OECDpublishing

Please cite this paper as:

Matheson, G. and L. Giroux (2010), "Capacity Development for Environmental Management and Governance in the Energy Sector in Developing Countries", *OECD Environment Working Papers*, No. 25, OECD Publishing.
doi: 10.1787/5km4knxj9tf3-en

OECD Environment Working Papers
No. 25

Capacity Development for Environmental Management and Governance in the Energy Sector in Developing Countries

George Matheson*, Laurie Giroux

JEL Classification: H23, O13, O17, O19, O29, O33, Q01, Q4, Q5

*Marbek Resource Consultants, Canada

Unclassified **ENV/WKP(2010)11**

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development **17-Nov-2010**

English - Or. English

ENVIRONMENT DIRECTORATE

ENV/WKP(2010)11
Unclassified

ENVIRONMENT WORKING PAPER NO. 25

CAPACITY DEVELOPMENT FOR ENVIRONMENTAL MANAGEMENT AND GOVERNANCE IN THE ENERGY SECTOR IN DEVELOPING COUNTRIES

George Matheson and Laurie Giroux, Marbek Resource Consultants, Canada

JEL Classification: H23, O13, O17, O19, O29, O33, Q01, Q4, Q5

Keywords: Capacity development, environmental management, environmental governance, energy sector, developing countries, sustainable energy, renewable energy, energy efficiency, country systems

JT03292594

English - Or. English

OECD ENVIRONMENT WORKING PAPERS

This series is designed to make available to a wider readership selected studies on environmental issues prepared for use within the OECD. Authorship is usually collective, but principal authors are named.

The papers are generally available only in their original language English or French with a summary in the other if available.

The opinions expressed in these papers are the sole responsibility of the author(s) and do not necessarily reflect those of the OECD or the governments of its member countries.

Comment on the series is welcome, and should be sent to either env.contact@oecd.org or the Environment Directorate, 2 rue André Pascal, 75775 PARIS CEDEX 16, France.

OECD Environment Working Papers are published on
www.oecd.org/env/workingpapers

ABSTRACT

The relationships between energy, the environment, and development are deep and complex. The International Energy Agency has noted that energy is deeply implicated in each of the economic, social and environmental dimensions of human development. Energy services provide an essential input to economic activity, contribute to social development, and help meet basic human needs. But energy production and use also has significant environmental implications that must be managed if countries are to meet their long term sustainable development goals.

The purpose of this paper is to highlight the importance of environmental management and governance in the energy sector; to present environmental goals, requirements, entry points, and strategies/approaches to capacity development for the environment (CDE) in this sector; and to discuss implications for donors. The focus is on CDE in a developing country context.

The paper recognises that CDE must be seen as part of an endogenous process of change, and that it must operate at multiple levels: the enabling environment, the organisation, and the individual. The paper argues that capacity development is not an end in itself; instead, defined environmental goals should be the basis for determining capacity requirements, which in turn should be the basis for defining capacity development priorities. Based on this, the paper further argues that CDE should focus on sustainable energy sources of relevance to the majority of the population, and on increased efficiency of energy use. The paper links these concepts to the country systems approach to development assistance advocated in the *Paris Declaration on Aid Effectiveness,* and discusses some of the challenges donors face in providing CDE assistance that responds to these concepts and principles.

JEL Classification: H23, O13, O17, O19, O29, O33, Q01, Q4, Q5

Keywords: Capacity development, environmental management, environmental governance, energy sector, developing countries, sustainable energy, renewable energy, energy efficiency, country systems

RÉSUMÉ

L'énergie, l'environnement et le développement entretiennent des liens étroits et complexes. L'Agence internationale de l'énergie a souligné que l'énergie occupe une place centrale dans chacune des dimensions du développement humain : économique, sociale et environnementale. Les services énergétiques apportent une contribution essentielle à l'activité économique, concourent au développement social, et aident à satisfaire les besoins humains fondamentaux. Mais la production et l'utilisation de l'énergie ont aussi des conséquences environnementales significatives qu'il convient de gérer si les pays veulent pouvoir atteindre leurs objectifs de développement durable à long terme.

Ce document de travail se propose de souligner l'importance de la gestion et de la gouvernance de l'environnement dans le secteur de l'énergie ; de présenter les objectifs, exigences, points d'accès et stratégies/approches en matière de renforcement des capacités pour l'environnement dans ce secteur ; et d'examiner les conséquences pour les donneurs. La réflexion est axée sur le renforcement des capacités pour l'environnement dans les pays en développement.

