations and EMPs • **Reduce reliance on fossil fuels** and increase the share of renewable energies in the energy mix • Promote **demand-side management, energy efficiency and a higher uptake of renewables** through adoption of a clear, consistent policy framework supporting long-term energy security, energy access and pollution abatement objectives; the creation of a favourable legal and regulatory framework (including emissions controls); and the provision of economic incentives (starting with phase-out of fossil fuel subsidies) • **Offset additional carbon emitted** by capacity expansion investments, e.g. by supporting reforestation • **'Hybridise'** existing diesel mini-grids (adding renewable sources) or set up **new 'green' mini-grids** based on hydro, biomass or hybrid (wind, solar, diesel) power systems • Promote access to **clean, modern cooking and heating fuels**, thus improving sustainability of charcoal sector
Opportunities	• Support rural and urban economic development, the creation of **green jobs** and the transition to a **greener economy** (through the development of renewable energies; see Table C) • **Reduce land and forest degradation** (through access to clean and modern cooking and heating fuels, e.g. biogas, as a substitute for unsustainable woodfuels), thus leading to benefits in terms of biodiversity protection, ecosystem resilience, continued production of key ecosystem services (e.g. water flow regulation) and the protection of rural livelihoods • Reduce vulnerability to climate change and enhance adaptive capacity through more widespread and secure **access to energy, information and education** services • Contribute to **food security** (e.g. through access to energy for pumping water for irrigation, for ensuring safe storage and conservation of food) • **Promote gender equality** by reducing women's workload • Achieve significant **health benefits** (especially for women and children) by reducing indoor air pollution, burns and fire-related hazards through improved access to modern energy or cleaner technology for cooking and lighting	

B. PROMOTING ENERGY EFFICIENCY

Areas of intervention

In the energy sector itself:

- Replacement, rehabilitation and modernisation of the power generation infrastructure and of electric power, oil and gas transport and distribution networks
- Creation of an enabling policy, legal and regulatory framework for energy efficiency
- Demand-side management: awareness raising campaigns, systematic metering and billing of consumption
- Awareness raising, capacity development and support for research and development

In other sectors (notably agriculture, industry, construction and transport):

- Promotion of targeted policy measures including fiscal reform and economic instruments to encourage investment in energy efficiency
- Introduction of technology standards, building codes and energy performance labelling (e.g. for buildings, electrical appliances)
- Introduction and enforcement of new regulations (e.g. on vehicle fuel efficiency, on energy reporting by large industrial firms such as mining companies)

	WHAT THEY ARE	HOW TO ADDRESS/AVOID/MINIMISE
Key risks and hazards	• Possibly reduced resilience of some energy-efficient building materials or architectural designs against storms and flooding • Rebound effect: increased energy affordability associated with improved efficiency may lead to overall increase in energy consumption	• **Climate-proof** all infrastructure including energy-efficient buildings and other infrastructure • **Monitor energy consumption and assess trade-offs**, taking into account development co-benefits and other efficiency gains (e.g. in the use of water and raw materials) associated with increased energy consumption
Potential impacts of sector development	• Few environmental impacts are likely to arise from energy efficiency measures; any risks would stem from poor implementation • Some energy efficiency measures may result in adverse environmental impacts through generation of more or new types of hazardous wastes (e.g. old power transformers containing PCBs, energy-saving fluorescent light bulbs and tubes containing mercury) • Introduction of financial measures to curb energy consumption (e.g. taxes, subsidy removal, systematic metering and full cost recovery) may make energy and transport services less affordable and thus generate significant socio-economic impacts, in particular for the poor	In addition to the general measures described in Table A: • Provide for adequate **disposal** of old power transformers and other equipment replaced in the context of energy efficiency policies • **Promote LED**-based rather than fluorescent lamps to replace incandescent lamps — or if LED-based lamps are deemed unaffordable (in particular for households), raise awareness and set up effective waste collection and recycling schemes for fluorescent lamps • Assess the **consequences of tariff changes and other measures** on the poor and address socio-economic impacts as part of analysing the feasibility of policy measures, based on wide and effective engagement of local communities; this can be done in the context of an SEA • Use the **expertise and networks of civil society organisations** to facilitate awareness, information and transfer of knowledge and technologies on energy efficiency

