



GUIDEBOOK FOR THE DEVELOPMENT OF A NATIONALLY APPROPRIATE MITIGATION ACTION ON EFFICIENT LIGHTING

UNITED NATIONS ENVIRONMENT PROGRAMME



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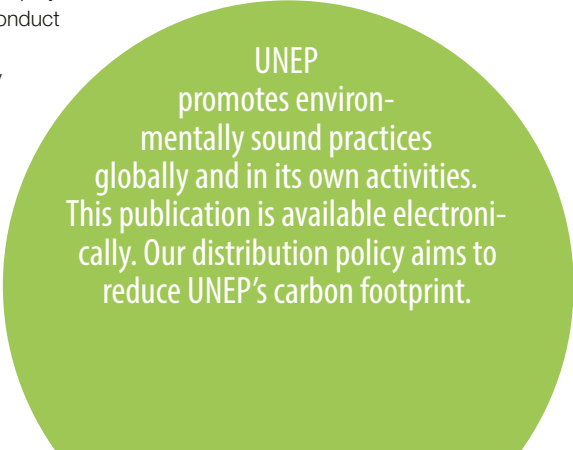
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Abbreviations and Definitions

GEF	Global Environment Facility
GHG	greenhouse gas
Gt	gigatonne
NAMA	Nationally Appropriate Mitigation Action
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

additionality	Efforts that are beyond what has already been planned. Project additionality was required under the Clean Development Mechanism to ensure that carbon credits were not awarded for emissions reductions that would happen regardless of whether the project was implemented or not.
baseline	Development that is expected without initiating any additional action to reduce emissions. The baseline is also referred to as 'business as usual', meaning the sum of the current emissions and the anticipated development of emissions over a given period of time (typically a project or programme duration).
Biennial Update Report (BUR)	Reports to be submitted every two years by a developing country in its National Communications, per UNFCCC decision 1/CP.16. Least Developing Country Parties and Small Island Developing States have more flexibility. Reports include information on greenhouse gas inventories, mitigation actions taken, and support needs.
International Consultation and Analysis (ICA)	The process of analysis of the information submitted in Biennial Update Reports, by international experts to ensure completeness, consistency and accuracy of information. It also includes consultations among Parties on the analysis and Biennial Update Reports under the Subsidiary Body of Implementation of the UNFCCC to collectively assess the efforts of countries to address climate change.
incremental costs	Costs that are over and above those incurred by following the baseline development. The incremental costs are additional ones affiliated with a choice of a lower carbon emission alternative. The term does not indicate which party bears the costs.
monitoring, verifying and enforcing (MVE)	Monitoring is a process to measure and track product efficiency. Verifying is the process through which declarations of product performance by suppliers are confirmed. Enforcing is the legal recourse taken by programme administrators or other responsible parties against suppliers of non-compliant products.
measuring, reporting and verifying (MRV)	Measuring includes collecting information on the impacts of a NAMA. Reporting refers to submitting the measured information in a defined and transparent manner. Verifying requires independently assessing the information that is submitted for completeness, consistency and reliability. The UNFCCC Subsidiary Body for Scientific and Technical Advice is developing guidelines for measuring, reporting and verifying for unilateral NAMAs. Measuring, reporting and verifying for internationally supported NAMAs will be guided by the supporters and will follow the guidelines for International Consultation and Analysis adopted at the UNFCCC 17 th Conference of the Parties.
stakeholders	All persons and institutions that are affected positively or negatively by a given action.
transformational	The character of an action that emphasizes the permanence of the expected impact. It is contextual, calling for a permanent change to current ways of operation. It prioritizes policy initiatives over projects and sector focus over stand-alone installations, but evaluation is qualitative and non-prescriptive, leaving the evaluation of the transformational character to the stakeholders.
Supported NAMA	A NAMA that involves contributions from third parties in developed countries in the form of finance, technology or capacity building. Contributions are documented through Biennial Update Reports to the UNFCCC, as per its guidelines in Annex III to Decision 2/CP.17. Developing countries will receive financial and technical support from developed countries for preparation of the Biennial Update Reports.
Unilateral NAMA	A NAMA that does not involve contributions from third parties in developed countries and, therefore, is implemented solely with the host country's domestic resources.

1. Introduction

Background

In 2010, global greenhouse gas emissions were 47.9 Gt compared to 35.8 Gt in 1990. Apart from the growth in international transport, this increase stemmed exclusively from industrialization in developing, non-Annex I countries^{1, 2}. Every year, the Conference of the Parties to the UNFCCC continues to seek an agreement that will decisively reduce the growing greenhouse gas emissions. Focus has been placed on the distribution of responsibilities and actions to address the challenges, guided by the principle of common but differentiated responsibilities.

Reflecting the changing balance in greenhouse gas emissions, the Nationally Appropriate Mitigation Action (NAMA) is a recent interpretation of the principle of common but differentiated responsibilities. In addition to developed countries' commitments to quantitative reductions of greenhouse gas emissions, developing countries are invited to contribute with voluntary actions that are 'nationally appropriate' deviations from 'business as usual' emissions scenarios. Such deviations may be captured in low-carbon (or low-emission) development strategies, and then implemented as NAMAs.

As the UNFCCC did not provide further definitions for NAMAs, it is up to the developing countries to interpret it according to their national contexts. A series of decisions made during the Conferences of the Parties to the UNFCCC, since 2007, may be relevant for defining NAMAs. In the context of this Guidebook, a NAMA can be considered as any mitigation action tailored to the national context, characteristics and capabilities, and embedded in national sustainable development priorities³. Countries can submit their NAMAs to the UNFCCC's *NAMA Registry*, for preparation assistance, recognition, or for international support⁴. Submissions to the *NAMA Registry* are voluntary. Anyone can develop or promote a NAMA but only a national authority can approve submission of a NAMA to the *NAMA Registry*. For links to the *NAMA Registry*, see Annex A.

Presently, the *NAMA Registry* shows NAMAs that have been submitted. More complete lists are available via the *NAMA Pipeline* hosted by UNEP Risø Centre and Ecofys' *NAMA Database*, which comprises more than 100 NAMAs, including those submitted to the UNFCCC, and others being developed around the world^{5, 6, 7}.

Keeping the global average temperature from rising more than 2°C above pre-industrial levels requires significant cuts in emissions from 2020 to 2050, in all countries including non-Annex I countries. Transitioning to energy efficient lighting offers a tangible, rapid, and cost effective way of reducing greenhouse gas emissions. Several NAMAs submitted to the UNFCCC mention energy efficient lighting as part of a broader strategy, while a few focus solely on efficient lighting. UNEP estimates that, "Replacing all on-grid inefficient lighting globally will result in annual savings of: USD 112 billion in electricity bills annually and 500 million tonnes of CO₂ reductions"⁸.

In 2010, with a grant from the Global Environment Facility, UNEP launched the en.lighten initiative, a public-private partnership that assists developing countries to phase out inefficient incandescent lamps, and to tap the potential economic and environmental benefits of a transition to the most advanced and efficient lighting technologies⁹. The en.lighten initiative supports developing country efforts to create national efficient lighting strategies that incorporate an integrated policy approach, including:

- Minimum energy performance standards
- Supporting policies and mechanisms
- Monitoring, verifying and enforcing
- Environmentally sound management of lighting products

¹ The data supporting *The Emissions Gap Report 2012* (UNEP 2012) documents that Annex I greenhouse gas emissions were 19.2 Gt in 1990 and 17.7 Gt in 2010, while non-Annex I greenhouse gas emissions were 16.6 Gt in 1990 and 30.2 Gt in 2010.

² For a list of non-Annex I countries see: http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php

³ In *Low Carbon Development Strategies: A Primer on framing NAMAs in LCDS*, (UNEP Risø Centre, 2011a) UNEP and UNEP Risø Centre encourage governments and planners to link general development planning, low-carbon development strategies, and NAMAs in a structured manner.

⁴ http://unfccc.int/cooperation_support/nama/items/6945.php

⁵ <http://namapipeline.org/>

⁶ <http://www.nama-database.org/>

⁷ Excluding those that were uploaded to the Copenhagen Accords.

⁸ UNEP en.lighten initiative, 2013, accessed on 8 July 2013 at: <<http://www.enlighten-initiative.org/portal/Portals/26107/documents/forum/gelf-brochure.pdf>>

⁹ The Australian Agency for International Development (AusAID) and the Global Environment Facility (GEF) provide funding to UNEP for the en.lighten initiative. Private sector partners of the initiative include: Osram, Philips Lighting, and the National Lighting Test Centre (Beijing).

To date, 50 countries have joined the en.lighten initiative's Global Efficient Lighting Partnership Programme with the intent of phasing out inefficient lighting by 2016. UNEP encourages countries embarking on national efficient lighting strategies to consider implementing these strategies as NAMAs.

Getting started

This Guidebook illustrates how to create an efficient lighting NAMA based on a country-led national efficient lighting strategy. It aims to be a practical resource for governments (ministries of energy, environment, housing, climate change, finance, planning and others), private sector investors and civil society organizations. Users already may have developed an efficient lighting strategy, or may be in the process of developing one¹⁰. Furthermore, users may have an interest in articulating a NAMA for the implementation of the strategy, indicating how the country will turn strategy into practice. Articulating the NAMA facilitates communication with stakeholders, including citizens, the private sector, and national and international funders.

Chapter 2 gives a generic background for the NAMA concept, origin and founding principles, as well as current interpretations among international stakeholders and the UNFCCC Secretariat.

Chapter 3 provides specifics on how to develop a NAMA from a national efficient lighting strategy, using UNEP en.lighten initiative's *Achieving the Global Transition to Energy Efficient Lighting Toolkit* and other tools, such as models and forecasts, to provide evidence for consideration by key stakeholders and potential funders. The UNFCCC has not yet promulgated strict requirements for NAMAs, but best practices from developed NAMAs, as well as donor and investor due diligence requirements provide a basis for evidence for present NAMAs.

Chapter 4 introduces one of the most important elements of a NAMA: the measuring, reporting and verifying of the NAMA impacts, including emissions reductions and co-benefits. While basic requirements are given by the decisions of the Conference of the Parties, current practices in designing and implementing NAMAs show that accurate interpretation of measuring, reporting and verifying systems for NAMAs are crucial.

Chapter 5 explains the current sources of financing for NAMAs, and ways that efficient lighting NAMAs could be financed. It introduces the 'incremental costs' approach as a means of quantifying budgets for 'supported NAMAs'.

Chapter 6 reviews and summarizes the information contained in this Guidebook, and offers brief advice on what steps to take in order to tap the potential of efficient lighting NAMAs.

Clarifying the differences between NAMAs and Clean Development Mechanism

Many readers may have experience with the Clean Development Mechanism, which is one of the flexible mechanisms introduced by the Kyoto Protocol. NAMAs are sometimes thought of as the successor to the Clean Development Mechanism (in particular, to the Programme of Activity modality¹¹), but the two are quite different. One of the core objectives of the Clean Development Mechanism is to support Annex I countries to achieve their emissions reduction targets through acquiring offsets from Clean Development Mechanism projects in developing countries¹². NAMAs aim to incentivize sufficient mitigation efforts from developing countries that will increase the chances of meeting the 2°C goal.

Compared to the mostly private-sector driven approach of the Clean Development Mechanism, NAMAs are designed to be driven largely by the public sector. Therefore, NAMAs are typically implemented on a long-term basis at a sector policy level to reduce emissions permanently. Although the concept of a NAMA is relatively new, many of the efficient lighting activities that can be supported through NAMAs are well-established. NAMAs may be developed from existing policy initiatives, guidelines and programmes, which ensures that NAMAs are not stand-alone actions, but are integrated into existing plans and in line with national sustainable development priorities.

¹⁰ UNEP offers a template and process for developing the strategy and articulating key policies. Available in English, French and Spanish at: <http://www.enlighten-initiative.org/portal/CountrySupport/GlobalEfficientLightingPartnershipProgramme/tabid/79081/Default.aspx>

¹¹ UNFCCC: "Under a programme of activities (PoA) it is possible to register the coordinated implementation of a policy, measure or goal that leads to emission reduction. Once a PoA is registered, an unlimited number of component project activities (CPAs) can be added without undergoing the complete CDM project cycle." <http://cdm.unfccc.int/ProgrammeOfActivities/index.html>

¹² Annex I country list: http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php

NAMAs are not intended primarily to generate carbon offsets for export into developed countries carbon markets. For this reason, no additionality is required for NAMAs. Also, NAMA baselines are not required to be as stringent as baselines for Clean Development Mechanism efforts.

Although the Clean Development Mechanism offers a readily available system for measuring, reporting and verifying impacts, NAMAs may benefit from greater flexibility in emissions reduction accounting and the monitoring of other impacts. Therefore, NAMAs may create more opportunities for large-scale emissions reductions. NAMAs may be a more feasible policy tool for planning and implementing a rapid transition to efficient lighting than the Clean Development Mechanism has been. Nonetheless, an efficient lighting NAMA still must include and account for the costs of monitoring, verifying and enforcing the associated lighting standards and regulations¹³.

¹³ For a thorough description of monitoring, verifying and enforcing, see “Section 4, Ensuring Product Availability and Conformance,” in, *Achieving the Global Transition to Energy Efficient Lighting Toolkit* (UNEP 2012).

2. Introduction to Nationally Appropriate Mitigation Actions (NAMAs)

NAMAs emerged from the international climate negotiations under the framework of the UNFCCC. They were first mentioned in the Bali Action Plan of 2007¹⁴ when they were referred to as “...actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner”¹⁵. NAMAs have inherited central formulations from the founding UNFCCC; these elements (sustainable development, technology transfer, financing and capacity building) help define the obligations of developed and developing countries. Each successive agreement on NAMAs sustains these elements, and provides more details on the different aspects of NAMAs.

Defining NAMAs

A number of NAMA elements have been negotiated, but ultimately the nature of NAMAs will emerge through the implementation and sharing of best practices. The national basis for NAMAs allows host countries to interpret what a NAMA means in their own situations and contexts. The first differentiation of NAMAs, also in the *NAMA Registry*, is made according to the source of financing:

- Unilateral NAMA (for recognition): entirely financed by the host country;
- Supported NAMA: enabled in part by international technology, financing and/or capacity building;
- Credited NAMA: not covered in this Guidebook¹⁶.

Few, if any, internationally supported efficient lighting NAMAs will be implemented solely on the basis of support from developed countries. The host country is expected to contribute to the NAMA financially or through other means, particularly by: setting minimum energy performance standards; establishing supporting policies for financing and communications; adopting environmentally sound management practices; and following through on these requirements by monitoring, verifying and enforcing all lighting and associated standards and requirements¹⁷.

Another differentiation is made between policy and programme NAMAs (the focus of this Guidebook), and project NAMAs¹⁸.