Ce document considère que le renforcement des capacités pour l'environnement doit être conçu comme s'inscrivant dans le cadre d'un processus endogène de changement, et qu'il doit s'opérer aux niveaux organisationnel et individuel et par la création d'un environnement propice. L'auteur affirme que le renforcement des capacités n'est pas une fin en soi, mais qu'il faut au départ établir des objectifs environnementaux précis pour déterminer les besoins en capacités, et de là définir les priorités en matière de renforcement. Ainsi, il considère que le renforcement des capacités pour l'environnement doit être axé en priorité sur le recours à des sources d'énergie durable utiles à la majorité de la population, et sur l'amélioration de l'efficacité énergétique. Le document établit un lien entre ces concepts et l'approche de l'aide au développement fondée sur l'utilisation des systèmes des pays partenaires que préconise la *Déclaration de Paris sur l'efficacité de l'aide au développement*, et il examine certains des problèmes auxquels se heurtent les donneurs désireux de fournir une aide au renforcement des capacités pour l'environnement qui soit conforme à ces concepts et principes.

Classification JEL: H23, O13, O17, O19, O29, O33, Q01, Q4, Q5

Mots clés : Renforcement des capacités, gestion de l'environnement, gouvernance de l'environnement, secteur de l'énergie, pays en développement, énergie durable, énergie renouvelable, efficacité énergétique, systèmes des pays partenaires

FOREWORD

This report on "Capacity Development for Environmental Management and Governance in the Energy Sector" is an output of the OECD Task Team on Governance and Capacity Development for Natural Resource and Environmental Management that is overseen jointly by the Working Party on Global and Structural Policies of the Environment Policy Committee (EPOC) and the Network on Environment and Development Co-operation (ENVIRONET) of the Development Assistance Committee (DAC). It was commissioned as background for the development of the upcoming Policy Guidance on Capacity Development for Environmental Management.

This report is authored by George Matheson and Laurie Giroux, (Marbek Resource Consultants). The authors would like to thank Philip Schubert of the Canadian International Development Agency, Erwin Kunzi of the Austrian Development Agency, and Ronald Kaggwa of the National Environment Management Authority (NEMA) in Uganda for their input into the case studies. The authors also gratefully acknowledge comments and feedback from the members of the OECD Task Team on Governance and Capacity Development for Natural Resource and Environmental Management; comments and feedback from Erik Haites, (Margaree Consultants) and Sarah Morif (IEA); and the guidance and support of Tamara Levine, Remy Paris, Roberto Martin-Hurtado, and Shardul Agrawala of the OECD Secretariat.

This paper is released as part of the OECD Environment Working Papers series [ENV/WKP(2010)11]. It can be downloaded on the OECD website: www.oecd.org/env/workingpapers.

Further enquiries on ongoing work on Capacity Development for Environmental Management and Governance should be directed to Tamara Levine, OECD Development Cooperation Directorate, Tamara.Levine@oecd.org; Tel +33 1 45 24 9759) and Roberto Martin-Hurtado, OECD Environment Directorate (Email: Roberto.Martin-Hurtado @oecd.org; Tel: +33 1 45 24 16 27).

TABLE OF CONTENTS

ACRONYMS

CBOs	Community-Based Organisations
CDE	Capacity Development for Environmental Management and Governance
CDM	Clean Development Mechanism
CFL	Compact Fluorescent Lamps
CPR	Conservation Potential Review
EER	Energy and Environmental Review
EFR	Environmental Fiscal Reform
ESCO	Energy Service Company
DNA	Designated National Authority
GDP	Gross Domestic Product
GW	Gigawatt
IEA	International Energy Agency
IPP	Independent Power Producer
ISO	International Organisation for Standardization
LDCs	Least Developed Countries
LPG	Liquefied Petroleum Gas
M&E	Monitoring and Evaluation
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-Operation and Development
PFM	Public Financial Management
PV	Photovoltaic System
RPS	Renewable Portfolio Standard
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

Energy, environment, and capacity development

The relationships between energy, the environment, and development are deep and complex. The International Energy Agency has noted that "Energy is deeply implicated in each of the economic, social and environmental dimensions of human development." Energy services provide an essential input to economic activity, contribute to social development, and help meet the basic human needs. But energy production and use also has significant environmental implications that must be managed if countries are to meet their long term sustainable development goals.

Capacity is the ability of people, organisations, and society to manage their affairs successfully. Various OECD documents clearly describe three levels of capacity: the enabling environment, organisational capacity, and individual capacity. Environmental capacity development (CDE) is the process by which environmental capacity is enhanced.

Key features of the energy sector

The defining characteristics of the energy sector in many developing countries include low access to modern energy sources (particularly in rural areas), coupled with significant local environmental impacts arising from the use of traditional fuels. The International Energy Agency (IEA) estimates that as of 2008, 1.5 billion people lack access to electricity. In the world's least developed countries (LDCs) and Sub-Saharan Africa as a whole, more than 80% of people rely primarily on solid fuels such as coal or wood for cooking.

The policy challenges in the energy sector of developing countries are diverse and often profound. Depending on the country, the challenges can include affordability and access to modern low carbon energy; environmental degradation associated with traditional biomass fuels; lack of a reliable and stable domestic electricity supply; security of supply and costs of imported energy; and the cost of subsidies where they exist. While increased energy access can be achieved through low carbon energy options, in many developing countries, the policy priority is increased access to energy for poor rural communities, and the development of modern low-carbon energy resources is deferred due to perceived or real cost issues.