B. PROMOTING ENERGY EFFICIENCY	
Opportunities	• **Reduce** the need for investment in additional power generation capacity • **Improve energy security**, reduce energy dependency and improve the trade balance (in particular for countries that import a significant share of their energy supply) • **Improve energy delivery** (as a result of increased efficiency in energy generation, transmission and distribution, and higher cost recovery rates as more satisfied customers are more inclined to pay their bills) • **Identify cost savings** when undertaking environmental assessment of policies, plans, programmes and projects in key energy-consuming sectors (e.g. agriculture, transport, industry, construction, water) — leading to enhanced productivity and competitiveness • Encourage the **development of new value chains and skills** that can create green jobs and capacity for transformation to a green economy • **Improve public budgets** (through lower government expenditure on energy bills, additional tax revenues associated with faster growth, reduced welfare payments consequent to job creation) • **Improve health and well-being** (e.g. from reduced exposure to indoor air pollution, reduced exposure to high or low temperatures in better-insulated buildings) • **Contribute to poverty alleviation** (e.g. from enhanced access to energy services, as more people can be served for a given level of power generation; from increased disposable income, as households spend less on energy services) • Support early achievement of peak global GHG emissions, and thus reduce loss and damage caused by climate change • Gain access to **carbon finance** (e.g. Clean Development Mechanism, voluntary carbon markets, Green Climate Fund)

C. PROMOTING RENEWABLE ENERGY

Areas of intervention

- Public and private investment in renewable energy infrastructure, including hydropower, solar, wind, bioenergy (including electricity and heat produced from biomass through combustion or gasification, as well as liquid biofuels), geothermal, marine and hydrokinetic energy
- Creation of an enabling policy, legal and regulatory framework for renewable energy, including phase-out of fossil fuel subsidies
- Direct and indirect financial support
- Capacity development and support for research and development

	WHAT THEY ARE	HOW TO ADDRESS/AVOID/MINIMISE
Key risks and hazards	• Vulnerability of renewable energy infrastructure to extreme weather events and other effects of climate change, exacerbating risks already associated with environmental degradation and loss of key ecosystem services (notably in degraded watersheds and coastal areas) • **Hydropower:** loss of generation capacity caused by drought or reduced precipitation in the context of climate change; clogging of turbines by the proliferation of invasive plant species triggered by water pollution and/or higher temperatures; reservoir siltation (and thus shortened lifespan of dams) caused by poor catchment management • **Biomass:** reduction in the sustainable yield of biomass resources and plantations as a result of drought, poor land use and forest management practices • **Biofuels:** limitations in production capacity arising from land degradation, water scarcity and competition with other land and water uses (notably food production)	In addition to the general measures described in Table A: • **Hydropower:** – carry out **climate change and hydrology assessments and modelling** to provide better information for decision-making and ensure additional climate/environmental costs are properly estimated – promote **sustainable catchment management practices** to reduce siltation and nutrient flow into waterways (e.g. reforestation of upper catchment, payment for ecosystem services); such measures can also contribute to climate change mitigation (by enhancing carbon sinks) and to disaster risk reduction and climate change adaptation, and benefit biodiversity • **Bioenergy:** – promote **sustainable land use** practices – use **drought-resistant woodfuel** species – use a **water-energy-food security nexus approach combined with an SEA** to inform policy and strategic decisions regarding the energy mix, land use planning and trade-offs between biofuel production and food crops
Potential impacts of sector development	• **Hydropower**: large infrastructure can lead to alterations in watershed ecosystems and flooding of productive agricultural lands (resulting from the loss of land and vegetation removal for accommodating reservoirs); consumptive water use (evaporation); changes in biodiversity; alterations in water flows, sediment load, nutrient flows and water quality, leading to adverse impacts on downstream fisheries, agriculture (notably floodplain farming systems) and the recharge of aquifers, to river bank and coastal erosion and to ecosystem stress; changes in the microclimate, in the incidence of vector-borne diseases; reduced water availability for downstream uses; GHG emissions resulting from the decay of flooded vegetation (in large reservoirs); and ecosystem degradation due to the building or upgrading of access roads	In addition to the general measures described in Table A: • Strive to achieve **universal access to cleaner cooking fuels and sustainable electricity** • **Hydropower:** – consider micro and run-of-river systems as an **alternative to large hydro**, as they entail significantly fewer adverse environmental impacts – **manage catchment areas** to limit soil erosion and offset consumptive use (through increased low-flow runoff) – define and discharge appropriate **environmental flows** to minimise impacts on downstream ecosystems – install **fish ladders** and appropriate fish barriers (upstream of turbines) and take other actions to protect biodiversity and fishery-dependent livelihoods – **clear vegetation** from reservoirs prior to impoundment