- Policy or programme NAMAs are interventions implemented by a government in order to promote or discourage technology options, impact economic activity or change consumer behaviour. Examples of efficient lighting policy or programme NAMAs include: minimum energy performance standards, which effectively lead to the phase out of inefficient lamps; banking regulations that allow energy efficiency agencies to guarantee low interest loans so that businesses can purchase and install high efficiency lighting systems; and policies that articulate extended producer responsibilities as a basis for establishing collection and recycling service organizations.
- Project NAMAs are specific activities undertaken by private or public organizations. They are clearly limited in duration, scope and geography. Project NAMAs encompass defined activities, which typically require technology investments. An example would be an investment to provide efficient lighting in public buildings and facilities in one or more large urban areas or municipalities to improve service reliability, reduce peak electricity demand and lower operating costs.

¹⁴ The Bali Action Plan is the name given to the Decision 1/CP.13, which is the first Decision adopted by the Conference of the Parties to the UNFCCC in December 2007 at the 13th Conference of the Parties in Bali.

¹⁵ Decision 1/CP.13, paragraph 1 b ii, document FCCC/CP/2007/6/Add.1

¹⁶ It is unlikely that NAMA crediting will be agreed upon at the international level. However, bilateral agreements may include crediting at the national level, allowing the importer to offset its greenhouse gas emissions, and requiring the exporter to add these emissions to the national inventory in the nation's Biennial Update Report. As of August 2013, credits emerging from NAMAs and consequent offsetting processes under such bilateral agreements are not recognized at the international level. NAMA host countries may establish domestic carbon markets, which could support NAMAs by incentivising national stakeholders to undertake mitigation actions in the context of an emission trading system and/or an offset system.

¹⁷ UNEP supports developing countries and international supporters of efficient lighting NAMAs by offering resource materials such as toolkits, calculators, webinars and expert advice: www.enlighten-initiative.org.

¹⁸ UNFCCC Guidebook on NAMAs, forthcoming.

Among international donor agencies there is increasing emphasis on the requirement for NAMAs to be ‘transformational’. The NAMA Facility states that, “Transformational NAMAs are projects, policies or sector programmes that shift a technology or sector in a country onto a sustainable low-carbon development trajectory”¹⁹. Such fundamental shifts are most likely to succeed if supported by policy or regulatory initiatives. Without embedding initiatives in national legislation, the permanence of the change and, thus, the transformational character of the initiative may be uncertain.

International interest in efficient lighting NAMAs is likely to swing towards policy instruments, and away from stand-alone projects. For example, international funders may require that an efficient lighting NAMA first establish and implement a minimum energy performance standard for lamps, and a system for monitoring, verifying and enforcing the standard prior to offering financial support for the purchase and distribution of high efficiency lighting products.

Even with the anticipated emphasis on policy, NAMAs are actions with a clear focus on implementation. An efficient lighting NAMA concerns the implementation of the national efficient lighting strategy; it details the tangible, fundable and verifiable activities.

Reasons for developing efficient lighting NAMAs

Supported NAMAs are a new avenue to channel financial, technological and capacity building support to climate change mitigation activities in developing countries. The most obvious reason to develop an efficient lighting NAMA is because the transition is relatively straightforward, fast and quantifiable, characteristics that are important to national governments and international funders. Other reasons that could weigh just as heavily include the overall global necessity to reduce greenhouse gas emissions, the demonstration of national commitment to the cause, opportunities to attract international financing to overcome financial barriers, and the potential to create green economy jobs and enterprises.

The efficient lighting NAMA may also promote domestic financial participation, as well as a more general awareness of the economic benefits in pursuing energy efficiency. Typically, lighting is one of the first, and most feasible, opportunities identified by governments as they systematically begin to regulate the efficiency of electrical appliances. Such awareness may be promoted through advisory services for targeted policy interventions and capacity building. Finally, establishing a NAMA for efficient lighting will provide the regulatory and policy certainties that private sector stakeholders seek to inform their decision-making.

NAMAs can be thought of as a continuous process of developing a number of interrelated actions under one logical framework with broader transformational development benefits. Benefits, such as reduced air pollution, health or education improvements, or the creation of green jobs can be systematically monitored.

NAMA support

In 2009, through the Copenhagen Accord of the 15th Conference of the Parties, developed countries pledged USD 30 billion in fast-start finance up to the year 2012, and also pledged to mobilize USD 100 billion annually by 2020, from both public and private sources, for adaptation and mitigation efforts in developing countries. Part of this support is expected to be channelled through the Green Climate Fund.

The Green Climate Fund is drafting its own delivery model, to be endorsed by the Conference of the Parties, for both public and private applicants for support. A private sector facility will be launched. Bilateral and multilateral donors are awaiting the delivery model before they commit to a replenishment system or permanent refinancing routine. Meanwhile, bilateral funding programmes for NAMAs have emerged. This creates some uncertainties regarding the structure of international public funding for NAMAs. Further uncertainty is added by using the term of “mobilizing” USD 100 billion, which refers to private sector involvement in NAMA financing.

International development organizations expect that international funding will be available through the Green Climate Fund, bilateral programmes such as The NAMA Facility and international private financing of specific investments incentivised by public sector intervention. Any of these funding channels, however, will require participation and possibly funding from the NAMA host country.

¹⁹ <http://www.international-climate-initiative.com/en/issues/nama-facility/>. Accessed 24 June 2013.

Table 1. Steps to develop, promote and implement a NAMA

<p>Step 1</p> <p>Engage key stakeholders</p>	<p>Engage key national stakeholders, promoters and implementers in a transparent consultation process:</p> <ul style="list-style-type: none"> • Ensure active stakeholder support, and encourage their public endorsement of the NAMA • Engage policymakers, and secure the necessary support for carrying out implementation of the NAMA • Confer with the national NAMA focal point to obtain support early in the process
<p>Step 2</p> <p>Develop the NAMA proposal</p>	<p>Develop a structured NAMA proposal, based on the national efficient lighting strategy, and linked to other national priorities (energy, environment), describing and quantifying as accurately as possible:</p> <ul style="list-style-type: none"> • Estimated greenhouse gas emissions reductions • Existing policies and actions targeting the co-benefits • National (financial) contribution • Measuring, reporting and verifying system or the preparedness to develop it • Co-benefits
<p>Step 3</p> <p>Publish the NAMA</p>	<p>Develop a NAMA proposal in the <i>NAMA Registry</i> format:</p> <ul style="list-style-type: none"> • Extract information from the structured NAMA proposal • Ensure that key information from Step 2 is included • Submit proposal to the <i>NAMA Registry</i>, through the NAMA focal point
<p>Step 4</p> <p>Promote and implement the NAMA</p>	<p>Promotion and implementation:</p> <ul style="list-style-type: none"> • Ensure that all supporting information has been published • Circulate NAMA proposal to, and meet with, relevant donors • Keep stakeholders engaged • Further develop the proposal through interaction with donors

To date, international funding for NAMAs supports readiness activities to help countries conduct feasibility studies, prepare NAMA proposals, and establish associated institutional structures. Annex B notes programmes for NAMA readiness activities. For example, UNEP/GEF's Global Efficient Lighting Partnership members have committed to phasing out inefficient incandescent lamps by 2016. The UNEP en.lighten initiative has provided grants and technical and policy capacity building assistance to two regions (Central America and sub-Saharan West Africa) and four countries (Chile, Jordan, Tunisia and Uruguay) to develop regional and national efficient lighting strategies. These strategies lay the foundation for developing NAMAs, should the countries take the additional steps to articulate them.

Measuring, reporting and verifying NAMAs

Measuring, reporting and verifying are fundamental requirements for NAMAs. The objective is to increase the transparency of mitigation efforts made by developing countries, as well as to build mutual confidence among all countries²⁰. From both national and international funders' perspectives, a robust system of measuring, reporting and verifying is essential for effective monitoring of the NAMA implementation, and for assessing its impact in terms of greenhouse gas emissions reductions, cost effectiveness and sustainable development benefits and other co-benefits. Measuring, reporting and verifying enable the regular evaluation of a country's progress toward the objectives of the NAMA, on the basis of predefined indicators. Presently, NAMA developers are the primary contributors to methodologies for measurement²¹.

Developing a NAMA, step by step

The NAMA development process is entirely dependent on existing preconditions, and the steps that need to be taken may be many or few depending on the starting point. A NAMA, in itself, often represents only a part of a longer process that may start with the development of a low-emission strategy, and end with implementation. The UNFCCC Secretariat, together with UNDP,

²⁰ UNEP Risø Centre (2011): <http://namapipeline.org/Publications/MRV_PrimerNationallyAppropriateMitigationActions.pdf>, and UNEP Risø Centre (2013). <http://www.uneprisoe.org/-/media/Sites/Uneprisoe/Publications%20%28Pdfs%29/UNEP%20Ris%C3%B8e,%20NAMA%20publikation_Web_NewBlue.ashx>

²¹ NAMA developers may find inspiration in Clean Development Mechanism baseline and monitoring methodologies, although these are likely to be more appropriate for projects than they are for lighting policies.

UNEP Risø and other development organizations, has developed non-prescriptive guidance for preparing NAMAs^{22,23}. Table 1 includes a detailed checklist of things to do when developing, submitting and promoting an efficient lighting NAMA. NAMA development takes time, and is similar to policy development; it is an ongoing process that involves much more than fulfilling the quite limited requirements for a NAMA proposal submission to the *NAMA Registry*.

Examples of efficient lighting NAMAs

An overview of the NAMA proposals that countries have officially submitted to the *NAMA Registry* can be found in the *NAMA Pipeline*, hosted by the UNEP Risø Centre²⁴. The *Ecofys NAMA Database* has information on feasibility studies from 35 countries and on more than 60 NAMAs²⁵. The following energy efficient lighting and related NAMA activities were published as of mid-August 2013.

Table 2. Examples of efficient lighting and related NAMAs under development²⁶

Country, Sector	Title	Objectives
Proposals		
The Gambia, Nationally Appropriate Mitigation Actions ^a	Increase production of energy from renewable sources (solar and wind)	Build capacity to use photovoltaic systems for off-grid lighting (residential and street)
Mexico, Building Sector NAMA ^b	NAMA in the urban residential sector	Enhance opportunities for mitigation and its sustainable development benefits in services for households, including but not limited to lighting
Pakistan, Building Sector NAMA ^c	Energy Efficient Lighting in Residential, Commercial, Industrial and Outdoor Sectors	Contribute to energy security and emission reductions through energy efficient lighting
Peru, Building Sector, Strategy/Plan NAMA ^d	Efficient lighting: a NAMA proposal	Reduce energy consumption by implementing efficient lighting technologies in the residential, industrial and public services sectors
Feasibility Studies		
Algeria, Building Sector ^e	Energy efficiency in residential buildings	Distribute at least 5 million compact fluorescent lamps, and phase out inefficient incandescent lamps, according to the government strategy
Libya, Building Sector Strategy/Plan ^f	Energy efficiency in residential sector	Establish labels and minimum efficiency standards for electric appliances and ban conventional, inefficient incandescent lamps.
Morocco, Building Sector, Residential Energy Efficiency Strategy/Plan ^g	Residential buildings energy efficiency	Distribute at least 23 million compact fluorescent lamps, to reduce peak load

^a http://unfccc.int/files/focus/application/pdf/nama_foc_prop_gambia.pdf

^b <http://unfccc.int/resource/docs/natc/mexnc5s.pdf>

^c http://www.nama-database.org/images/a/ad/NAMA-Proposals-Executive-Summaries_CCAP_May-8-2013.pdf

^d <http://www.climatechange.gc.ca/default.asp?lang=En&n=57B84C7D-1>

^e http://www.nama-database.org/images/5/5b/Mobilizing_NAMAs_in_RCREEE_member_states.pdf

^f http://www.rcreee.org/Studies/Mobilizing_NAMAs&new_market_mechanisms_to_harness_mitigation_in_RCREEE_Member_States_Beyond_2012.pdf

^g http://www.rcreee.org/Studies/Mobilizing_NAMAs&new_market_mechanisms_to_harness_mitigation_in_RCREEE_Member_States_Beyond_2012.pdf

²² UNFCCC Secretariat 2013 (forthcoming).

²³ GIZ has developed a *NAMA Tool* that outlines 10 steps, including strategy and implementation. <http://mitigationpartnership.net/nama-tool-steps-moving-nama-idea-towards-implementation>, accessed 1 July 2013.

²⁴ www.NAMApipeline.org

²⁵ NAMA Database is a wiki that tracks NAMA activities: www.nama-database.org

²⁶ Published as of mid-August 2013. Refer to the *NAMA Registry*, the *NAMA Pipeline* and the *NAMA Database* for more recent feasibility studies and NAMAs.

3. Structuring a NAMA for Efficient Lighting

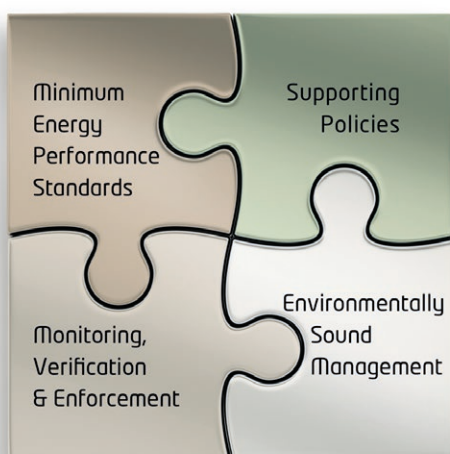
UNEP/GEF en.lighten initiative’s integrated policy approach contains most of the elements needed to develop a NAMA proposal. Two additional elements (measuring, reporting and verifying; and, financing) are described in this Guidebook. NAMA proposals present an opportunity for countries to obtain support for implementing their efficient lighting strategies on the basis of concrete, implementable actions. The national strategy should be developed first, to provide the framework and objectives. The NAMA follows the strategy, and outlines how the activities will be implemented, funded, monitored, reported and verified.

Developing a national efficient lighting strategy

Many countries have completed, or will soon complete, massive programmes to procure and distribute millions of energy efficient lamps (such as compact fluorescent or light-emitting diode lamps) to replace inefficient incandescent ones. However, without supporting policies and legislation to permanently remove inefficient lighting products from the marketplace, users may revert to inefficient lamps because they are familiar and still available, typically at lower initial costs. The presence of poor quality products in the market may result in consumers abandoning the energy efficient alternatives after a first try. Strategies, therefore, have to be long-term, covering a complete phasing out of the inefficient products from the market, while simultaneously ensuring an environmentally sound management system for the reduction of hazardous materials in lighting products and for collecting and recycling spent lighting products.

To address these issues and guarantee a sustainable transition to efficient lighting, UNEP recommends an integrated policy approach, based on the publication, *Achieving the Global Transition to Energy Efficient Lighting Toolkit*²⁷. This approach emerged from a global dialogue facilitated by UNEP and 40 institutions from governments, international organizations, private sector, and civil society groups from developing and developed countries, to elicit successful lessons learned in implementing efficient lighting programmes. It highlights the importance of a multi-stakeholder consensus, incorporating the needs and priorities of the public and private sectors, non-governmental organizations, civil society, and funders. The integrated policy approach has four elements, as described below.