Key aspects of environmental sustainability in the energy sector

Globally, non-renewable fossil fuels account for approximately 80% of primary energy consumption. In its annual world energy outlook series, the IEA has repeatedly noted that current reliance on non-renewable fossil fuels is unsustainable environmentally, economically and socially, and that there is an urgent need for action to bring about a wholesale global shift to low-carbon technologies.

Some renewable energy sources also raise resource use issues. An important example is small-scale wood and charcoal use by rural households in developing nations worldwide. Over-harvesting forest resources means reduced availability of the biomass resource for fuel and other purposes. Large scale biomass use also raises land use issues, particularly in instances where prime agricultural land is used for

energy crops rather than food, and where forested land is converted to agricultural land for growing energy crops.

The energy sector is also associated with other environmental impacts at each stage of the energy "lifecycle" (including resource extraction, energy production and distribution, and energy end use). The impacts are described in the main report, and include emissions of greenhouse gases and a range of air pollutants; contamination of land, surface water, and groundwater; radioactive waste issues; deforestation and compounding impacts such as habitat loss, soil erosion, reduced water retention, and downstream impacts; and consequential social, economic, and human health impacts.

Key actors

Governments

Energy touches all sectors of the economy, and consequently a wide range of sectoral ministries have responsibilities related to environmental management in the energy sector. The structure and responsibilities of government ministries/departments vary from country to country, but the agencies responsible for the following sectors are all "key actors": Environment, Energy, Natural Resources (forestry, water, land, and mining), Agriculture, Rural Development, and energy using sectors (transportation, industry, housing, etc.)

In addition, the various central agencies of government are key actors in the energy sector, including the agencies responsible for Development Planning, Finance, and Infrastructure. Many countries also have independent or partially independent regulatory bodies such as an environmental regulatory authority and/or an energy regulatory authority.

Experience and evidence in the literature suggest that while government capacity varies greatly among developing countries, most often capacity is relatively low. In view of the major environmental challenges noted above, and the key role of government in addressing these challenges, capacity development in government is a high priority.

Energy suppliers, private sector, and civil society

In developing countries the electric utilities and the oil and gas companies often have good capacity in areas directly related to their core mandates. Capacity related to environmental management and governance is, however, less developed in many cases. The suppliers of biomass fuels, and specifically the small producers and vendors in the informal sector, will generally have extremely low environmental management capacity. They are unlikely to have knowledge of environmentally improved technologies, nor the means to adopt these technologies. Suppliers of renewable energy equipment and energy efficiency services are typically under-represented in developing countries, and may lack access to the latest technologies and expertise, and to business capital.

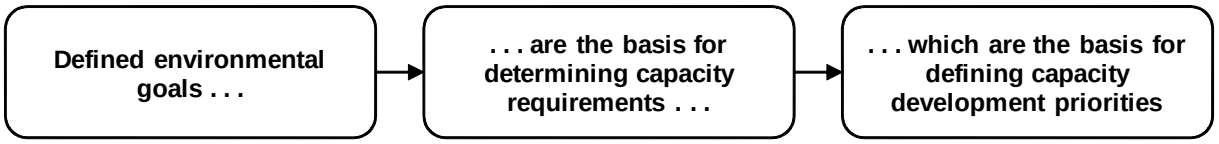
The formal private sector is an important stakeholder group. Aside from the energy suppliers discussed above, private sector actors do not typically have formal environmental management functions in the energy sector. However, many private sector firms provide services to the sector (consulting, engineering, construction, equipment, etc.), and many are significant energy users. Some larger companies may have good capacity in areas directly related to their core mandates, but are unlikely to have strong capacity related to environmental management in the energy sector.

Environmental NGOs and other civil society organisations have in many countries engaged deeply in environmental management issues in the energy sector. These organisations often seek to influence environmental policy and legislation. NGOs also play an important role in disseminating information to

decision-makers and to citizens. Many development NGOs have become deeply involved in the area of sustainable energy, delivering projects and programmes that address national priorities.

CDE goals and related capacity requirements

Capacity development is not an end in itself. It is simply a step, albeit a critical one, towards some larger goal or set of goals. As such, an underlying premise of this paper is that environmental capacity development at the sectoral level must be framed within the context of these larger goals, and must begin by considering what capacity is required to meet these goals.



Environmental goals

The first building block for CDE in the energy sector is a clear understanding of the ultimate goals to be achieved through improved environmental management and governance in the sector. This paper suggests that there are at least five such goals:

Environmental management and governance goals in the energy sector

Energy supply:

- A shift towards more environmentally sound and sustainable energy sources and technologies.
- Reduced environmental impact at all stages of the energy supply chain (production and distribution) for all in-use energy sources and technologies.

Energy use:

- A shift towards increased end use energy efficiency.
- Reduced environmental impact associated with all energy end uses through adoption of environmentally sound technologies and practices.

Cross-cutting

- Improved resilience of energy supply to the impacts of environmental change (including in particular climate change).