C. PROMOTING RENEWABLE ENERGY		
	WHAT THEY ARE	**HOW TO ADDRESS/AVOID/MINIMISE**
Potential impacts of sector development	• **Solar:** toxic waste (e.g. batteries) can be generated by the disposal of solar units (in particular photovoltaic stand-alone systems); concentrated solar power can use considerable amounts of water, interfering with competing water uses in dry areas • **Wind:** can lead to noise pollution, disruption of birdlife, and perceived reduction in the recreational and cultural value of the landscape; offshore installations can negatively affect marine life, fishing, navigation, aquaculture and tourism • **Bioenergy:** biomass and biofuel combustion (including in waste-to-energy schemes) causes air pollution; biofuel production can lead to mono-cropping (with impacts on biodiversity and agro-biodiversity), land use changes (and related GHG emissions), excessive water use, soil erosion and land degradation, displacement of food crops (pushing up food prices); production of vinasse as a by-product of bioethanol distillation can constitute a significant water pollution risk • **Geothermal:** when used for electricity production, can cause emissions of GHGs (carbon dioxide, methane) as well as hydrogen sulphide, ammonia and boron; can also cause land subsidence, seismic activity, water pollution and (limited) changes in land use • **Marine and hydrokinetic:** tidal barrages can lead to significant impacts on marine ecosystems (due to changes in estuary flow, salinity and turbidity); also potential impacts on fishing, navigation and recreational value • **All forms of renewable energy:** there is a risk that developments (especially if dominated by private interests) do not benefit local communities (e.g. renewable power generation benefiting only distant urban areas, while the burden of impacts falls on local communities)	• **Solar:** provide for adequate **management and disposal of spent batteries** and other potentially hazardous waste • **Wind:** – set up **radar shutdown systems** to protect birdlife – **locate onshore wind farms to minimise impacts** on land and local communities – **locate and design offshore wind farms to minimise impacts** on marine life, fishing and navigation • **Bioenergy:** – use **sustainable land and forest** management and agricultural practices – use a **water-energy-food security nexus approach** to assess trade-offs between energy generation and food production needs, and integrate the findings in land use planning – to the extent possible, **produce biofuel from wastes** – **use filters and upgrade boilers** to reduce industrial air pollution from the combustion of biomass – adequately **dispose of vinasse** (which can be biodigested, used to produce pellets or mixed with irrigation water as a fertiliser) • **Geothermal:** re-inject geothermal fluids and condensed steam back into the reservoir to **keep up pressure and avoid subsidence** • **Marine and hydrokinetic:** locate barrages and wave devices to **minimise impact** on marine ecosystems, navigation, fishing and recreational value • **Address socio-economic impacts** as part of analysing the feasibility of policy measures, based on wide and effective engagement of local communities; this can be done in the context of an SEA • Ensure **local villages and towns benefit** from new renewable electricity projects (through the development of local grid networks) • Where resettlement is needed, support the development of **sustainable livelihoods to protect newly settled areas** • Use the **expertise and networks of civil society organisations** to facilitate awareness, information and transfer of knowledge and technologies on renewable energies