Figure 1: Integrated policy approach for a rapid transition to efficient lighting



²⁷ UNEP en.lighten initiative publications are available to download in multiple languages: <<http://www.enlighten-initiative.org>>

Minimum energy performance standards²⁸

Minimum energy performance standards are regulatory measures specifying minimum efficacy or efficiency levels acceptable for products sold in a particular country or region.

- Countries should define the parameters, stringency and implementation period for the standards.
- Countries are encouraged to review existing standards of major markets to learn from best practices.
- Performance standards should specify the maximum permissible energy consumption limit for a given lumen output, or the minimum efficacy that a product must meet.
- A schedule of future performance standards may require greater stringency as more efficient technology becomes available.
- Legislation typically includes or refers to product labelling requirements.
- Additional lighting and product quality guidelines may be stipulated.

Supporting policies²⁹

Supporting policies ensure that the intent of minimum energy performance standards is met by enabling all market players to make an effective transition to higher efficiency technologies and practices. Policies may include:

- Regulatory and control mechanisms: laws and implementation regulations that require certain devices, practices or system designs to improve energy efficiency.
- Economic and market-based instruments: market mechanisms that are often initiated and promoted by regulatory incentives, but which can also contain elements of voluntary action or participation.
- Fiscal instruments and incentives: mechanisms that impact prices, such as taxes aimed at reducing energy consumption, or financial incentives to overcome initial cost differences.
- Information and voluntary action: initiatives that persuade users to change or modify their behaviour by providing relevant information and examples of successful implementation.

Environmentally sound management³⁰

Environmentally sound management encompasses all phases of the life cycle for lighting products: materials used in manufacturing; manufacturing processes; packaging; distribution; use; collection and recycling; and, treatment of the spent products. Maximum amounts of mercury and content standards for other hazardous substance should be established in line with global best practices. Ensuring the availability of quality lighting in the market, and verifying their compliance with maximum hazardous materials limits, is essential to minimizing health and safety risks.

- Special attention should be given to the development of a legal framework for environmentally sound end-of-life activities, making this a high national priority and ensuring coordinated law enforcement.
- The principle of extended producer responsibility should be considered by each country's environmentally sound management plan.
- Policy and legislation should be carefully drafted and implemented before formal collection channels and recycling facilities are established.

These recommendations reflect global international initiatives addressing hazardous waste, such as the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*, and the forthcoming *Minamata Convention on Mercury*³¹.

Monitoring, verifying and enforcing³²

The success of an efficient lighting transition strategy depends heavily on a functional system of monitoring, controlling, and testing facilities capable of ensuring enforcement and full compliance with standards. Unless effective and timely market surveillance systems are enforced, substandard products will continue to enter national markets in increasing numbers, reducing energy and financial savings.

²⁸ Described in "Section 2, Selecting and Implementing Energy Efficient Lighting Policies," in, *Achieving the Global Transition to Energy Efficient Lighting Toolkit*. UNEP, 2012.

²⁹ Described in "Section 3, Financing the Transition to Energy Efficient Lighting," and, "Section 6, Communications and Engagement," in, *Achieving the Global Transition to Energy Efficient Lighting Toolkit*. UNEP, 2012.

³⁰ Described in "Section 5, Safeguarding the Environment and Health," in, *Achieving the Global Transition to Energy Efficient Lighting Toolkit*. UNEP, 2012.

³¹ Basel Convention: <<http://www.basel.int/Home/tabid/2202/mctl/ViewDetails/EventModID/7698/EventID/393/xmid/8052/Default.aspx>>. The Minamata Convention on Mercury will be presented for signature on 9-11 October 2013: <<http://www.unep.org/hazardoussubstances/MinamataConvention/tabid/106191/Default.aspx>>

³² Described in "Section 4, Ensuring Product Availability and Conformance," in, *Achieving the Global Transition to Energy Efficient Lighting Toolkit*. UNEP, 2012.

Compliance activities have multiple purposes. They protect citizens from products that fail to perform as declared; ensure that government regulators fulfil the objectives of their efficient lighting initiatives; and, protect suppliers by ensuring that all lighting product suppliers are subject to the same market entry conditions. Compliance activities can be explained as follows:

- Monitoring is a measurement process to verify product efficiency.
- Verifying is the process through which declarations of compliance are confirmed by lighting suppliers.
- Enforcing is the system of action taken by programme administrators or other responsible parties against suppliers of non-compliant (including counterfeit) products.
- Enhancing the capacity of various countries and the sharing of information and skills between countries and across regions provides an effective means through which to promote best practice, quickly and thoroughly.

Contents of a national efficient lighting strategy

A national efficient lighting strategy describes goals, activities and expected outcomes, within a specified timeline and with clearly designated parties. UNEP recommends that each country convene a national coordinating committee to develop its national strategy. UNEP offers tools and templates for strategy development³³.

Situation and need for strategy

The national efficient lighting strategy begins with a section that quantifies and justifies the potential benefits of the transition to efficient lighting, evaluates activities that have been carried out in the past, and presents a summary of analyses of the key issues and options for action.

Goals

Heeding the national situation and interests, the country must identify and name the goals in the strategy framework. Some examples would be: establishing an integrated policy approach for a sustainable and rapid transition to efficient lighting; harmonizing lighting-related legislation with other national standards and with regional standards or best practices; providing affordable, clean, safe and modern lighting for all households; or, fulfilling national and international climate change and environmental agreements and conventions.

Objectives and method

Up to three objectives are identified for each of the agreed-upon goals. The objectives are specific actions that have measurable results. Some examples would be to increase the “stock efficiency” of installed lighting products; increase national demand for high efficiency, high quality lighting products; reduce operating costs of lighting; reduce or shape electricity peak demand; and reduce greenhouse gas emissions by a certain percentage annually, contributing to a multi-year percentage reduction by a certain date. The method by which evidence will be developed should be described and made available to any national stakeholder. Most countries require that a cost-benefit analysis accompany any proposed legislation, thus, the evidence provided must be as accurate and up-to-date as possible.

Key legislation

An effective strategy contains a regulatory framework compatible with existing or planned legal structures. Often, countries already have some regulations or standards for on-grid electrical appliances. However, policies or standards regarding off-grid lighting may have no legal precedent.

Key legislation should identify the legal instruments in force or to be implemented on each of the elements of the integrated approach, such as minimum energy performance standards that phase out equipment that does not satisfy the minimum levels. A labelling scheme may also be applied to help buyers recognize high efficiency lighting products.

Principles for establishing the environmentally sound management of used lighting products may include a producers' extended responsibility scheme, and limits on hazardous substances in products³⁴. Other legislation may encourage economic reforms,

³³ “National Efficient Lighting Strategy Inception Package for Pilot Countries,” <http://www.enlighten-initiative.org/portal/CountrySupport/GlobalEfficientLightingPartnershipProgramme/tabid/79081/Default.aspx>.

³⁴ Examples include: the European Union's *Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) 2002/95/EC*; *European Community directive 2002/96/EC on waste electrical and electronic equipment (WEEE)*; and the forthcoming *Minamata Convention on Mercury*.

such as monitoring, verifying and enforcing schemes; tax incentives on efficient lighting appliances and disincentives for inefficient products; awareness campaigns and efficient lamp distribution programmes with on-bill financing schemes.

Responsible parties

The development of an efficient lighting strategy is a country-driven process. All the competent national institutions must work on the strategy together, and the responsibilities must be identified according to each institution's scope and reach. For example, the Ministry of Energy may have the mandate to regulate the energy efficiency of lighting and other appliances, the Ministry of Environment (or equivalent institution) is typically in charge of developing laws and regulations on hazardous waste, and the Ministry of Economy (or equivalent institution) generally has authority on tax exemptions, subsidies, and customs. All entities responsible for the activities proposed in the national efficient lighting strategy must be identified, with roles and outcomes described. A national coordinating committee should steer the process and include all relevant stakeholders.

Government must ensure that the national strategy is broadly supported and developed through a multi-stakeholder, participatory process, involving and engaging appropriately interested and affected parties, such as the private sector (manufacturers, retailers, distributors, business associations and investors), civil society (non-governmental organizations and advocacy groups), and technical institutions (laboratories, universities and other experts). A strong and transparent participatory process ensures that the national strategy considers relevant concerns and provides potential solutions to issues that the government may have overlooked.

Time frame and measuring progress

A comprehensive timeline for implementing the strategy is developed that details activities for each element of the integrated approach, the expected outcome for each of these activities, and clear indicators and milestones to measure progress.

Risks and costs

Using the tools provided by UNEP, along with national data, the strategy includes a list of financial, market, and political risks and barriers to be addressed in the transition to efficient lighting. This analysis notes the obstacles, and suggests solutions. The costs and benefits from the transition are estimated, as accurately as possible. Financial sources and opportunities are identified. Based on the financial risk analysis and the plan of activities, the national coordinating committee should ultimately propose a budget, and financial scenarios to support the budget.

Moving from strategy to action

Once the national efficient lighting strategy has been satisfactorily completed, the developer of a NAMA proposal works to transcribe the strategy into a practical implementation plan, following the last three steps described in Chapter 2, Table 1. The NAMA process encompasses a wide range of activities: developing the NAMA proposal, submitting it to The *NAMA Registry*, implementing the NAMA action plan, monitoring progress and reporting its impacts, which are carried out by various stakeholders. A transparent, nationwide consultation process and strong stakeholder engagement are essential for the successful outcome of an efficient lighting NAMA.

Different organisations supporting NAMAs will likely provide their own templates for NAMA proposals. The *NAMA Registry* formats for the presentation of NAMAs for support include basic guidance on how to submit information to the *NAMA Registry*³⁵, and may be used as a generic format for the provision of the minimum information requirements, which resulted from the international negotiations under the UNFCCC. Although submission to the *NAMA Registry* is voluntary, UNEP recommends using the *NAMA Registry* to increase the international visibility of the NAMA, but also stresses that funders are likely to require more detailed information.

The overview presented below is generic and does not follow a template format. It includes the relevant elements to present a NAMA for support, based on current experience, and different NAMA templates that have been developed by several organisations. The suggestions allow countries to respond to information requirements from different potential funders, although NAMA proponents should be prepared to tailor their proposals to the (type of) funder addressed.

³⁵ http://unfccc.int/files/cooperation_support/nama/application/pdf/registry_manual_25_oct.pdf

Elements of a NAMA proposal

The NAMA proposal provides detailed information on the planned mitigation activities, how they will be implemented and monitored, as well as justification for why international support is necessary to support the implementation. Table 3 provides a summary of the main information elements of a NAMA proposal.

Table 3. Overview of an efficient lighting NAMA proposal

NAMA Proposal	What should be included?
Context, background, barriers and proposed solutions	<ul style="list-style-type: none"> • Situation and need for a national efficient lighting strategy, linked to national energy, environmental or other strategies • Information on the policy context, current (baseline) situation, institutional context and stakeholders • Description of existing barriers to efficient lighting • Proposed solutions
Scope and objectives	<ul style="list-style-type: none"> • Description of the scope of the NAMA, its goals and main objectives
Components and timing	<ul style="list-style-type: none"> • Components should be developed in the context of the identified barriers • Plans and timing for implementing the main activities • Key legislation that will be proposed, and the responsible parties for proposing and approving the legislation
Expected impacts	<ul style="list-style-type: none"> • Including estimated emissions reductions and other positive or negative impacts
Costs and support needs	<ul style="list-style-type: none"> • Description of the implementation cost of the NAMA, including identification of finance sources and support needs, including non-financial support required, such as capacity building • Budget items, per year and for the duration of the NAMA, including anticipated revenues (cash and in-kind support) and expenses
Measuring, reporting and verifying framework	<ul style="list-style-type: none"> • Description of the framework for measuring • Key indicators to measure progress in implementation • Key indicators to assess impacts, sustainable development, and greenhouse gas emissions reductions <ul style="list-style-type: none"> · Methodology for estimating impacts · Systems and procedures for collecting and storing data • Roles and responsibilities for data collection, analysis and reporting • Reporting format and verifying procedures should conform to the government's and funders' requirements
Implementation plan	<ul style="list-style-type: none"> • Details on the planned implementation of the activities: • Institutional framework, roles and responsibilities of various stakeholders • Time frame • Risk management
Financing plan	<ul style="list-style-type: none"> • Describes the funding scheme, which may include domestic funds or a combination of domestic and international funds • References the budget for costs and support needs
Responsible parties	<ul style="list-style-type: none"> • NAMA focal point • Person and organization with overall responsibility for the NAMA • Key institutions and contacts

Context, background, barriers and proposed solutions

The context and background should include a description of the current efficient lighting situation in the country. Relevant national policies, objectives, and laws should be cited, such as energy efficiency policies, existing energy performance standards, product labelling requirements, and national climate change policy and targets. This information serves as both a baseline (starting point of the NAMA) and a commitment to integrate the actions into national policy; both are important considerations for NAMA funders.

When framing the NAMA, existing barriers to an efficient lighting transition should be noted and analysed, and solutions proposed. Barriers may include:

- Economic and financial: higher initial cost of the efficient lighting products, potential impact on local manufacturers or distributors;
- Information: lack of knowledge of the technology and its benefits, concerns about environmental impact of lighting technologies, concerns about power supply variables (surges, brown-outs, black-outs) and the performance of lighting products, and lack of metering to track the impact of installing efficient lighting;
- Regulatory and institutional: lack of performance standards, lack of procurement policies, inadequacy/lack of verification and enforcement capacity;
- Market: technology not yet available in the market, low volume demand for products, lack of incentives to adopt new technologies;
- Behavioural: unfamiliarity with or unwillingness to buy or use new technology.

The barrier analysis provides the basis for defining the interventions, the activities that form the core of the NAMA, and that should solve the problems posed by the barriers.

NAMA scope and objectives

The scope and objectives of the NAMA include a definition of the efficient lighting technologies covered, sectors (residential, commercial, and industrial) and geographic range (national or sub-national). The objectives may include:

- High level policy objectives related to the national climate change and development path, such as improving the energy efficiency of buildings and contributing to national energy efficiency and greenhouse gas emissions reduction targets;
- Sector-specific objectives related to efficient lighting, such as the phasing out of inefficient lighting products by a specific target year or development of the lighting energy technology and services market (as tracked, for example, by the number of efficient lighting products installed and operating during a specific year).

The national efficient lighting strategy can include other goals and objectives not directly related to mitigation, such as achieving annual collection and recycling targets. However, the focus of objectives in the development of a NAMA should be on goals that refer to climate change mitigation activities, even though co-benefits may, in some cases, be the actual drivers.

NAMA components and timing

An analysis of the barriers that prevent the elements of the integrated policy approach from being fully or efficiently implemented may help identify specific activities to be included in the NAMA. For example, the lack of a monitoring, verifying and enforcing policy would weaken the impact of a minimum energy performance standard, because non-compliant products may not reduce electricity consumption or related greenhouse gas emissions. The analysis section must describe in detail the concrete activities and proposed interventions, and how they would help overcome potential barriers. The actions should build on existing policies and processes, where possible, to ensure an integrated approach at the national policy level. Table 4 shows how activities can be derived from the objectives of the NAMA, through a barrier analysis.