These goals demonstrate an important and fundamental point: that sound environmental management in the energy sector goes well beyond a narrow and more traditional focus on the direct environmental impacts of energy extraction, production and use. Sound environmental management also encompasses major goals such as significantly expanded use of sustainable energy sources and increased energy demand management.

Capacity requirements

The table below provides an initial indicative list of the key capacity requirements relating to the energy sector and the environmental management and governance goals presented above. These requirements are defined on a functional basis and are broad in scope, in keeping with the multi-faceted reach of the energy sector.

The relevance of these requirements will vary between the different groups of key actors, and within each group will vary between agencies and organisations. All of the capacities presented in the table are necessary to help ensure sound environmental management and governance in the energy sector.

Capacity requirements for sound environmental management and governance in the energy sector
An indicative list

Capacity Required	Government	Energy Suppliers	Private Sector	Civil Society
Energy supply:				
Capacity for the creation and maintenance of an enabling environment for sustainable energy (policies, legislation, regulation, finance, promotion, etc.)	√	√	√	√
Capacity for energy supply planning (forecasting, full cost economic analysis, technical assessments, evaluation and selection of options, etc.)	√	√		
Capacity for program delivery (implementation of sustainable energy policy commitments)	√	√	√	√
Capacity to provide environmental oversight of the development of new energy sources	√	√	√	√
Capacity to monitor environmental performance of the energy supply sector and support improved performance through enforcement and compliance activities	√	√	√	√
Energy use:				
Capacity for the creation and maintenance of an enabling environment for energy efficiency (policies, legislation, regulation, finance, promotion, etc.)	√	√	√	√
Capacity for demand side planning (end use analysis, economic and technical assessment of energy efficiency potential, etc.)	√	√		
Capacity for program delivery (implementation of energy efficiency policy commitments)	√	√	√	√
Capacity to provide oversight of energy demand management programs and projects	√	√	√	√
Capacity to monitor technical and environmental performance of energy end use and support improved performance through enforcement and compliance activities	√	√	√	√
Cross-cutting:				
Capacity to undertake integrated planning (demand and supply)	√	√		
Capacity for strategic and project environmental assessment	√	√	√	√
Capacity to assess climate vulnerability and risks to energy infrastructure (demand and supply)	√	√	√	√
Capacity to engage and communicate with stakeholders.	√	√	√	√

Entry points

Governments

The 2005 *Paris Declaration on Aid Effectiveness* committed to reform the way aid is delivered. One of the key commitments related to strengthening and using country systems. If capacity development is to focus on country systems, it follows that the entry points for capacity development should also be found within this country systems framework. This paper therefore focuses on four core country system categories: strategic planning, public financial management, monitoring and evaluation, and social and environmental procedures.

Strategic Planning Entry Points: The development of national and sub-national strategies/ plans is an important entry point related to the enabling environment and organisational dimensions of environmental capacity development. Energy supply and demand planning is an important entry point related to the organisational dimension of capacity development. In addition, opportunities such as support for analytic work related to energy/environment can be seen as catalytic in nature, building towards broader future engagement.

Public Financial Management Entry Points: The setting of national (and sub-national) budgets is an important entry point related to the enabling environment and organisational dimensions of environmental capacity development in the energy sector. A number of operational aspects of public financial management provide entry points related to the organisational dimension of capacity development (for example public expenditure reviews to identify environmental implications of public expenditures).

Monitoring and Evaluation Entry Points: From a country systems perspective, "monitoring and evaluation" refers to national systems established by countries to assess their programmes and activities. This monitoring and evaluation function is not sector specific, but there are also sector and sub-sector specific monitoring and evaluation systems in most countries. The environmental performance of the energy sector is likely to be subject to periodic review through national monitoring and evaluation activities, offering a periodic entry point for capacity development support.

Social and Environmental Procedures Entry Points: Within government, all agencies that have environmental responsibilities are potential entry points for work relating to social and environmental procedures. The most obvious entry points are the environment and energy ministries/departments, but other line and central agencies also present important opportunities. Depending on the degree of decentralization in the country, sub-national and local governments may also play a role in implementing environmental procedures.

Energy suppliers, private sector, and civil society

Energy suppliers, the private sector, and civil society all provide numerous possible entry points for environmental capacity development in the energy sector. Options include direct engagement with individual organisations; contact via industry associations; and access via intermediaries such as various levels of government, the media and other groups that provide services (including for instance energy suppliers, micro-finance groups, and training/education providers). Further discussion is provided in the main report.

Developing environmental capacity in the energy sector

There are many approaches to enhancing capacity for environmental management and governance in the energy sector. The list below is not comprehensive, but rather is intended to illustrate the range of options and opportunities that are available, and in so doing demonstrate that capacity development is indeed a multi-dimensional process. The information is organised into sub-sections based on the three dimensions of capacity defined previously: strengthening the enabling environment, organisational capacity, and individual capacity.