C. PROMOTING RENEWABLE ENERGY	
Opportunities	• **Improve energy security and reduce economic vulnerability** by diversifying sources of energy • **Reduce energy dependency**, improve the balance of payments and foreign exchange reserves (for countries dependent on fossil fuel imports) • Increase the **resilience of power networks** through the development of more distributed power generation infrastructure • **Increase access to energy for income-generating activities**, notably in remote areas not served by the grid (though the deployment of distributed, small-scale renewable energy systems) • Encourage the **development of new value chains and skills** that can create green jobs and capacity for transformation to a green economy (e.g. jobs associated with the deployment and maintenance of solar home systems; development of tourism, fisheries or navigation in the reservoirs of hydropower stations) • Achieve **productivity and efficiency gains** (e.g. from using wastes to generate renewable heat and power; using biogas production residues as a source of low-cost, low-emission fertilisers) • **Reduce pollution and natural resource degradation** (e.g. from the substitution of fossil fuels with cleaner sources of energy, and from the management of waste to produce biogas), with benefits in terms of biodiversity protection, ecosystem resilience, protection of rural livelihoods and human health • Achieve **significant health benefit**s from reduced atmospheric pollution associated with fossil fuel combustion • Support early achievement of peak global GHG emissions, and thus reduce loss and damage caused by climate change • Gain access to **carbon finance** (e.g. Clean Development Mechanism, voluntary carbon markets, Green Climate Fund)

Part 5: Resources

General guidance on mainstreaming

Integrating the environment and climate change into EU international cooperation and development: Towards sustainable development (EC, 2016). Practical guidelines for mainstreaming environment and climate change in EC cooperation and development. Provides model terms of reference for CEPs, SEAs and EIAs; and environmental and climate risk screening procedures.

Global Climate Change Alliance. EU initiative with training materials on climate change mainstreaming.

United Nations Development Programme–United Nations Environment Programme Poverty-Environment Initiative (UNDP-UNEP PEI). EU-supported programme on county-led environmental mainstreaming, which has developed a comprehensive methodology and toolbox on mainstreaming.

Sector-specific guidance and tools

'Capacity Development for Environmental Management and Governance in the Energy Sector in Developing Countries' (OECD, 2011)

Climate Impacts on Energy Systems: Key Issues for Energy Sector Adaptation (World Bank, 2011)

'Methodological note on sector budget support operations in the field of sustainable energy' (EC, forthcoming)

Web-based resources

Capacity4Dev, Public Group on Energy

Capacity4Dev: Public Group on Environment, Climate Change and Green Economy

Clean Energy Solutions Center, site that assists countries with clean energy policy

Climate Change (World Bank)

Hands-on Energy Adaptation Tool Kit (HEAT). Energy Sector Management Assistance Program (ESMAP), World Bank, Washington, DC.

Hydropower Sustainability Assessment Protocol

Sustainable Energy Handbook (EU Technical Assistance Facility for Sustainable Energy for All, with the support of MWH and Atkins International, 2016). Divided into six chapters and 18 sub-chapters that can be downloaded from the Capacity4Dev website.

Sector SEAs and related guidance

Applying Strategic Environmental Assessment: Good Practice Guidance for Development Co-operation (OECD DAC, 2006). Guidelines prepared in response to commitments under the Paris Declaration for Harmonisation of Donor Approaches to Environmental Assessment. Provide an overview of different approaches to SEA used by donors and basic principles for SEA. Complementing the guidance, Advisory Notes have been prepared on SEA and biofuel development, climate change adaptation, ecosystem services, disaster risk reduction, and post-conflict development.

SEA of the energy sector in Rwanda (EC, 2014)

'Strategic Environmental Assessment Best Practice Process Elements and Outcomes in the International Electricity Sector', *Journal of Environmental Assessment Policy and Management* 15(02) (2013)

Country environment and climate change situation

Country environmental analyses (CEAs). Detailed state of the environment reports prepared by the World Bank for some countries; provide good overview of environmental issues.

Country environmental profiles (CEPs). Prepared in support of EU multiannual programming. Provide an overview of the state of the environment (including pressures and trends); expected impacts of climate change; the institutional, policy and regulatory framework for environment and climate change; donor activity in environment and climate change; and recommendations for EU programming.

Low-emission development strategies (LEDS). National development plans addressing low-emission and/or climate-resilient economic growth. Typically include a compilation of emissions data and projections; economy-wide, broad, long-term mitigation goals (15–30 years); a survey of cost-efficient mitigation options and their prioritisation; and stipulation of concrete short- and medium-term mitigation actions.

National adaptation programmes of action (NAPAs). Produced by all least developed countries (LDCs) and submitted to the UNFCCC, NAPAs identify priority climate change adaptation projects. In many cases, NAPAs are outdated and/or have been replaced with national adaptation plans (NAPs) and/or LEDS.