Table 4. Example of identification of activities through a barrier analysis

Goal						
Reduce greenhouse gas emissions via a rapid and sustainable transition to energy efficient lighting						
Objectives						
Increase the stock efficiency of installed lighting products by (percent) by (date)				Establish environmentally sound management scheme to collect, treat and recycle (number) tons of spent product annually		
Barriers						
Products not affordable for buyers	Buyers and users lack awareness of the benefits of efficient lighting	Lack of enforcement for minimum energy performance standards for lighting	Lack of capital to build, operate and maintain facilities	Lack of technical expertise		
Activities						
Provide rebates or distribute products to targeted groups	Buy products in bulk to obtain lower prices	Provide information via communications campaign	Strengthen capacity to enforce standards	Create labelling program	Create a public-private partnership to plan and execute the scheme and its financing	Offer a training program

Expected impacts

NAMAs should result in transformational changes in the lighting sector by moving the market along a low-carbon pathway. Efficient lighting NAMAs also should reduce greenhouse gas emissions in the context of sustainable development. UNEP recommends that an efficient lighting NAMA proposal should be designed and described, with respect to both of these fundamental objectives. The NAMA proposal should estimate the anticipated impacts in terms of expected emissions reductions. Annex C provides more detail on estimating impacts for an efficient lighting NAMA.

Efficient lighting NAMAs are mitigation actions identified in the context of countries' sustainable development objectives. Their implementation should deliver economic, social and environmental benefits.

- **Economic:** The implementation of a national efficient lighting strategy can reduce electricity bills for consumers. Implementation can lower the rate of growth of electricity demand, thus resulting in cost savings associated with avoided additional electricity generation capacity, including government savings from lower dependence on fossil fuel subsidies.
- **Environmental:** Reduced demand for electricity compared to the business as usual case, and, hence, reduced electricity generation, is expected to result in lower levels of air pollution (sulphur dioxide, nitrous oxide and other gases). Lower electricity production could also have benefits such as reduced use of water and other natural resources. As part of an efficient lighting NAMA, a disposal facility for mercury-added lamps and electronic gear used for lighting systems would reduce mercury and other hazardous material risks.
- **Social:** The implementation of a national efficient lighting strategy by reducing electricity bills, especially for the lower income section of the population, results in welfare gain as saved income that can be used for other expenses. An efficient lighting NAMA could also contribute to job creation and economic development by establishing new service areas, such as recycling and test centres.

The NAMA proposal should include an assessment of the expected impacts on a qualitative and/or quantitative basis (for example, the number of jobs created or expected amount of savings on fossil fuel subsidies). Impacts can derive from specific activities or outcomes, as illustrated below.

Table 5. Logical framework for impacts associated with efficient lighting activities

Activities						
Provide rebates or distribute products to targeted groups	Buy products in bulk to obtain lower prices	Provide information via communications campaign	Strengthen capacity to enforce standards	Create labelling program	Create a public-private partnership to plan and execute the scheme and its financing	Offer a training program
Outcomes						
Increased installation of efficient lighting products					Spent lighting products managed in an environmentally sound manner	
Impacts						
Climate: Lower greenhouse gas emissions (compared to business as usual)	Economic: Energy cost savings	Institutional: Increased mitigative capacity		Environmental: Less mercury and other hazardous materials in waste streams and environment	Social: Green jobs created	

The template provided for sharing information on NAMAs in the *NAMA Registry* includes a section on contributions of the NAMA towards sustainable development priorities of the host country³⁶. This should also link to wider national goals, including the national energy strategy and low-carbon development strategies, if these already exist.

Costs, support needs and financing plan

The NAMA proposal needs to provide a detailed assessment of costs of implementing all activities under the NAMA. These costs will form the basis of a request for support at the international level and for the design of public finance instruments, which will channel domestic and/or international funding.

Once the costs have been established, the amount of financial support required is then defined. The NAMA should highlight which elements can be financed unilaterally through public and/or private means. Generally, a high share of host country unilateral finance is more attractive to potential international funders because it demonstrates national commitment to the initiative. Other technology and capacity building needs may be identified, too. The financing plan should include costs, revenues and savings.

Countries may seek support other than financing. Chapter 5 provides guidance on which types of information to include if technology and capacity building support is requested. For example, Mexico identified the need for capacity building support activities to raise awareness of local banks, and to train the implementing national agency on procurement processes. Annex D includes a case study of Mexico's funding arrangements for efficient lighting activities.

Implementation plan

The implementation plan will accompany the NAMA proposal, either as an annex or as a complementary document. It will provide detailed information on the roles and responsibilities of different actors and stakeholders who will be involved in the implementation of the NAMA. It will also describe the institutional processes needed to implement the NAMA. The implementation should identify risks, and suggest mitigation measures. Alternatively, a separate risk section should be inserted to outline major risks and possible options for addressing them.

³⁶ Template: http://unfccc.int/cooperation_support/nama/items/7476.php

The NAMA proposal should set out how the sustainability and continuity of the expected outcomes can be ensured in the long-term, by referencing the long-term aspects of the national efficient lighting strategy and the climate change strategy. Moreover, the NAMA should explain when and how the funders would conclude their support of the NAMA.

Measuring, reporting and verifying framework

Measuring, reporting, and verifying of NAMAs is an international requirement, although there are no agreed guidelines yet. The UNFCCC Subsidiary Body for Scientific and Technical Advice is developing guidelines for measuring, reporting and verifying for unilateral NAMAs. International measuring, reporting, and verifying for internationally supported NAMAs will be guided by the supporting entity, and will follow the guidelines for International Consultation and Analysis adopted at the 17th Conference of the Parties.

Where possible, the NAMA should describe the measurement methodology, including: the greenhouse gases impacted by the NAMA activities as well as other expected impacts, indicators and estimation methods, data required for estimation, methods to collect and store data, and methods for ensuring reliability of data and estimates. The main aim is to ensure transparency, so the methodology description should be comprehensive and consistent, to enable a third party to replicate the estimations. Measuring, reporting and verifying requirements for NAMAs ultimately are likely to be aligned with funders' demands, while generally affording more flexibility than mechanisms such as the Clean Development Mechanism.

4. Measuring, Reporting and Verifying

This chapter provides guidance on measurement methodologies, reporting and verification processes and procedures. It briefly explains the measuring, reporting and verifying framework for NAMAs, and then explains the aspects of developing a measurement methodology for an efficient lighting NAMA.

Framework for developing country NAMAs

This section explains in simple terms the complete measuring, reporting and verifying framework for developing country mitigation actions. In order to understand this framework, it can be divided into two tiers: the measuring, reporting and verifying of the voluntary national mitigation actions of developing countries under the Convention, which can be called the national tier, and the measuring, reporting and verifying of the specific individual NAMAs (implemented by the countries as part of their voluntary national mitigation obligations), which can be called the NAMA tier. The NAMA tier supports the national tier³⁷.

National tier

The measuring, reporting and verifying of the voluntary national mitigation actions of the developing countries will be conducted at the international level, under the UNFCCC. This tier covers the measuring, reporting and verifying of all the national mitigation efforts and the national greenhouse gas inventory. It includes: measuring parameters to prepare the national greenhouse gas inventory; reporting of information on the national greenhouse gas inventory and the impacts of NAMAs implemented by the country, including on greenhouse gas emissions; and assessment of the information reported through International Consultation and Analysis (akin to the verifying step of measuring, reporting and verifying).

NAMA tier

The NAMA tier addresses the measurement, reporting and verification of individual NAMAs. This tier supports the national tier, and provides the necessary information on NAMAs for countries to prepare their Biennial Update Reports for the UNFCCC. Unilateral and supported NAMAs will be subject to measuring, reporting and verifying, according to the NAMA tier. The NAMA tier will be established by the country, based on the general guidance being developed by the Conference of the Parties³⁸. This will likely provide guiding principles and/or good practices, which countries could use to establish institutional arrangements, and modalities and procedures for undertaking measuring, reporting and verifying of NAMAs. Modalities and procedures will include: guidance for developing measurement requirements for individual NAMAs, reporting requirements, and process and procedures for undertaking verification of the reported information. NAMA developers are expected to use the guidance on measurement requirements to develop a measurement methodology for the NAMA, and to use the reporting requirements to report the measured information.

Domestic measuring, reporting and verifying will be in accordance with the general guidelines being developed by the Conference of Parties, to be finalized in November 2013. The guidelines are expected to be generic, and allow for significant national interpretation for the development of a domestic measuring, reporting and verifying system.

Measuring, reporting and verifying of internationally supported NAMAs will be influenced by the requirements of the entity providing support. Internationally supported NAMAs will also be subject to international measurement, reporting, and verification, in accordance with guidelines developed for International Consultation and Analysis, adopted at the 17th session of the Conference of the Parties.

The measurement requirements for NAMAs described in this chapter are based on UNFCCC defined guidelines for the Biennial Update Report (regarding information to be provided on planned and implemented NAMAs), and on the approaches used for measurement by various internationally supported climate change mitigation funders, such as the Global Environment Facility and investors in Clean Development Mechanism projects.

Given the wide range of activities possible under NAMAs, the level of accuracy with which the impacts, especially greenhouse gas impacts, can be measured at a given cost is expected to vary significantly. Also, the level of accuracy required by financial

³⁷ United Nations Environment Programme Riso Centre. 2013. *Understanding the Concept of Nationally Appropriate Mitigation Actions*.

³⁸ General guidance for measuring, reporting and verifying NAMAs will be considered at the 19th Conference of the Parties.

and other stakeholders may vary. Thus, the approach to measurement and verification could vary from a simple approach to a very accurate and sophisticated approach. For example, estimates of reduced load from the replacement of inefficient incandescent lamps with higher efficiency compact fluorescent or light emitting diode lamps may suffice for some NAMAs. The estimates could be increased in accuracy by prequalifying the energy performance of the lamps, then measuring the use and useful life of the lamps after they are installed. The trade-off between cost/level of effort and precision, which ultimately will be influenced by the current availability of data and opportunities for initiating additional data collection, will also influence the approach to measuring and verifying.

Methodology for measuring, reporting and verifying

Measurement methodologies and procedures

Measurement methodologies and procedures define how to monitor the expected impacts (including greenhouse gas related impacts, transformational impacts and sustainable development benefits), the progress (both the status of activities and outputs), and the support given to the NAMA. The measurement methodology includes:

- Defining the geographical scope;
- Defining the impact boundaries of the activity on greenhouse gas emissions, as well as sustainable development benefits;
- Defining the baselines for key development benefits and greenhouse gas emissions;
- Defining the indicators to measure the impacts;
- Identifying the data required to measure/estimate the impacts;
- Developing a data collection system; and
- Establishing procedures to ensure reliability of data collected and estimates.

What to measure in a NAMA

To understand what kinds of measurements are required, the guidelines for Biennial Update Reports, as adopted at the 17th session of the Conference of Parties, outline the following types of information that countries are expected to report on NAMAs (planned and implemented) to the UNFCCC³⁹:

- Information on planned NAMAs: progress indicators to track the implementation of the NAMAs; methodologies and assumptions related to estimation of greenhouse gas emissions reduction.⁴⁰
- Information on NAMAs under implementation, or implemented: progress of NAMAs under implementation, including the underlying steps taken and further steps envisaged; results achieved, outputs (metrics depending on type of action), and impacts in terms of greenhouse gas emissions reduction.

This is the minimum required information that should be measured for NAMAs. The two broad categories of measurement requirements listed are progress indicators and impacts indicators of NAMAs, including greenhouse gas impacts. Countries are also required to provide the methodology and assumptions made in estimating greenhouse gas impacts.

Types of indicators

The first categorization of what is being measured concerns either the progress (position relative to the time frame and milestones) or the impacts (results obtained). Both impact and progress indicators should aim to be specific, measurable, accurate, realistic and time-bound (“SMART”), while bearing in mind the trade-off between price and precision⁴¹.

Progress indicators track the implementation status of NAMA activities. The expected deliverables for each of the activities described in the national efficient lighting strategy are a good basis for identifying progress indicators, as are the indicators and milestones to measure progress on each of the elements of the integrated approach. Progress indicators may relate directly to impact indicators if the impact is assessed on the basis of reaching certain milestones. For example, an indicator could be a certain number of efficient lighting products that are distributed in the market and associated by deemed usage. Both impact

³⁹ Annex III to decision 2/CP.17.

⁴⁰ It will also include information on the objectives, and a description of NAMAs, including information on the emissions sources covered in the NAMA (sectors and gases) and quantitative goals; steps envisaged to implement the NAMA; barriers, and related financial, technical and capacity needs, including a description of the support needed.

⁴¹ In some cases, it may not be possible to have quantitative indicators and, thus, qualitative indicators may be used to measure progress or impacts. In the case of qualitative indicators, the term ‘measurable’ does not imply measuring exact quantities, but measuring the perceived impacts. For example, qualitative indicators could be the percentage of people likely to buy efficient lamps; this could be measured through surveys.

and progress indicators help to demonstrate the effectiveness of implementation, and the efficiency of support for specific NAMA activities.

Table 6. Examples of progress indicators

Goal						
Reduce greenhouse gas emissions via a rapid and sustainable transition to energy efficient lighting						
Objectives						
Increase the stock efficiency of installed lighting products by (percent) by (date)					Establish environmentally sound management scheme to collect, treat and recycle (number) of tons of spent products annually	
Activities						
Provide rebates or distribute products to targeted groups	Purchase products in bulk to obtain lower prices	Provide information via campaign	Strengthen capacity to enforce standards	Create labelling programme	Create a public-private partnership to plan and execute the scheme and its financing	Offer a training programme
Progress Indicators						
(number) of efficient products sold (or distributed) and in use	(number) of efficient products purchased at low cost and in use	(number) of media appearances (times) (number) of viewers or listeners	Additional enforcement programmes and/or officers trained to recognize standards violations	Labelling programme established and in use by industry	Facilities are built and scheme is operating, and handling (number) of tons of spent products annually	(number) of sessions conducted (times) (number) of persons trained

Impact indicators refer to the impact of outputs of NAMAs. These are referred to as outcomes in the logical framework analysis, and relate to the reduction of greenhouse gas emissions, as well as other objectives served by the activity, in accordance with national sustainable developmental goals. The measurement methodology must include indicators for all objectives served by the NAMA, including transformational changes that shift the economy towards a low-carbon development pathway.