Strengthening the enabling environment

- Policy approaches/tools:
  - develop a national energy policy and strategy with a strong commitment to renewable energy and/or energy efficiency;
- Regulatory approaches/tools:
  - deregulate/liberalize the energy market to create an enabling environment for independent power producers to develop new low carbon supply options;
  - require electricity suppliers to obtain a minimum percentage of their electricity from renewable sources :
  - implement regulations to improve environmental performance of energy production;
  - develop and implement energy efficiency standards.

- Economic approaches/tools:
  - implement environmental fiscal reform;
  - remove subsidies to fossil fuel production or use (as necessary accompanying it with policies to enhance energy services provisions to the poor)
  - price the negative effects of energy production or use (such as greenhouse gas and air pollution emissions)
  - develop the market for sustainable energy (renewable energy, energy efficiency) through use of other economic instruments, including public procurement policies;
  - facilitate establishment of Energy Service Companies (ESCOs) to support the delivery of cost-effective sustainable energy to all;
  - focus on market transformation.

Strengthening organisational capacity:

- use environmental planning and analytic tools (such as Strategic Environmental Assessment, software tools to assess the feasibility of energy alternatives, Conservation Potential Reviews, and Energy and Environment Reviews);

- co-ordinate the work of finance, planning, energy and environment ministries;

- strengthen capacity of local authorities to improve energy service delivery and monitoring;

- strengthen the capacity and role of Designated National Authorities (DNAs) for promoting low carbon energy development through the clean development mechanism.

Strengthening individual capacity

Notwithstanding the importance of the enabling environment and organisation levels of capacity development, strengthening individual capacity remains an important priority. Individual capacity and expertise are required in all of the capacity areas identified previously. For each of these areas, a mix of technical, economic, and governance-related skills, knowledge, and experience are required. Although the specific required capacities may be unique to the energy sector, the approaches to developing these individual capacities will be similar to those required in all areas of CDE.

The Role of donors: conclusions and recommendations

OECD guidance concerning capacity development for the environment incorporates a series of basic concepts and principles, recognising that capacity development is part of an endogenous process of change; that it occurs at the level of the enabling environment, the organisation, and the individual; and that it should be delivered using a country-systems approach. Based on the review undertaken for this paper, it is clear that these concepts and principles are fully relevant and appropriate to CDE in the energy sector.

Donors have a part to play in facilitating environmental capacity development in the energy sector. Most importantly, this requires increased focus on sustainable energy sources of relevance to the majority of the population, and increased focus on efficiency of energy use.

Examples of possible donor roles relative to environmental management and governance in the energy sector are presented throughout the paper. These examples include support for:

- increased access to information and creation of knowledge;

- facilitation of policy dialogue and other change processes;

- mainstreaming environment/energy linkages in policies, strategies, and programmes.

To fully realise the potential contribution of donor agencies, it will be important to address the issue of competing, conflicting or unco-ordinated donor programmes that arise in many countries. It is vital that donors' support strategies and policies are harmonised, and that they work together to avoid duplication. Given the diversity of the energy sector, and the wide economic reach of the sector, this can be a challenging goal.

PART I: INTRODUCTION

CHAPTER 1. ENERGY, ENVIRONMENT, AND CAPACITY DEVELOPMENT

1.1 Energy, environment, and development

The relationships between energy, the environment, and development are deep and complex. The International Energy Agency has described these relationships as follows (IEA, 2004):

> Energy is deeply implicated in each of the economic, social and environmental dimensions of human development. Energy services provide an essential input to economic activity, contributing to social development through education and public health, and help meet the basic human need for food and shelter.
>
> Modern energy services can improve the local environment in some instances, for example by reducing local air emissions caused by inefficient equipment or by slowing deforestation of local forests. However, increased energy use can also lead to increased greenhouse gas emissions globally and possibly contribute to climate change impacts. In addition, it is possible that increasing use of energy resources can have ecosystem impacts, depending on the energy resource being used. The relationships between energy use and human development are extremely complex.
>
> The complementary relationship between energy use and economic growth is obvious; however less obvious is the extent to which constraints on the availability of energy and its affordability can affect economic development . . . In many poor countries, under-investment in public utilities, inefficient management, under-pricing and a generally unattractive climate for private investment cause energy shortages and hold back economic growth and development.

As noted later in this paper, 1.5 billion people do not have access to electricity, which limits their potential for improved livelihoods and income. For those in developing countries who do have access to electricity, the supplies are often sporadic, which imposes economic costs due to reduced production and the need to invest in back-up supplies. Most developing countries are also substantial importers of energy, so the economic cost and security of supply are important issues. Many subsidize energy production or consumption, yet these subsidies are costly, economically inefficient, and generally provide least benefit to those in greatest need.

The linkages between the energy sector and other sectors are also strong. For example, in the area of biomass energy there are significant interactions between the energy, agriculture, and forestry sectors: decreased reliance of conventional biomass fuels can reduce pressure on forest resources; increased reliance on liquid biofuels can increase pressure on agricultural resources with implications for agricultural land use, rural livelihoods, and food security.