Nationally appropriate mitigation actions (NAMAs). Prepared in the context of the UNFCCC by developing country parties to the convention, NAMAs identify priority climate change adaptation actions. Discussions are ongoing in climate negotiations to see if NAMAs could qualify for carbon credits under the New Market Mechanisms.

National communications to the UNFCCC. Submitted by all countries that are party to the convention and include an overview of the country situation, expected impacts from climate change, an inventory of GHG emissions, an indication of climate change vulnerabilities in different sectors, and an indication of opportunities for GHG reductions and adaptation.

(Intended) nationally determined contributions (INDCs). INDCs, prepared ahead of or following the Paris Agreement, are to be communicated by all countries party to the UNFCCC. Present each country's ambition for reducing emissions, taking into account domestic circumstances and

capabilities. Can also describe climate change impacts and adaptation needs and plans, and what support if any might be needed from the international community. Once a country ratifies the Paris Agreement, its INDC becomes an NDC.

National environmental summaries (NESs). Prepared by the United Nations Environment Programme for some countries. Offer a good synthesis of a country's most important environmental issues.

Other country resources

- National state of the environment reports
- National reports to the Convention on Biological Diversity (CBD)
- National biodiversity strategies and action plans (NBSAPs)
- National reports to the United Nations Convention to Combat Desertification (UNCCD)
- National environment policy
- National climate change policy
- National energy policy
- Any SEA carried out in the sector
- Research, evaluations and analysis produced by other donors in the energy, environment and climate change sectors

References

AFREPREN/FWD, 2009. 'Large Scale Hydropower, Renewable Energy and Adaptation to Climate Change: Climate Change and Energy Security in East and Horn of Africa'. Occasional Paper 33. Energy, Environment and Development Network for Africa, Nairobi.

C2ES (Center for Climate and Energy Solutions), 2015. 'Comparison Table of Submitted INDCs (as of December 21, 2015'.

EC (European Commission), 2010a. 'Energy 2020: A strategy for competitive, sustainable and secure energy'. Communication, COM(2010) 639 final. EC, Brussels.

EC (European Commission), 2010b. 'EU development policy in support of inclusive growth and sustainable development: Increasing the impact of EU development policy'. Green paper, COM(2010) 629 final. EC, Brussels.

EC (European Commission), 2011a. 'A budget for Europe 2020'. Communication, COM(2011) 500 final. EC, Brussels.

EC (European Commission), 2011b. 'Energy roadmap 2015'. Communication, COM(2011) 885 final. EC, Brussels.

EC (European Commission), 2011c. 'Increasing the impact of EU development policy: An agenda for change'. Communication, COM(2011) 637. EC, Brussels.

EC (European Commission), 2011d. 'On security of energy supply and international cooperation — The EU energy policy: Engaging with partners beyond our borders'. Communication, COM(2011) 539 final. EC, Brussels.

EC (European Commission), 2012. '"Energising Development": Commission's new initiative to help achieve energy access for all by 2030'. Press release IP-12-352. EC, Brussels.

EC (European Commission), 2013. 'Sector indicator guidance for programming'. EC, Brussels.

EC (European Commission), 2014. 'A policy framework for climate and energy in the period from 2020 to 2030'. Communication, COM(2014) 15 final. EC, Brussels.

EC (European Commission), 2015a. 'EU leads in mobilising resources for sustainable development'. Press release IP-15-5353. EC, Brussels.

EC (European Commission), 2015b. 'A framework strategy for a resilient energy union with a forward-looking climate change policy'. Communication, COM(2015) 80 final. EC, Brussels.

EC (European Commission), 2015c. 'Launching the EU International Cooperation and Development Results Framework'. Staff Working Document, SWD(2015) 80 final. EC, Brussels.

EC (European Commission), 2016a. *Integrating the environment and climate change into EU international cooperation and development: Towards sustainable development*. Tools and Methods Series Guidelines 6. EC, Brussels.

EC (European Commission), 2016b. 'Proposal for a new European consensus on development: Our world, our dignity, our future'. Communication, COM(2016) 740 final. EC, Brussels.

EC (European Commission), 2016c. 'The road from Paris: Assessing the implications of the Paris Agreement and accompanying the proposal for a Council decision on the signing, on behalf of the European Union, of the Paris Agreement adopted under the United Nations Framework Convention on Climate Change'. Communication, COM(2016) 110 final. EC, Brussels.