Table 7. Examples of impact indicators

Goal				
Reduce greenhouse gas emissions via a rapid and sustainable transition to energy efficient lighting				
Objectives				
Increase the stock efficiency of installed lighting products by (percent) by (date)			Establish environmentally sound management scheme to collect, treat and recycle (number) of tons of spent products annually	
Impacts				
Climate: Lower greenhouse gas emissions (compared to business as usual)	Economic: Energy cost savings	Institutional: Increased mitigative capacity	Environmental: Less mercury and other hazardous materials in waste streams and environment	Social: Green jobs created
Impact Indicators				
(number) of tCO ₂ e reduced	Annual savings (amount) attributable to use of efficient lighting products	Minimum energy performance standards and labelling programme violations identified and processed via enforcement authority	Amount of hazardous materials reduced or removed from waste streams and environment	(number) of jobs created

The potential benefits identified in the national efficient lighting strategy are a good starting point for identifying and deciding which indicators are useful to measure, report and verify the impacts of an efficient lighting NAMA on a regular basis. Impacts can be indicated either quantitatively (such as the number of efficient lighting jobs created), or qualitatively (such as the successful enforcement of a lamp labelling programme).

Procedures for data collection are described in Annex E.

Implementing the measuring, reporting and verifying process

A measuring, reporting and verifying scheme includes institutional arrangements to oversee the implementation of the process, procedures and guidelines, including a clear definition of the responsibilities of the different actors. In the case of internationally supported NAMAs, these guidelines and procedures may need to be agreed upon with the entity providing international support.

The institution that oversees the measuring, reporting and verifying system will be responsible for developing and providing guidance on measurement methodology and reporting, and, for defining the process for verification. Developers and implementers of NAMAs will be responsible for developing the measurement methodology and for reporting in accordance with the guidelines.

Reporting

Reporting entails regular communication from the entity implementing a NAMA to different entities, such as the designated authority that manages the measuring, reporting and verifying system or the entity providing international support. The parties agree upon the content and format of the reporting templates. Purposes of reporting may include:

- Providing information to the relevant national entity for inclusion in the Biennial Update Report, for the *NAMA Registry* (which in the case of unilateral NAMAs would be for recognition), for national policy mainstreaming, for impacts on sustainable development and for co-benefits; and,
- Fulfilling requirements per agreement with the entity providing support as per its requirement in a mutually agreed upon protocol, especially regarding greenhouse gas emissions reduction impacts.

The monitoring report for Clean Development Mechanism projects is an example of a reporting template. There are no standard guidelines for reporting for NAMAs at present, so the following principles of reporting can be used to prepare and submit information: feasibility, relevance, completeness, transparency, consistency, accuracy and cost effectiveness.

Reporting frequency for internationally supported NAMAs would be as per the agreement with the international funder. For instance, this could be an annual report on the progress of implementing the NAMA.

Verifying

Verifying confirms that what has been measured and reported (progress in implementation and impacts) is complete, accurate, and transparently presented, so that a third party would arrive at the same conclusions based on the reported information. What is to be verified (the progress in implementation, greenhouse gas emissions reduction impacts, impact of sustainable development benefits, or a combination of these three aspects), and how the information is verified, will depend partly on the domestic and international entities providing support and partly on other national reporting requirements, if any. Below are two approaches that could be used to determine the verification procedure of an efficient lighting NAMA:

- The Clean Development Mechanism style of verification: Requires detailed analysis by a specific entity that is designated to verify the emissions reductions based on data collected in predefined procedures, with or without employing specified metering and estimations of indicators for greenhouse gas emissions, as reported by Clean Development Mechanism project implementers through the monitoring report. This is followed by an on-site visit from the verifier to undertake a sample-based analysis of the measured data to ensure accuracy and reliability.
- International Consultation and Analysis: This is equivalent to the verifying step for the Biennial Update Reports to the UNFCCC. The information in the report, including on NAMAs, is subject to analysis by an international team of experts to ensure that reporting is done as per the guidelines, and that it is complete, consistent and transparent. The analysis and the report will be discussed by Parties to the UNFCCC in order to understand the progress and identify the challenges that the host country is facing in implementing the NAMA.

NAMAs may have a wider scope and be policy-focused rather than project-focused, so the International Consultation and Analysis approach is most likely to be followed for verifying both unilateral and supported NAMAs. The reports submitted by the entities implementing a NAMA are expected to be thoroughly analysed to ensure completeness, transparency, and consistency. In the case of internationally supported NAMAs, depending on the requirements for precision of greenhouse gas emissions estimates, and the financing provided, verification of the greenhouse gas emissions reductions could be more stringent. It may use the approach based on sampling, used by Programmes of Activities under the Clean Development Mechanism. It would be natural to seek inspiration here to design a verification system that corresponds to the required balance between precision and cost.

A third party could also perform a detailed review of the NAMA impacts, specifically the emissions reductions, based on the measurement methods and procedures. This is similar to the approach used for the evaluation of policies and programmes implemented by governments, where specifically designated governmental departments (ones that are separate from the departments responsible for implementing the programmes or policies) undertake evaluation to assess the effectiveness of implementation in achieving the objectives of policies and programmes.

Specific process requirements for measuring, reporting and verifying support

Developed countries are required to report information on support provided to developing countries through biennial reports and National Communications. Thus, entities providing financing will require information on utilization of funds, as well as types of activities supported by their financial contribution, to enable them to meet their reporting obligations to the UNFCCC. This information will be used to assess the provision of climate finance by developed countries, to improve transparency of the support provided and the assessment of global efforts to reach the goal of USD 100 billion of climate change related funding per year by 2020. Developing countries are also required to provide information on support received and utilized in the Biennial Update Reports. Thus, entities implementing NAMAs will be required to provide information to the appropriate national authorities to enable host countries to meet their reporting obligations to the UNFCCC.

NAMA funders, whether national or international, will require effective systems for allocating and tracking financial resources for the implementation of NAMAs, to ensure that funds are used effectively and for the purposes intended. Entities implementing internationally supported NAMAs should adhere to international fiduciary standards. For example, national implementing entities applying for funds from the Adaption Fund must meet the fiduciary standards established by this fund. Similar requirements will emerge for NAMAs. In addition to fiduciary standards, monitoring of the support provided will also be subject to an agreement between the NAMA host country and the funder for the reporting through the appropriate national authority, ultimately also being subject to verification procedures.

5. Financing a NAMA

This chapter provides guidance to the NAMA developer to design a financing strategy, to structure the NAMA to meet funders' interests, and to identify potential funding sources. It includes advice on the details of incremental costs and ways to approach potential donors with a NAMA concept note or proposal.

Identify potential funding sources

A central activity in the design of a NAMA is identifying requirements in terms of financial, technical or capacity building support. Financial support is most relevant for NAMA implementation, so the needs that can be met domestically are specified, while those that require international support are described quantitatively, to demonstrate how the support will contribute to the activity.

Key issues to focus on, include⁴²:

- Well designed proposals that transparently incorporate extensive domestic stakeholder consultations;
- Detailing an ambitious but realistic work programme, capable of implementation. For example, the NAMA may focus on a region, and be phased in successive periods based on previous successes;
- Identifying a NAMA developer with a relevant mandate and appropriate technical and financial capabilities.

Domestic and international financing may include both public and private sources. For example, domestic funding could be targeted for low-cost, rapid return on investment interventions, such as straightforward lamp replacement programmes for the residential sector, while international funding may be requested for higher cost, longer term interventions such as lighting system upgrades for municipal and infrastructure facilities. Annex F lists potential funding sources for efficient lighting NAMAs. As shown below, diverse sources of financing can be considered and combined to implement a NAMA.

Table 8. Examples of funding that could support an efficient lighting NAMA

Type / Activity	Subsidized distribution of efficient products	Bulk purchase	Awareness raising campaign	Training programs at banks	Establishing product recycling facilities
Domestic funding					
Public funds, possibly combined with international funds	x	x	x	x	x
Private contributions, including public-private partnerships			x		x
International funding					
Market-based funds	x				
Public funds		x	x	x	x
Private investment	x			x	x

Developing a funding model involves exploring and evaluating different sources and kinds of public and private finance. NAMA funding plans should not rely solely on grants because transformational changes assume a permanent shift in the financing model employed in a sector. Such shifts will be achieved by attracting more sustainable sources of funding, such as private investments, permanent shifts in financing priorities, or bridge financing in anticipation of future savings or changes in market conditions.

⁴² A. Sharma, personal communication, 2013.

Domestic financing

Domestic financing includes budgetary support from public institutions as well as private sector investment⁴³. The following stakeholders may play a key role in mobilizing domestic financing for efficient lighting NAMAs:

- Government, such as national energy agency or Ministry of Finance;
- Power utilities or independent power producers;
- Energy service companies (ESCOs);
- Suppliers of lighting products and services;
- Banks and other financial service institutions;
- Electricity consumers.

Many of these stakeholders can contribute to the design and choice of policies, economic instruments, and financial vehicles (such as taxes, loans, grants, rebates or capital investments) that can be used to channel domestic financing toward specific NAMA components. For example, in Indonesia, a partnership between Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Policy Advice for Environment and Climate Change (PAKLIM) and PT OSRAM Indonesia is supporting and promoting the large-scale substitution of conventional streetlights with LEDs, as a component of a future NAMA⁴⁴.

Domestic financing can play a role in attracting additional international funds, and in setting framework conditions that make private investment attractive. Depending on the host country's circumstances and abilities, a strong domestic financial contribution will increase the attractiveness of the NAMA for international participation. Domestic financing may be directed towards 'no regrets' actions that are cost neutral or that yield a net profit. The latter would be obvious targets for private sector investment. Conversely, if there is no national contribution, or no national preparedness to restructure the financing to achieve transformational changes in a sector, the attraction for international funding may be limited. For instance, it may be difficult to convince international funders to compete with national fossil fuel subsidies.

International funding

International funding for NAMAs has focused on supporting readiness activities, such as institutional capacity building and preparation of concept notes, through either bilateral or multilateral programmes⁴⁵. Most of these programmes have been financed from the 2010 to 2012 'fast start financing' of USD 30 billion, agreed upon at the 15th Conference of Parties. International partnerships have also emerged from these programmes to build knowledge and share views on NAMAs among various institutions⁴⁶. Dedicated initiatives and sources for funding NAMA implementations are emerging, such as The NAMA Facility and the Green Climate Fund.

Some developed countries have announced funding for the implementation of NAMA activities in specific countries⁴⁷. A range of existing bilateral and multilateral funds offer funding to countries for mitigation activities without explicitly targeting NAMAs⁴⁸. Existing programmes offer support opportunities for sector-specific actions, as does the Renewable Energy and Energy Efficiency Partnership⁴⁹. Other development finance institutions continue to provide technical and/or financial support for mitigation measures in various sectors, though without a dedicated 'NAMA financing window'.

⁴³ For an overview of domestic financing options for efficient lighting, see Section 3 of the Efficient Lighting Toolkit. Available at: <http://learning.enlighten-initiative.org/ebook/en/mobile/index.html>

⁴⁴ Policy Advice for Environment and Climate Change et al. (n.d.). *Substitution of Conventional Street Lights with LEDs: An approach for RAD-GRK mitigation actions (NAMA)*. Accessed 14 August 2013 at: <http://www.paklim.org/news/>

⁴⁵ For example, the Japanese International Cooperation Agency (JICA) and the Ministry of Environment of Japan offer support in NAMA design and implementation. This funding is usually bilateral and based on requests from the host country. (Arnaoudov, 2013, personal communication).

⁴⁶ For example, the International Partnership on Mitigation and MRV (<http://mitigationpartnership.net/>) and the NAMA Partnership (<http://www.namapartnership.org/>).

⁴⁷ For example, Norway for Ethiopia and German institutions for Mexico, as noted by L. Cameron et al. 2012. *Annual Status Report on Nationally Appropriate Mitigation Actions*.

⁴⁸ For example, the Global Environment Facility and the International Climate Investment Funds.

⁴⁹ Also see Section 3, Financing the Transition to Energy Efficient Lighting, *Achieving the Global Transition to Energy Efficient Lighting Toolkit*. Available at: <http://learning.enlighten-initiative.org/ebook/en/mobile/index.html>

Box 1. The NAMA Facility

Announced in 2012, The NAMA Facility, established jointly by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, and the United Kingdom Department of Energy and Climate Change recently posted its first call for NAMA project outlines^a. “The Facility is designed to support developing countries that show leadership on tackling climate change and want to implement transformational country-led NAMAs. By this means, models should be explored for how NAMAs can be delivered within the existing global mitigation architecture in the short term”^b. As its first project, The NAMA Facility intends to support the implementation of the sustainable new housing NAMA of the Mexican Government.

- Type of financing available: grants, concessional loans and guarantees
- Budget: EUR 70 million (Germany’s funding of EUR 40 million is from the Special Energy and Climate Fund; and, the UK Government’s funding of GBP 25 million is from the International Climate Fund)
- Access modalities: open calls for NAMA projects, and selection by The NAMA Facility Board^c
- Delivery channels: KfW Development Bank, Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), and other bilateral and multilateral qualified delivery organizations
- Geographic and sectoral scope: all developing countries, all sectors

One of the most important statements in the guidance to The NAMA Facility is that proposals require the full support of the developing country receiving The NAMA Facility funding. Written documentation proving the full endorsement by the responsible national ministry or agency for the implementation of the NAMA support project must be included in the outline (templates are provided). In addition, proposals need to demonstrate evidence of successful consultation with the respective national ministry responsible for the coordination of official development assistance, in order to ensure a broad commitment for the proposed project within the government of the partner country.

^a <http://www.international-climate-initiative.com/en/issues/nama-facility/>. Accessed 13 August 2013.

^b As of 15 May 2013, Germany has committed €40m and the UK approximately €30 million. See <https://www.gov.uk/government/publications/information-about-the-nationally-appropriate-mitigation-actions-nama-facility>

^c Composed of representatives from DECC and BMU https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/199043/NAMA_Facility_-_Information_Document_14May2013_final.pdf

Box 2. The Green Climate Fund

The Green Climate Fund aims to become the main global fund for climate change. It was established in 2010 to support projects, programmes, policies and other activities in developing countries, including NAMAs^a. It is expected to channel a significant portion of the USD 100 billion that developed countries have pledged to mobilize by 2020 for mitigation and adaptation purposes in developing countries. Funding from the Green Climate Fund is not expected to be available before 2014. Access modalities, financing instruments and selection criteria for projects, including NAMAs and private sector support for NAMAs, will be developed by the Board and the Secretariat of the Green Climate Fund.

^a <http://gcfund.net/home.html>

Carbon market based funding

Experience with the Clean Development Mechanism illustrates how a carbon market based instrument can contribute to the financing of efficient lighting strategies through the revenues gained from the sale of offsets, in the form of carbon credits. NAMAs do not entail any international crediting. However, the New Market-based Mechanism that is currently being discussed in UNFCCC negotiations considers trading carbon units at a global or sectoral level⁵⁰. Clarity will only be established after 2015, when the New Market-based Mechanism rules are defined and operational. Any market mechanism, however, will depend on a demand for credits, as was learned from the first commitment period of the Kyoto Protocol.