1.2 Capacity development

1.2.1 Basic concepts

The OECD has concluded that: "Adequate country capacity is one of the critical missing factors in current efforts to meet the Millennium Development Goals. Development efforts in many of the poorest countries will fail, even if they are supported with substantially increased funding, if the development of sustainable capacity is not given greater and more careful attention" (OECD, 2006).

Capacity is the ability of people, organisations, and society as a whole to manage their affairs successfully. Capacity development is the process whereby people, organisations, and society as a whole unleash, strengthen, create, adapt, and maintain capacity over time (OECD, 2006).

Various OECD documents clearly describe three levels of capacity:

- **Enabling environment** is the term used to describe the broader system within which individuals and organisations function, including the policy, legal, regulatory, economic, and social support system. The enabling environment determines the 'rules of the game' for interaction between and among organisations. The enabling environment is determined by national policy, international regimes, rule of law, accountability, transparency, information flows, and communication.

- **Organisational capacity** refers to the internal policies, arrangements, procedures and frameworks that allow an organisation to operate and deliver on its mandate. Thus, organisational capacity refers to the mandates, structures, functions, systems, and infrastructure that bring together individual capacities and allow an organisation to fulfil its mandate and achieve its objectives.

- **Individual capacity** refers to the skills, experience and knowledge of individuals. This includes "soft" competencies such as building relationships, as well as "hard" competencies such as technical, logistical, and managerial skills.

1.2.2 Capacity development for environmental management and governance

Environmental capacity represents the ability of individuals, groups, organisations, and institutions to address environmental issues as part of a range of efforts to achieve sustainable development. Environmental capacity development (CDE) is the process by which environmental capacity is enhanced (OECD, 2005a).

The *Paris Declaration on Aid Effectiveness* stresses the importance of country systems in development co-operation, and the concept of country systems is central to the discussion of CDE in this paper. A country system approach to capacity development for environment implies a need to mainstream environmental capacity across government. It also implies the need to address the role and capacity of non-governmental actors in the private sector and civil society (OECD, 2010). The country systems approach is described in more detail elsewhere in this paper.

1.3 Purpose, scope, and structure of this paper

1.3.1 Purpose

The purpose of this paper is to highlight the importance of environmental management and governance in the energy sector; to present environmental goals, requirements, and entry points for

environmental capacity development in the energy sector; to review selected strategies/approaches to CDE in the energy sector; and to discuss implications for donors related to CDE in the energy sector.

1.3.2 Scope

The focus of this paper is on capacity development in a developing country context (although information on developed and emerging economies will be provided as background in certain sections). This paper is a high-level discussion of relevant topics pertaining to CDE in the energy sector. It should not be considered exhaustive or comprehensive. With respect to the energy resources/technologies discussed, the information presented relates to currently available technologies, not those in the research and development stage.

1.3.3 Structure of this paper

Following this introductory section, Parts II to V of this paper are organised as follows:

- **Part II**: The Energy Sector and the Environment in Developing Countries: Situation Analysis.
- **Part III:** Goals, Capacity Requirements and Entry Points: A Framework for CDE in the Energy Sector.
- **Part IV:** Developing Environmental Capacity in the Energy Sector.
- **Part V:** The Role of Donors: Conclusions and Recommendations.

In addition, the Appendices to this paper include an overview of key aspects of environmental sustainability in the energy sector, and a set of case studies documenting project experience relating to environmental capacity development in this sector.

PART II: THE ENERGY SECTOR AND THE ENVIRONMENT IN DEVELOPING COUNTRIES: SITUATION ANALYSIS

CHAPTER 2. KEY FEATURES OF THE ENERGY SECTOR

2.1 Developed countries

2.1.1 Use of energy resources: current situation

In developed countries, all sectors of the economy have ready access to energy services. Sectoral energy use in OECD countries breaks down as follows: industry (30%); transport (34%); residential, services and agriculture (33%) (RISO, 2008).

Fossil fuels, including oil, gas, and coal, have in the past been the dominant energy resource. Oil is the most important fuel, accounting for 40% of primary energy in OECD countries, followed by gas (22%), coal (20%), nuclear energy (11%), and renewable sources including hydropower, biomass and waste (7 %) (2005 figures from RISO, 2008).

In 2008 the global installed wind power capacity was about 100 GW. Unlike most new renewable sources, in developed countries wind turbines are increasingly competitive with conventional power production. Analysis from the Danish Energy Association, for instance, estimates that offshore wind turbines will be competitive with other energy technologies in 2015 (RISO, 2008). Developed countries have had a strong influence in the development new energy supply opportunities, and have an opportunity to drive increased demand for renewable energy.

Experience in developed countries has demonstrated that access to modern energy services is inherently connected with economic development. According to the International Energy Agency (IEA) publication *World Energy Outlook 2004*, access to modern energy services is an indispensable element of sustainable human development. It contributes not only to economic growth and household incomes, but also to services vital to an improved quality of life, such as education and healthcare (IEA, 2004).