EC (European Commission), forthcoming. 'Methodological note on sector budget support operations in the field of sustainable energy'. EC, Brussels.

EU (European Union), 2012. 'Country Environmental Profile Lesotho, 2012'.

EU (European Union), 2014. 'National Indicative Programme for Lesotho, 2014–2020'. 11th European Development Fund.

EU (European Union), 2015a. 'Action document for the Sector Reform Contract (SRC) to increase performance of Rwanda's energy sector and develop the corresponding institutional capacities'. 11th European Development Fund.

EU (European Union), 2015b. 'Intended Nationally Determined Contribution of the EU and its Member States, submitted by Latvia and the European Commission on behalf of the European Union and its Member States'.

FAO (Food and Agriculture Organization of the United Nations), 2014. *The Water-Energy-Food Nexus: A New Approach in Support of Food Security and Sustainable Agriculture*. FAO, Rome.

IEA (International Energy Agency), 2013. *Redrawing the Energy-Climate Map: World Energy Outlook Special Report*. IEA, Paris.

IEA (International Energy Agency), 2014. *Capturing the Multiple Benefits of Energy Efficiency*. IEA, Paris.

IEA (International Energy Agency), 2015a. *Energy and Climate Change: World Energy Outlook Special Report.* IEA, Paris.

IEA (International Energy Agency), 2015b. *Making the Energy Sector More Resilient to Climate Change*. IEA, Paris.

IEA (International Energy Agency), 2016. 'World Energy Outlook: Energy Subsidies'. Web page.

IRENA (International Renewable Energy Agency), 2015a. *Renewable Energy and Jobs: Annual Review 2015*.

IRENA (International Renewable Energy Agency), 2015b. *REthinking Energy: Renewable Energy and Climate Change*.

IRENA (International Renewable Energy Agency), 2016. 'The True Cost of Fossil Fuels: Saving on the Externalities of Air Pollution and Climate Change'. Brief.

OECD DAC (Organisation for Economic Co-operation and Development Development Assistance Committee), n.d. *OECD DAC Rio Markers for Climate Handbook*. Revised.

REN21, 2016. *Renewables 2016: Global Status Report*. Renewable Energy Policy Network for the 21st Century, Paris.

TAF SE4All and Atkins (Technical Assistance Facility for Sustainable Energy for All and Atkins International), 2015. 'Module 2.4: Water-energy-food nexus' in *Sustainable Energy Handbook*.

UN (United Nations), 2015. 'Transforming Our World: The 2030 Agenda for Sustainable Development'. General Assembly Resolution, A/RES/70/1.

UNEP (United Nations Environment Programme), 2014. 'XII/3. Resource mobilization'. Decision adopted by the Convention on Biological Diversity. UNEP/CBD/COP/DEC/XII/3.

UNFCCC (United Nations Framework Convention on Climate Change), 2015. 'Paris Agreement'.

WAPP (West African Power Pool) and Pöyry Energy, 2012. 'ESIA Report. Mount Coffee HPP ESIA and RAP: Environmental and Social Impact Assessment and Resettlement Action Plan for the Rehabilitation of the 64 MW Mount Coffee Hydropower Plant, Liberia'. Pöyry Energy AG, Zurich.

WAPP (West African Power Pool) and Pöyry Energy, 2013. 'Resettlement Plan. Mount Coffee HPP ESIA and RAP: Environmental and Social Impact Assessment and Resettlement Action Plan for the Rehabilitation of the 64 MW Mount Coffee Hydropower Plant, Liberia'. Pöyry Energy AG, Zurich.

Acronyms

CEP	Country Environmental Profile
CRA	Climate Risk Assessment
CRMP	Climate Risk Management Plan
DAC	Development Assistance Committee
DEVCO	Directorate-General for International Cooperation and Development
EC	European Commission
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
GHG	Greenhouse Gas
INDC	Intended Nationally Determined Contribution
MIP	Multiannual Indicative Programme
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-operation and Development
SEA	Strategic Environmental Assessment
SDG	Sustainable Development Goal
UNFCCC	United Nations Framework Convention on Climate Change