Countries including Japan have announced a willingness to use bilateral offset mechanisms to support mitigation actions in developing countries, including NAMAs. In such cases, the importer of some of the emissions reductions resulting from a NAMA will use the import to offset a part of its national greenhouse gas emissions, implicitly requiring the NAMA host country to reflect the export of that quantity of emissions reductions in its Biennial Update Report and greenhouse gas inventory, in order to avoid double counting. The exported emissions reductions, therefore, would no longer count as national reductions in the NAMA host country. Only the portion of the greenhouse gas emissions reductions that are not exported, if any, would be considered as net mitigation benefits, as they would not be used to offset greenhouse gas emissions.

Private sector financing

Efficient lighting projects can be attractive investment opportunities for both domestic and foreign private companies, if they are profitable in a life cycle assessment. Private sector intervention, however, would require a financial structuring that allows a return on the investment. Energy service companies enter into contracts that allow them to invest in energy efficient equipment, and finance it through the savings on the energy bill. Such contracts are sizeable and, therefore, challenging for the domestic household market, but may function well with the public sector or large commercial customers. The private sector only invests if the risk/return ratio is acceptable; its involvement in energy service companies may require public sector intervention that reduces risks and barriers, or increases returns. Some major producers or distributors of efficient lighting products and related electrical equipment (including lighting controls) may offer energy services funding to municipalities or large industrial customers, if the returns on investment are low-risk and significant. Typically, the financial analysis is for a long-term period, such as 20 to 30 years, in keeping with the expected useful life of the lighting installation.

Other sources of financing

Bilateral financial institutions have extensive and long-standing experience in supporting traditional mitigation projects, and are increasingly engaging in the international support of NAMAs. A review of pilot and relevant activities of four bilateral financial institutions highlighted the measuring, reporting and verifying process, funding channels, engaging the private sector, and explores opportunities to utilise market mechanisms. "One of the key insights is that NAMAs should be mainstreamed into national development strategies to make the proposed actions 'nationally appropriate,' engaging planning, finance and line ministries, together with environment ministries. In addition, efforts should be intensified to produce financially viable and sustainable NAMA proposals, which can withstand the due diligence of financial institutions"⁵¹.

Meeting international funders' requirements

The type of information that funders may expect from a NAMA developer is shown below. There are many types of funding sources; they provide financing instruments that may require different types of information. Key requirements from potential domestic and international funders should be considered when structuring the NAMA financial plan.

The proposal to any donor should state at the outset how much funding is requested, how the funds would be deployed, and over what period they would be used. An exit strategy for winding down the intervention by funders is also important, as a NAMA should establish a self-sustaining market.

⁵⁰ For updates on these discussions, search <<http://www.unfccc.int/>> for, "New Market-based Mechanism."

⁵¹ *NAMA Finance Study: Examples from the UNEP Bilateral Finance Institutions Climate Change Working Group*. UNEP, 2012. Accessed 13 August 2013 at: <http://www.unep-fin.org/article/publications/3-unep-bfi-ccwg/35-nama-finance-study-examples-from-the-unep-bilateral-finance-institutions-climate-change-working-group.html>

Table 9. Information to be provided on costs and support required for NAMA preparation and/or implementation for the NAMA Registry

	Request of support for preparation	Request of support for implementation
Costs		
Estimated full cost	Costs and time frame of activities associated with the preparation of a NAMA, including: <ul style="list-style-type: none"> • Background and feasibility studies • Technical assessments and designs • Consultations with stakeholders • Selection and prioritisation of NAMAs 	Costs and time frame of activities for the implementation of the NAMA during its entire lifetime, including: <ul style="list-style-type: none"> • Pre-operation activities (legal, administrative and other costs) • Construction works • Operation and maintenance • Debt service for industrial facilities • Closure
Estimated incremental costs of implementation	Not applicable	Incremental cost is the difference in cost between a baseline scenario and a mitigation scenario
Support required		
Financing	<ul style="list-style-type: none"> • Total amount of financial resources that are needed for the activity (preparation or implementation), and amount provided from national budget • Type of financing instrument (debt, equity, guarantee or grant), and amounts needed from third parties 	
Capacity building support	<ul style="list-style-type: none"> • Type of capacity building support (institutional development, human capital, systemic: policies, legislative, regulatory) • Amount of capacity building support to prepare or implement the NAMA (for example, training of personnel, institutional strengthening activities, or e-learning programmes). • The amount of support could be expressed in monetary or person/hour terms. 	
Technological support	<ul style="list-style-type: none"> • Development of domestic framework conditions for adoption of certain technologies 	

Bilateral and multilateral funders are increasingly concerned with the transformational character of NAMAs, while private funders are generally concerned with traditional risk/return ratios for employing their private investment capital. Specific interests among donors and funders should be explored case-by-case, acknowledging that all NAMAs will differ in substance due to differing host country conditions. Financing criteria may be divided between greenhouse gas related criteria, shown in Table 10, and non-greenhouse gas related criteria, in Table 11. Both tables indicate how these criteria could be applied to efficient lighting NAMAs.

Table 10. Greenhouse gas related financing criteria

Greenhouse gas related criteria	Application to efficient lighting NAMAs
Cost effectiveness of emissions reductions	Ratio of emissions reduced by the replacement of inefficient incandescent lamps, versus costs to implement the NAMA.
Direct and indirect mitigation potential	Direct and indirect emissions reductions expected from the replacement of inefficient incandescent lamps (tCO ₂ e).
Mitigative capacity	Refers to a country's ability to reduce greenhouse gas emissions in the longer term. In the context of efficient lighting strategies, enabling activities to build institutional structures for measuring, reporting and verifying, for example, improve a country's ability to achieve long-term emissions reductions, also beyond the immediate target sector.
Long-term transformational potential and replicability	Transformational change is achieved through targeted strategic policy interventions which go beyond, for example, the mere replacement of inefficient incandescent lamps. It may include regulatory changes or training or awareness building activities aimed at making the programme sustainable in the long term.

Table 11. Non-greenhouse gas related financing criteria

Non-greenhouse gas related criteria	Application to efficient lighting NAMAs
Sustainable development benefits	The achievement of sustainable development through the NAMA will enhance the country's ownership, and will be considered a guarantee of the NAMA continuity in the long term (for example, creation of jobs for recycling systems).
Ownership and domestic funding (including co-financing)	Ownership of the country can be demonstrated through the involvement of high-level decision makers during the stakeholders' consultative process, and through domestic funding (for example, to cover the hardware costs for street lighting systems) or partial funding of specific NAMA components.
Robust measuring, reporting and verifying systems	As measuring, reporting and verifying of NAMAs is necessary to assess the emissions reductions achieved by the NAMA's activities and the use of support provided to such activities, the funder will pay particular attention to it, and may have specific expectations regarding measuring, reporting and verifying systems.
Alignment with national priorities	Demonstrates how the NAMA will contribute to the achievement of development or environmental objectives, and specifies if, and how, the NAMA is embedded into existing governmental strategies.

Box 3. The Role of the *NAMA Registry* in financing

The *NAMA Registry* is serving dual purposes of: presenting NAMAs for recognition; and, providing a platform where NAMA host countries and NAMA funders can meet. The UNFCCC Secretariat has already provided templates for submission of NAMA proposals. More guidance is expected by the end of 2013.

Some international funding requirements can be deducted from the information requested for the submission to the *NAMA Registry*. It is less certain, however, if the *NAMA Registry* will eventually be the main platform for directing financing to NAMAs. It may serve the purpose of announcing financing agreements established through other channels, such as The NAMA Facility.

Although highly recommended, it is not mandatory to fill all the information fields. Additional criteria that reflect the interests of international funders should also be considered when selecting the NAMA, and designing the NAMA proposal.

Structuring NAMA finance

The financial plan for a NAMA presents financial instruments and vehicles (with their respective amounts) for the implementation of the NAMA. It contains the entire financing of the action, not only the part for which international third party financing is invited. The plan may or may not be based on private sector financial involvement. In most cases, the plan will have to be updated, based on discussions with potential funders. Countries should initiate discussions with funders at an early stage in the development of the NAMA, rather than waiting until the full NAMA proposal has been developed.

Structuring the financial and economic instruments and vehicles

The main barriers to the implementation of mitigation activities are often financial and economic constraints or disincentives. The design of the NAMA includes the solutions proposed in the national efficient lighting strategy, showing how policy interventions, in the form of financial and economic instruments, can be used effectively to address specific barriers to the implementation of NAMA components⁵². Involving stakeholders early in the strategy and the NAMA process, allows for the design of instruments and mechanisms that are feasible and that can be combined to address a specific barrier. For example, a country could combine a tax rebate on efficient lamps with grants to community organizations for awareness raising campaigns to encourage consumers to buy the efficient lamps. Stakeholders should discuss the principle of extended producer responsibility and suggest which financial or economic instruments could help companies cover the initial costs of building collection systems and recycling facilities.

Table 12 presents examples of financial and economic instruments that could be used to overcome barriers to an efficient lighting NAMA, and channel domestic or international financing.

⁵² Württemberg, 2012 and OECD/IEA, 2012.

Table 12. Examples of financial and economic instruments

NAMA component	Encourage consumers to choose efficient lighting products	Install efficient lighting systems in commercial buildings	Build and operate collection and recycling facilities
Barrier	Lack of awareness of benefits and life cycle costs of efficient lighting	Unfamiliarity with new technology and concern about higher initial costs	Difficulty to access capital
Government	Tax rebate on efficient systems to make them comparable to conventional systems Reduce availability of inefficient products through regulation	Invite energy service companies into long-term contracts for the provision of energy efficient lighting	Direct public (or public-private partnership) investment to build recycling facilities, for example, using debt/equity based investment vehicles and guaranteed cash flow
Utility	Grant or co-funding of awareness raising campaigns Host professional training sessions for service providers	Finance capital costs through energy performance contracting Offer rebates to encourage uptake of new technologies, such as LED lighting systems and controls	Advise on best design and technologies for optimal use of electricity and other utility services
Local banks	Offer discounted loans to qualifying business owners	Use bank facilities as best-practice demonstration sites	Concessional loans (lowered interest rate) to builders or operators
Energy consumers	Calculate savings over full life cycle of system	Instruct users and maintenance staff on how to best use efficient lighting systems	Participate in collection and recycling programmes
Local companies	Demonstrate, distribute and install high efficiency lighting systems	Energy service company drives the project; undertakes efficiency monitoring	Capital investment

Such instruments and mechanisms are also essential to attracting international financing from both public and private sources. For instance, a development bank may be interested in providing a credit line to a local bank that provides loans for setting up recycling facilities, as a consequence of a grant offered by the government to lower the interest rates of those loans. National financial contribution may leverage international funding, demonstrating to the international counterpart a national priority and risk-sharing capability.

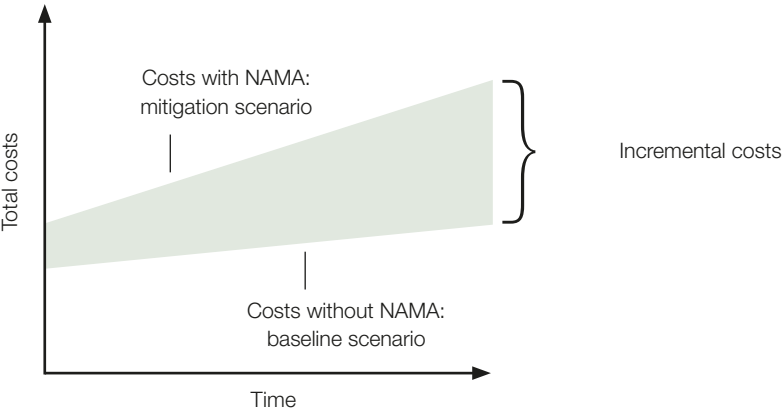
Some instruments may be more appropriate than others, depending on the host country's general economic situation and level of development. Grants and concessional loans are a preferred option in low income countries, while a broader range of financing instruments will be available in middle-income and transitional economies.

Calculating incremental costs

International support for NAMA implementation should cover incremental costs, the difference in costs between a baseline scenario and a mitigation scenario, as illustrated in Figure 6. In the context of mitigation actions, this may be interpreted as additional costs associated with transforming a project with national benefits into one with additional global greenhouse gas mitigation benefits⁵³.

⁵³ Incremental Costs and Financing Modalities. Global Environment Facility, 1995.

Figure 2. Incremental costs



For NAMAs, incremental costs are the differences between costs of delivering goods or services under “business as usual” conditions versus the costs of delivering the same illumination service with an additional mitigation outcome. Time is central to the calculation of incremental costs. For efficient lighting activities, the initial cost of equipment may require financing; the resulting lower operating costs eventually should contribute to a return on the investment. The time frame, the methodology and the assumptions should be stated.

Calculation of the incremental cost should be as transparent as possible. Potential funders may provide advice if models employed are inadequate or disregard later returns on investment. The less efficient the financing model, the higher the incremental cost. UNEP en.lighten modelling tools can support calculation efforts, including assessing costs associated with inaction⁵⁴. Most likely the final determination of incremental costs may be negotiated with any prospective funders.

The example below illustrates the difference in cost categories between the baseline scenario and the NAMA scenario for the replacement of streetlights with efficient lighting technologies. Incremental costs will be the difference between the costs of the baseline scenario and the costs of the mitigation scenario. To assure a transformational, long-lasting impact, such a programme should occur in parallel with, or subsequent to, the adoption of minimum energy performance standards and environmentally sound management legislation.

⁵⁴ The tool is available at: <http://learning.enlighten-initiative.org/Tools.aspx>.

Table 13. Examples of cost items

Scenario	Objective	Cost items
Baseline scenario	Use of conventional lighting technologies	<ul style="list-style-type: none"> • Operation • Maintenance • Energy costs • Installation and commissioning • Hardware, including possible warranty
Mitigation scenario	Replacement of conventional technologies with efficient lighting ones	<ul style="list-style-type: none"> • Engineering design and feasibility study • Hardware, including possible warranty • Operation • Maintenance • Energy costs • Quality control costs • Collection and recycling of conventional lamps • Institutional capacity building for municipalities and lending institutions • Measuring, reporting and verifying costs

Maximizing opportunities with private sector

The private sector may play a role in providing financing for efficient lighting NAMA components that show attractive returns on investment. The private sector, especially the technology providers, also can contribute to non-market activities, such as awareness raising and marketing campaigns, to increase the use of efficient lighting technologies. Activities with the least administrative or transaction costs are also more attractive. Therefore, large-scale efficient lighting projects are likely to attract more funding than small-scale projects, because of lower transaction costs. An important 'private sector representative' for the financing of efficient lighting products is the consumer who will ultimately pay the incremental investment cost in anticipation of a return on the investment in the form of saved electricity. As electricity prices increase, possibly through a reduction in subsidies, these savings will increase.

The private sector also could be involved in the technical implementation of specific NAMA components, such as collection and recycling. To identify opportunities for private funding and involvement, international and local private sector stakeholders should be consulted during the NAMA development process through dialogues or workshops. Such dialogues will help to identify potential barriers to private sector investment and involvement, which can then be addressed by targeted public sector interventions as part of the NAMA and help leverage private sector finance.