2.1.2 Policy challenges

Developed countries face a range of complex policy challenges related to the energy sector. The most complex issue is undoubtedly climate change, a global problem driven in substantial part by greenhouse gas emissions associated with fossil fuel combustion. Over a decade ago, many countries joined an international treaty - the United Nations Framework Convention on Climate Change – which sought to mitigate climate change by reducing greenhouse gas emissions. In 2005, most developed nations adopted the Kyoto Protocol, with legally binding commitments to reduce greenhouse gas emissions. Countries are now working towards a new framework for broadened and deeper action after the first commitment period of the Kyoto Protocol. Many developed nations are also working in other multilateral forums to develop regional action plans to reduce emissions in various sectors. The myriad of policy choices made by

developed countries in different regions of the world (Europe verses North America for example) result in differing approaches, and possibly lost opportunities to focus resources most efficiently to achieve the greatest impact on climate change.

A second broad policy challenge relates to the investment choices made regarding new energy supplies. Each energy alternative is associated with opportunities, constraints, and tradeoffs. For example, some developed nations are committing significant resources to development of biomass energy systems (both direct combustion and biofuels), in part due to the low greenhouse gas emissions from end-use combustion. However, there are complex issues to consider with biomass technology, including the energy resources required during large-scale production, potential land use changes, and the potential displacement of food production on agricultural land. These potential issues are significantly mitigated when waste biomass is used as feedstock; in part for these reasons, the majority of the biomass program development in the United States is based on agricultural crop residues and forest harvesting residues (US DOE, 2010). Biofuels is just an example – there are pros and cons to each energy alternative.

A third policy challenge relates to the subsidies that governments in developed countries have traditionally provided to the energy sector, including subsidies for oil and gas exploration and development. Often the subsidy is in the form of tax incentives such as favourable treatment of the capital costs of exploration and resource development. However, subsidies to this sector result in an un-level playing field among energy options, and have as a result hindered the development of renewable energy options and discouraged otherwise economic investments in energy efficiency. The reduction and rationalization of subsidies and incentives for energy supply and for energy efficiency is a complex and often controversial process.

2.2 Developing and emerging countries

2.2.1 Use of energy resources: current situation

The defining characteristics of the energy sector in many developing countries include low access to modern energy sources (particularly in rural areas), coupled with significant local environmental impacts arising from the use of traditional fuels.

The International Energy Agency (IEA) estimates that as of 2008, 1.5 billion people lack access to electricity, representing over one-fifth of the world's population. Approximately 85% of those people live in rural areas, mainly in Sub-Saharan Africa and South Asia. The low level of electrification is due to a number of factors including poverty, a highly-dispersed rural population, a low degree of industrialization, a historically inefficient energy sector, and difficulties accessing capital to finance the development of modern energy sources (IEA, 2009).

In the world's least developed countries (LDCs) and Sub-Saharan Africa as a whole, more than 80% of people rely primarily on solid fuels such as coal or wood for cooking, compared to 56% of people in developing countries as a whole. Biomass fuels such as firewood, charcoal, straw, agricultural residues, and animal dung supply 95% of all energy consumed in the Sub-Saharan African region (RISO, 2008). Most of these fuels are not traded commercially in the formal sector of the economy; rather they are gathered as needed by household members or, particularly in the case of charcoal, may be sold via the informal sector. Although charcoal can be produced sustainably, increasing use in many African countries has led to widespread unauthorized forest harvesting. This practice can lead to scarcity and cause ecological damage in areas of high population density. The use of biomass energy can also reduce agricultural productivity, because agricultural residues and dung burned in stoves might otherwise be used as fertilizer (IEA, 2004).

As incomes rise, households in developing countries begin to switch to modern energy services for cooking, heating, and electricity. The rate of transformation depends on the affordability and availability of modern energy services. The process is gradual, and can include a shift first from traditional fuels to intermediate modern fuels, such as kerosene, and then to more advanced fuels such as liquefied petroleum gas and natural gas. Kerosene is generally the cheapest fuel for cooking, heating and pumping water, and is easy to obtain; liquefied petroleum gas is a cleaner, safer fuel, but it is not easily accessible due to the higher cost of the gas cylinder and the stove (IEA, 2004).

The potential economic benefits from investing in renewable energy will vary from country to country, depending on the mix of renewable energy used. At the national level the use of renewable energy can reduce the need for imports of fossil fuels and therefore improve the balance of payments of oil-importing countries. In addition, an increased use of renewable energy can also diversify the energy portfolio of a country and improve price stability in times of rising fossil fuel costs. This leads to enhanced energy security and a more reliable and sustainable energy basis for economic growth. At a more local level, the increased use of renewable energy can offer important opportunities for the creation of local employment and income generation through production, distribution, marketing, maintenance and servicing of renewable energy technologies. According to a study from Goldemberg (2004), renewable energies can create up to 116 229 jobs per TWh (terawatt hour) produced as compared with 1 145 for conventional energies (oil, coal and natural gas) (OECD, 2008, Chapter 12).

Hydroelectricity is an important energy source in some developing and emerging economies, especially China. China installed 18.2 GW of large hydro in 2009, and now has more installed capacity than any other country. Micro-hydro is also a developed technology, with total installed capacity worldwide at 61 GW, more than half of this in China.