Forward strategy

The NAMA proposal, including the financial plan, will be a reference document when seeking support, either by approaching potential funders directly and/or making a submission to the *NAMA Registry*. Potential financing partners should be engaged at an early stage, before the NAMA proposal is drafted, in order to take into account their expectations. It may be helpful to make presentations of the NAMAs at UNFCCC meetings or other events that attract the financial and climate change communities.

6. Conclusions

Reducing consumption of electricity by transitioning to energy efficient lighting is one of the easiest and most cost effective ways for a country to mitigate greenhouse gas emissions. This Guidebook describes how to articulate and seek support for a national efficient lighting strategy via a NAMA. Using the currently available guidance and templates for the structuring of the efficient lighting NAMA ensures a systematic approach to implementation that is recognizable and potentially attractive to domestic and international funders. Guidelines on measuring, reporting and verifying for NAMAs should be available by the 19th Conference of the Parties in November 2013. They will further inform this particular component of any subsequent NAMA on efficient lighting.

While this Guidebook concentrates on the elements that must be developed for an efficient lighting NAMA, those countries that have already developed a national efficient lighting strategy will have completed most of the work for a NAMA. The two main topics to add to the content of a national efficient lighting strategy are: the NAMA measuring, reporting and verifying scheme; and, the financing plan and budget.

In many cases, the financing approach is straightforward, because the economic analyses show efficient lighting strategies as profitable in a life cycle calculation, mainly through savings in electricity consumption. However, efficient lighting strategies may face a traditional investment barrier for 'high investment/low consumption' equipment. Therefore, additional third party financing is still valuable if an attractive revenue model can be applied. An advantage of efficient lighting NAMAs is that they can quickly become self-sustaining, thus, creating the first NAMA implementation success stories with a credible exit strategy for the support.

The building blocks presented in this Guidebook are options that could be included in a tailor-made measuring, reporting and verifying system that should be guided by sensible considerations as to what is needed for a systematic and reasonably precise estimate of the emissions reduction impact of the strategy implementation. Although there may be different requirements for national versus international schemes, rigour should be applied to both because they require collecting the same data. The international, third party verification improves the trustworthiness of the results achieved. Designing for an international measuring, reporting and verifying system and process from the outset reduces risk, and encourages international funders to engage with the NAMA proposer.

The relative ease with which a national efficient lighting strategy can be carried through to the development of a NAMA also makes it an excellent introduction to NAMAs, in general. Eventually most developing countries will have a suite of NAMAs in different sectors, with different modalities for implementation, financing, and measuring, reporting and verifying. Some of these NAMAs can be mutually supporting. The development of an efficient lighting NAMA gives countries an initial experience that can be applied in the development of NAMAs in other sectors. It provides a learning platform that should be actively promoted domestically, in public administration, in private businesses, and in public, to create awareness of the energy efficiency and emissions reduction agendas.

UNEP promotes an energy efficient lighting agenda through the en.lighten initiative and extends its support to countries developing efficient lighting NAMAs. UNEP invites national and international funders in both the public and private sectors to consider engaging in a global transition to energy efficient lighting, through NAMAs.

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Annex A

The *NAMA Registry*: Implementation Support

Until the *NAMA Registry* is available online, details on submitting information to the prototype, via email, can be accessed at:
http://unfccc.int/cooperation_support/nama/items/7512.php

Templates for email submissions are available upon request from:
NAMA-registry@unfccc.int

The UNFCCC states that these templates can only be submitted via the relevant National Focal Point.

As of 13 August 2013, the UNFCCC offers a 55-page downloadable pdf, *Manual of the NAMA Registry prototype, Version of 30 April 2013* at:
http://unfccc.int/files/cooperation_support/nama/application/pdf/manual_for_prototype_version_of_30_april_release.pdf

This manual explains how to fill in the required information. It also provides flow charts for the processes of submitting, revising and updating NAMAs.

Annex B

Some Existing Programmes for NAMA Readiness Activities

Lead organizations	Initiative	Sources of financial support
Energy Research Centre of the Netherlands (ECN) and Ecofys	Mitigation Momentum ^a	German Ministry of Environment
Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)	International Partnership on Mitigation and Measuring, Reporting and Verifying ^b	German Ministry of Environment
Center for Clean Air Policy (CCAP)	Mitigation Action Implementation Network ^c	German Ministry of Environment; The Netherlands; and, Environment Canada, with additional support from World Bank Institute's Carbon Finance-Assist programme and other donors
Japan International Cooperation Agency (JICA)	Training and Dialogue Programs on Capacity Development for NAMA/ MRV ^d	Ministry of Foreign Affairs, Japan
Global Environment Facility (GEF)	GEF Climate Change Priority	GEF
United Nations Development Programme	Low Emission Capacity Building Programme ^e	Australia; European Commission; and, German Ministry of Environment
United Nations Environment Programme	en.lighten initiative	Australian Agency for International Development; and, GEF
United Nations Environment Programme	Facilitating Implementation and Readiness for Mitigation ^f	Denmark

^a <http://www.mitigationmomentum.org/>

^b <http://www.bmu-klimaschutzinitiative.de/en/projects?p=1&d=840>

^c <http://ccap.org/programs/mitigation-action-implementation-network-main/>

^d http://www.jica.go.jp/english/our_work/types_of_assistance/tech/acceptance/training/about/lineup.htmlhttp://www.jica.go.jp/english/our_work/types_of_assistance/tech/acceptance/training/about/c8h0vm000066m3ps-att/environmental2013.pdf

^e <http://lowemissiondevelopment.org/>

^f <http://www.lowcarbondev-support.org/>

Annex C

Estimating the Impact of an Efficient Lighting NAMA

As per the UNFCCC guidelines for the Biennial Update Report (Decision 2/CP.17), both the greenhouse gas emissions and sustainable development impacts need to be assessed and reported. The estimated greenhouse gas emissions reduction is the expected amount of carbon dioxide equivalent (tCO₂e) that will be reduced as a direct or indirect result of the activities implemented under the NAMA to achieve the NAMA objectives. These should be estimated quantitatively and compared to a business as usual scenario. These estimates are based on measured indicators for outcomes of the activities implemented under the NAMA. For example, the number of efficient lamps distributed through the programme is needed to estimate the amount of greenhouse gas emissions reduced by this activity (see Box 4). For the purpose of transparency and completeness, the direct and the indirect greenhouse gas emissions reductions should be distinguished and separately reported.

Direct greenhouse gas emissions reductions are directly attributable to the activities implemented through the NAMAs. These effects are mediated through an intermediate actor. In efficient lighting NAMAs, the following activities have direct greenhouse gas impacts:

- Minimum energy performance standards remove from the market any lamps that perform below the prescribed minimum. Thus, the average efficiency of the stock of lamps increases over time.
- Programmes for distribution and installation of efficient lamps.

Indirect greenhouse gas emissions impacts are related to the activities of the NAMA without having a direct causal link. These indirect impacts result from impacts of NAMA activities on the behaviour of people who are responsible for making decisions on the use of lamps.

- Fiscal incentive schemes or cooperative bulk procurement programmes to bring down the prices of efficient lamps influence changes in consumer behaviour, by making the prices of efficient lamps more competitive
- Regulations to enforce mandatory labelling and certification which indirectly affect emissions through an influence on consumer behaviour, by providing quality assurance of the product, information on lamp efficiency and resulting savings in energy costs.
- Strengthening capacities for monitoring and enforcing regulations improves the quality of products available in the market and thus influences the behaviour of the consumers and the efficiency of the products available in the market.
- Awareness raising activities increase the uptake of energy efficient lamps, by influencing the behaviour of customers through persuasive messages and accurate information.

Activities that have direct impacts could also have indirect impacts. For example, an efficient lamp distribution programme may increase awareness of efficient lighting technology, thus, increasing its use in the wider population that is not immediately covered by the distribution programme. It may be difficult to quantify the indirect greenhouse gas emissions reductions, and in some cases it may need to be expressed qualitatively. For example, awareness raising campaigns can influence purchasing behaviour and thus increase consumers' use of efficient lamps.

Box 4 provides further details on the calculation of the emissions reductions from the replacement of inefficient lamps with efficient ones. From a donor's perspective, conservative approaches are more appealing than overly optimistic assessments. However, in contrast to the Clean Development Mechanism, the NAMA provides a greater degree of flexibility in the calculation of impacts and the use of indicators. This also could yield significant variations in the level of accuracy in greenhouse gas emissions reduction estimates from the measured outcome of activities, depending on the estimation model employed. In cases where high accuracy could be achievable, but at a high cost, use of conservative estimations, benchmarks, and average factors are likely to be acceptable to the funders.

Another example of a simple tool for estimating greenhouse gas emissions reductions from a project is UNEP's "Efficient Lighting Savings Forecasting Model." NAMA developers can use this tool to estimate the electrical energy and carbon dioxide emissions savings potential of efficient lighting regulations, relative to a business as usual scenario. The model includes two additional factors that need to be considered in estimating the greenhouse gas impacts:

- Potential rebound effect refers to the possible increase in electricity consumption for lighting, as a result of energy cost reductions from the efficient lighting product. Estimates for the rebound effect for lighting range from 5% to 20% (actual savings in electricity is 5% to 20% lower than estimated savings, assuming that neither the operational hours of lighting, nor the light density change)⁵⁵.
- The timeframe for estimating emissions reductions is related to the period over which impacts of implementing the NAMA are realized. The shortest time frame is the NAMA implementation period, when activities included in the NAMA are implemented. However, in most cases, and in conformity with the objectives of transformational change, impacts will be realized well after the implementation of the NAMA. An obvious example of this is the implementation of minimum energy performance standards that could be central in the implementation of an efficient lighting NAMA. Thus, the choice of timeframe should also reflect the planning horizon of the national initiative.
- It may be beneficial to link the NAMA to internationally discussed timeframes for achieving significant deviation from baseline emissions. For example, the UNEP en.lighten initiative has a target date of the end of 2016 for the global phase out of inefficient incandescent lamps. The target year of 2020 is often used in negotiations in the Conference of Parties decision for demonstration of deviations from business as usual greenhouse gas emissions. It is expected that most of the reductions in greenhouse gas emissions will occur beyond the completion of activities of the NAMAs. Therefore, calculations should state the reductions during and beyond the implementation phase, at least until 2020. For supported NAMAs, the duration of the financial involvement of a third party may set another target date for achievements under the NAMA.

Beyond these strictly emissions reduction related achievements, most NAMAs are expected to accomplish sustainable and transformational development in the targeted sector.

- Sustainable and transformational impacts: NAMAs should result in a long-term, permanent transformation of a sector towards a lower greenhouse gas emissions pathway. To secure long-term transformation, NAMA design should ensure sustainability of impacts beyond the implementation period. A NAMA is one way to transition rapidly to an efficient lighting market, yielding continuous gains in energy efficiency, economic savings and emissions reductions. For example, a NAMA could include a requirement to periodically assess the efficiency of best available lighting technologies, so that the minimum energy performance standards can be updated regularly and can capture the greatest opportunities possible.
- A NAMA should include quantitative and qualitative information on expected long-term transformational impacts. For lighting, pertinent information can be found in government and private sector forecasts of advances in lighting technology. Most lighting reports and roadmaps document the recent and significant improvements in solid-state lighting technologies, and forecast that anticipated improvements will render older technologies obsolete (particularly inefficient incandescent lamps), while making high efficiency technologies (particularly lighting systems that incorporate light emitting diodes and controls) a compelling alternative.

⁵⁵ Study by Davis et al. presents a comprehensive summary of Rebound Effect, and can be found at: http://www.erc.uct.ac.za/Research/publications/10-Davis_Rebound_effect.pdf

Box 4. Calculation of greenhouse gas impacts from use of efficient lamps

Detailed calculations, sources and figures should be included where possible. Relevant methodologies developed for the Clean Development Mechanism could be employed because these are internationally approved methodologies and are likely to be acceptable to international partners. Clean Development Mechanism Methodologies AM46 and AMS-Il.J are used successfully in project activities related to efficient lighting. The equation below is a simplified generic model for estimating the emissions reduction from increased use of energy efficient lighting products.

$$ER = ES \times EF$$

$$ES = \frac{Q \times (P_{BL} - P_{EE}) \times O \times (1 - RE)}{(1 - TDL)}$$

ER	Emissions reductions achieved annually (tCO ₂)
ES	Electricity saved by use of energy efficient lighting products (MWh)
EF	Emission factor for electricity (tCO ₂ /MWh)
Q	Energy efficient lighting devices replacing baseline lighting devices
PBL	Power rating of the baseline lighting product
PEE	Power rating of the energy efficient lighting product
O	Average annual operating hours of lighting product
TDL	Transmission and distribution losses (fraction)
RE	Rebound effect (fraction)

The key information and data needed to estimate the greenhouse gas emissions reductions of efficient lighting programmes include:

- Types of different efficient lighting products to be covered in the NAMA;
- Estimates of penetration of each energy efficient lighting product type used in the accounting period;
- Average annual operating hours for each energy efficient lighting product type;
- Power consumption of each type of energy efficient lighting product;
- Power consumption of baseline lighting product replaced by each type of energy efficient lighting product;
- Transport and distribution losses and emissions factor (may need to be calculated by region).

Emissions reductions are estimated against a business as usual scenario. This describes the total lighting stock, including the installation rate of efficient lighting products in the absence of the NAMA. Establishing the business as usual case requires information on:

- Existing stock of lighting products for a given base year and expected rate of growth of lighting product use;
- Current level of energy efficient lighting products in the market;
- Rate of growth of energy efficient lighting products in the market over past few years;
- Expected change in policies and regulations regarding energy efficient lighting products (in the absence of the NAMA), and assessment of their impact on use of energy efficient lighting products;
- Impact of projects and programmes to promote the use of energy efficient lighting products, under implementation or planned for implementation;
- External factors, such as imports of energy efficient lighting products, prices of energy efficient lighting products, electricity prices, or other factors that may affect purchasing or use behaviour.

Business as usual can be established either by expert judgement, based on available data, or, by using models. The use of projection methods depends on the availability of data, and the level of accuracy desired. Modelling does not guarantee greater accuracy, but does enable understanding the implications of various factors on the use of lighting products, as well as penetration of energy efficient lighting products. The trade-off is between the resource intensity of the estimate and the accuracy of the estimate.

Annex D

Case Studies

Mexico

Recent and ongoing efficient lighting efforts in Mexico show how international and domestic financial instruments can be combined. Similar approaches could be taken for efficient lighting NAMAs. Well-established agencies for the implementation of energy efficiency initiatives, such as FIDE, indicate market readiness and support for transformational change.

Mexico designed a strategy to replace 47.2 million inefficient incandescent lamps with compact fluorescent lamps in 11.25 million low to medium-income households over a three-year period, starting in 2011⁵⁶. Households could exchange inefficient incandescent lamps with compact fluorescent lamps at approved retail stores, which would then deliver the incandescent lamps for proper disposal.

After an initial phase targeting 2.2 million lamps (supported by domestic funds), Mexico sought financial support to reach the objective of 47.2 million lamps, as well as to replace other inefficient appliances, such as refrigerators. To support the compact fluorescent lamps component of this strategy, the Government of Mexico received a Specific Investment Loan from the International Bank for Reconstruction and Development, and a grant from the Global Environment Facility, complemented with domestic co-funding. The international funding supports a different set of activities, including capacity building, awareness raising, and hardware expenses. The table below summarizes funding sources, amounts, and corresponding activities.

The strategy had the following objectives: stimulating domestic demand for energy efficient products, strengthening social inclusion through the free distribution of compact fluorescent lamps to low-income households, and reducing greenhouse gas emissions.

The strategy was supported at the operational level by an independent private trust fund, the Fideicomiso para el Ahorro de Energía Eléctrica (FIDE), which has been appointed as the “Compact Fluorescent Lamp Executing Agency.” FIDE is responsible for the bulk procurement of the lamps and associated services, including signing contracts with the suppliers of lamps and with the firms selected for the collection and disposal of the inefficient incandescent lamps. Other activities include a study to encourage the development of lamp recycling centres and disposal schemes by the private sector.

⁵⁶ [http://www.thegef.org/gef/sites/thegef.org/files/gef_prj_docs/GEFProjectDocuments/Climate%20Change/Mexico%20-%20\(4116\)%20-%20Lighting%20and%20Appliances%20Efficiency%20Project/10-07-2010%20ID4116%20Project%20document.pdf](http://www.thegef.org/gef/sites/thegef.org/files/gef_prj_docs/GEFProjectDocuments/Climate%20Change/Mexico%20-%20(4116)%20-%20Lighting%20and%20Appliances%20Efficiency%20Project/10-07-2010%20ID4116%20Project%20document.pdf)

Table 14. International and national funding, and financial instruments for the compact fluorescent lamp component of Mexico's Energy Efficiency Strategy

	Total costs (million USD)	Domestic funding (million USD)	International funding (million USD)
Activities supported by the Government of Mexico			
Designing a long-term strategy for the phase out of inefficient incandescent lamps	0.1	0.1	none
Training for local banks in energy efficiency	0.1	0.1	none
Activities supported by a loan from the International Bank for Reconstruction and Development			
Replacement of 45 million inefficient incandescent lamps with compact fluorescent lamps	70	15	55
Activities supported by Global Environment Facility grant			
Promotion of lamp recycling centres	0.1	none	0.1
Information and awareness raising campaigns	1.8	1	0.8
Training and capacity building for implementing agencies (including procurement training)	0.15	none	0.15

Pakistan

An energy crisis in Pakistan motivates the country's efforts to implement cost effective energy efficiency activities. One cost effective opportunity is a rapid transition to efficient lighting.

Taking into account the National Energy Conservation policy of 2006 and the National Climate Change policy of 2012, Pakistan is developing a NAMA to implement the transition to energy efficient lighting in the residential, commercial, industrial and outdoor sectors.

The main objective of this NAMA is to reduce both energy consumption and also greenhouse gas emissions, thereby helping to achieve national sustainable development goals. The savings of this transition to energy efficient lighting are estimated at 1.97 million tonnes of CO₂ annually.

The NAMA document developed by Pakistan was supported by the Center for Clean Air Policy and the UNEP en.lighten initiative. It was first introduced in the NAMA Financing summit in Copenhagen in May 2013. Pakistan is requesting USD 7 million from The NAMA Facility. Some of the activities that are proposed include:

- Development of a national efficient lighting strategy, following the integrated policy approach, including minimum energy performance standards; supporting policies and mechanisms; monitoring, verifying and enforcing; and, environmentally sound management;
- Development of a measuring, reporting and verifying system for the calculation of greenhouse gas emissions reductions resulting from the transition to energy efficient lighting;
- Deployment of an integrated waste management system for lighting products;
- Establishment of a revolving loan fund to develop energy efficient lighting projects;
- Public awareness campaign to educate people about the benefits of adopting energy efficient lighting.

With this NAMA, Pakistan expects to pave the way to low-carbon economic growth, achieve important economic, energy and emission savings, meet its obligations under the UNFCCC, and foster private sector involvement in national energy efficient activities.

Annex E

Procedures for Data Collection

Measurements and estimations of indicator values may require measuring data for a set of parameters. For example, the information needed for greenhouse gas emissions reduction impact requires measuring data for parameters, such as the number of lamps replaced by efficient lamps, or operating hours of lamps. The data could be collected and processed through either a top-down or bottom-up approach. These two approaches combined can increase the reliability of measurements and estimates. The measurement approach depends on the type of information being collected.

The top-down approach focuses on collecting data from the supply side, that is, from those implementing the activity, such as the providers of lighting products and services.

The bottom-up approach consists of collecting data from users of lighting products. Information should be collected from a large sample, so surveys or field audits should be used. The types of data regarding lighting products that could be collected through surveys are, for example:

- Percent of population using efficient products;
- Average daily operating hours, by type of building, by room, or by type of lighting system;
- Factors that influence purchases;
- Other information about the national or local market.

Surveys can document indirect impacts of NAMA implementation. For example, a sample survey carried out on carefully defined control groups could be used to measure the impact of efficient lamp distribution on the population outside the coverage area, or, to measure the influence of awareness campaigns.

The Clean Development Mechanism methodology, “AM46 Distribution of efficient light bulbs to households, version 2”⁵⁷ is an example of using sample control groups to collect data. Similarly, Clean Development Mechanism small-scale methodology, “AMS-II.L. Demand-side activities for efficient outdoor and street lighting technologies, version 1.0” recommends sample surveys to collect data for estimating the emissions reductions⁵⁸.

Other Clean Development Mechanism small scale methodologies include: “AMS-II.J. Demand-side activities for efficient lighting technologies, version 5.0,” “AMS-II.N. Demand-side energy efficiency activities for installation of energy efficient lighting and/or controls in buildings, version 1.0,” and “AMS-III.AR. Substituting fossil fuel based lighting with LED/CFL lighting systems, version 4.0.” A Clean Development Mechanism large-scale methodology that provides for ongoing installation of efficient lamps is, “AM0113: Distribution of compact fluorescent lamps (CFL) and light-emitting diode (LED) lamps to households, Version 01.0.”

⁵⁷ <https://cdm.unfccc.int/methodologies/DB/5SI1IXDIZBL6OAKIB3JFUFAQ86MBEE>

⁵⁸ <http://cdm.unfccc.int/methodologies/DB/V53UISEM035E08WWY2S5M3IHUEJYTU>

Box 5. Guidance on sampling, from principles defined in “AMS-II.L. Demand-side activities for efficient outdoor and street lighting technologies, version 1.0”

- Sampling must be statistically robust and relevant so that the survey has a random distribution and is representative of target population (size, location).
- The sampling size is determined by a minimum 90% confidence interval and a 10% maximum error margin. Refer to the General Guidelines for sampling and survey for small-scale Clean Development Mechanism project activities.
- The method to select project installation sample locations is random.
- For a monitoring survey, individual project luminaires (or groups of project luminaires if applicable) shall constitute the population constituents when determining sample size and distribution.
- If multiple systems of scheduling and/or controls are installed within the project boundaries, the luminaires under each system of scheduling and/or controls shall represent unique population sets for sample sizing and sample location selection.

To assess the emissions reduction effect of an efficient lighting NAMA, both the top-down and bottom-up approaches complement each other and should be combined. The top-down approach estimates the quantity of efficient lighting products purchased, and the products available for purchase. The bottom-up approach, using sampling surveys, provides information on the effective use of the efficient lighting products including the average annual operating hours of lamps and the power demand.

For each indicator, the data collection method, the processing modalities, the responsible entity, and the timeframe should be described, as noted in Table 15.

Table 15. Example of monitoring elements for various indicators (top-down and bottom-up)

Indicator	Data collection method	Processing modalities	Responsible entity	Reporting period
Number of tCO₂e (impact indicator)	Top-down: number of efficient lighting products sold and power rating Bottom-up: sampling surveys to assess average operating hours and power rating	Mandatory reporting from sale points through a centralized database	For reporting: retailers, distributors and wholesalers For processing: implementing entity	Annual
Number of lamps installed (to assess the success of a distribution programme) (progress indicator)	Top-down: number of lamps distributed Bottom-up: number of lamps installed (sampling survey)	Mandatory reporting from the distribution programme distributor through a centralized database	For reporting: distribution programme administrator For processing: implementing entity	Bimonthly
Number of jobs created for collection, disposal and recycling (impact indicator)	Bottom-up: registration of new collection, disposal and recycling companies, including number of employees	Annual company reporting, including on the number of employees	Implementing entity to collect information from the national registry of companies	Annual

The entity responsible for implementing a NAMA, as identified by the host country, has the primary responsibility of measuring progress and reporting on the indicators. For an effective measurement system, the responsibility of all partners involved in implementing a NAMA should be identified. Information to assess the transformational impacts of a NAMA should be integrated with national data collection systems, including specific institutional or regulatory changes, if relevant. Such institutional and/or regulatory changes and their associated timelines would equally be captured in the implementation plan which defines the role of all stakeholders involved in a NAMA. The cost of the development and operation of a measuring, reporting and verifying system may be significant and so should be integrated in the overall cost estimate.

Annex F

Some NAMA Funding Organizations

Organization: International Climate Initiative (IKI)

- Sponsors/investors: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Germany, and Energy and Climate Fund (EKF)
- Fund size: EUR 120 million (annually)
- Target: Energy (and others) for national/sectoral goal, strategy, national/sectoral policy or programme
- Type of support: Projects, such as developing NAMAs, gaining access to funding for implementation, and implementing ambitious components of NAMAs
- Accessible by: Individual project developers
- Example of project finance: Mitigation Momentum NAMAs
- More information:
 - <http://www.international-climate-initiative.com/en/>
- Contact: Annual call for proposals: programmhuero@programmhuero-klima.de

Organization: The NAMA Facility

- Sponsors/investors: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Germany, and Department of Energy & Climate Change (DECC), UK
- Fund size: EUR 70 million
- Target: NAMA support projects
- Type of support: NAMA support projects (grants)
- Accessible by: Partner governments, individual project developers
- More information and templates:
 - <http://www.international-climate-initiative.com/en/issues/nama-facility/>
 - <https://www.gov.uk/government/publications/information-about-the-nationally-appropriate-mitigation-actions-nama-facility>
- Contact: contact@NAMA-Facility.org

Organization: Global Climate Partnership Fund (GCPF)

- Sponsors/investors: KfW Entwicklungsbank, International Finance Corporation (IFC), Ministry of Foreign Affairs, Denmark, and Deutsche Bank
- Fund size: USD 235 million
- Target: Energy (efficiency and renewables) for emerging and developing countries
- Type of support: Technical, financial (senior and mezzanine debt, limited equity)
- Accessible by: Financial institutions, project developers, sponsors, and technology providers
- More information:
 - <http://gcpf.lu/> and <http://gcpf.lu/investment-portfolio-62.html>
- Contact: info@gcpf.lu

Organization: Global Energy Efficiency and Renewable Energy Fund (GEEREF)

- Sponsors/investors: European Union, Germany, Norway, European Investment Bank Group (European Investment Bank and the European Investment Fund)
- Fund size: EUR 112 million
- Target: Energy (efficiency and renewables) for developing countries in Asia, Latin America & Africa
- Type of support: Technical, financial (equity, channels financing to regional funds)
- Accessible by: Regional funds, private equity funds
- More information:
 - <http://geeref.com/>
- Contact: geeref@eib.org

Organization: The Green Climate Fund (anticipated opening in 2014)

- Sponsors/investors: (The World Bank is interim Trustee)
- Fund size: (Anticipated, USD 100 billion)
- Target: Mitigation, and adaptation to climate change in developing countries
- More information:
 - <http://gcfund.net/home.html>
- Contact: Interim Secretariat, isecretariat@gcfund.net

Organization: KfW Development & Climate Finance

- Sponsor/investor: KfW, Germany
- Target: Any
- Type of support: Financial (grants, concessional loans, structured financing)
- Accessible by: National governments
- Contact: info@kfw-Entwicklungsbank.de

About the UNEP Division of Technology, Industry and Economics

Set up in 1975, three years after UNEP was created, the Division of Technology, Industry and Economics (DTIE) provides solutions to policy-makers and helps change the business environment by offering platforms for dialogue and co-operation, innovative policy options, pilot projects and creative market mechanisms.

DTIE plays a leading role in three of the six UNEP strategic priorities: climate change, harmful substances and hazardous waste, resource efficiency.

DTIE is also actively contributing to the Green Economy Initiative launched by UNEP in 2008. This aims to shift national and world economies on to a new path, in which jobs and output growth are driven by increased investment in green sectors, and by a switch of consumers' preferences towards environmentally friendly goods and services.

Moreover, DTIE is responsible for fulfilling UNEP's mandate as an implementing agency for the Montreal Protocol Multilateral Fund and plays an executing role for a number of UNEP projects financed by the Global Environment Facility.

The Office of the Director, located in Paris, coordinates activities through:

- > **The International Environmental Technology Centre** – IETC (Osaka), which promotes the collection and dissemination of knowledge on Environmentally Sound Technologies with a focus on waste management. The broad objective is to enhance the understanding of converting waste into a resource and thus reduce impacts on human health and the environment.
- > **Sustainable Consumption and Production** (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
- > **Chemicals** (Geneva), which catalyses global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
- > **Energy** (Paris and Nairobi), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
- > **OzonAction** (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
- > **Economics and Trade** (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies. This branch is also charged with producing green economy reports.

DTIE works with many partners (other UN agencies and programmes, international organizations, governments, non-governmental organizations, business, industry, the media and the public) to raise awareness, improve the transfer of knowledge and information, foster technological cooperation and implement international conventions and agreements.

For more information:
see www.unep.org/dtie

This Guidebook emphasizes the role of energy efficient lighting and its potential for rapidly reducing carbon emissions and delivering economic and environmental benefits through Nationally Appropriate Mitigation Actions (NAMAs). It has been designed to assist governments, international agencies and other stakeholders shape national efficient lighting strategies into NAMAs. The Guidebook encompasses the entire process from developing a basic checklist to forming a national efficient lighting strategy. It also addresses other critical elements required to establish a successful efficient lighting NAMA by providing the most up-to-date information and case studies related specifically to energy efficient lighting.

The United Nations Environment Programme (UNEP)/Global Environment Facility (GEF) en.lighten initiative was established to accelerate a global market transformation to environmentally sustainable lighting technologies by developing a coordinated global strategy and providing technical support for the phase-out of inefficient lighting. It was created in 2009 as a partnership between UNEP, OSRAM, Philips Lighting and the National Lighting Test Centre of China with the support of the GEF. It is additionally supported by the Australian government.

For more information about the en.lighten initiative, please visit: www.enlighten-initiative.org

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