A growing number of countries in Asia, such as India, Indonesia, Thailand and Vietnam are considering the increased use of nuclear energy for electricity generation. India and the United States have agreed to co-operate in increasing India's nuclear power generation capacity as a key method to reduce greenhouse gas emissions (RISO, 2008).

Energy demand can be expected to increase significantly in emerging economies in particular (e.g. China, India) in the coming decades. These countries generally use energy less efficiently than developed countries. China's energy conversion and utilization efficiency, for instance, is around 25 % lower than developed countries. More broadly, rapidly-developing countries like China and India are important in shaping world trends in energy development. With their significant new investments in energy infrastructure over the coming decades, these countries have a window of opportunity to move towards low-carbon development and low-cost greenhouse gas emissions reduction (RISO, 2008).

2.2.2 Policy Challenges

The policy challenges in the energy sector of developing countries are diverse and often profound. Depending on the country, the challenges can include affordability and access to modern low carbon energy in rural and urban settlements; environmental degradation associated with traditional biomass fuels; provision of a reliable and stable domestic electricity supply; security of supply and costs of imported energy; economic competitiveness for energy exporters; and the cost of subsidies where they exist. Some of these challenges are discussed briefly below.

In many developing countries, the policy priority is increased access to energy for poor rural and urban communities – energy that is available, appropriate, affordable, and reliable. The scale of this challenge, and the associated capacity development needs, are significant and will require major investment at the country level.

In this context, particularly in the least developed countries, development of modern low-carbon energy resources is often not a priority due to perceived or real cost issues. Traditionally in developing countries the first option for new energy supply is fossil fuel. However, studies by the World Bank indicate that higher oil prices are causing many net oil importing Sub-Saharan African countries to lose economic ground, costing them a cumulative loss of over 3 % of GDP and increasing poverty in those areas by as much as 4 to 6 % (RISO, 2008). In addition, volatile world market prices for oil pose risks for economic and political stability, with sometimes critical effects on energy-importing developing countries (OECD, 2008). There are opportunities for co-operation with developed nations in the area of carbon financing and investment in low-emission energy technologies, to break the cycle of poverty and other risks associated with fossil fuel dependence. Renewable energy can play an important role in providing a more sustainable and secure energy supply for developing nations.

With respect to traditional biomass fuels used for cooking and heating (especially wood and charcoal), there is often a conflict between the fuel needs of poor households and the environmental and livelihood consequences of deforestation. The conflict is particularly significant when countries lack adequate policies and/or enforcement to control tree harvesting and charcoal production, and to ensure reforestation – and this is commonly the situation. Options do however exist to address this challenge. For example, some countries regulate planting and harvesting of trees for charcoal production (Mugo and Ong, 2006); some have tree planting programmes or give land owners incentives to plant; some promote alternative energy sources to reduce charcoal demand; and others police exploitation of existing stocks of wood. The challenge is nonetheless complex and likely to become increasingly difficult to address in many countries, as climate change, population pressure, and other stressors intensify.

With respect to increasing access to modern energy sources in off-grid rural settlements, renewable technologies such as solar electricity (photovoltaic or PV) and solar water heaters can be cost-effective options, and in some areas, wind pumps, geothermal, and local mini-grids may also be good options. These locally available energy resources avoid the high costs associated with installing extensive grid connections and reduce reliance on imported energy. Africa is estimated to account for nearly a quarter of the global potential in wind energy development, and more than 15% of the world's potential in geothermal energy (OECD, 2008). Investing in these types of renewable energy sources will help ensure a reliable and stable energy supply.

Experience has shown that subsidies to energy services are usually ineffective, economically inefficient and contrary to good environmental practice. However, subsidies may be justified in some cases in order to combat poverty. In these situations the use of subsidies should be properly targeted and affordable, deliver quantifiable benefits, be easily administered, avoid large economic distortions, and be transparent and limited in duration. In the case of electricity for instance, the challenge is to ensure that subsidies increase access at the lowest cost, while ensuring that electric utilities remain viable and continue to invest.

Each individual country has different priorities, different policies, different governance structures, and different resources. Each will need different approaches to meet the policy challenges identified above.

CHAPTER 3. KEY ASPECTS OF ENVIRONMENTAL SUSTAINABILITY IN THE ENERGY SECTOR

This Chapter discusses three aspects of environmental sustainability in the energy sector:

- Resource use and costs;
- Other environmental impacts;
- Climate change policy challenges.

The discussion presented here is a brief overview only. Appendix A provides additional detail concerning these topics.

3.1 Resource use and costs

3.1.1 Resource use

Energy sources are of two types: non-renewable and renewable. Non-renewable energy sources are not replenished when used, and include fossil fuels (coal, natural gas, oil and petroleum products) and uranium. Renewable energy sources are naturally replenishing, and include biomass, solar, wind, hydro, geothermal, ocean thermal, wave, and tidal energy.

Our reliance on non-renewable energy sources is high. Globally, non-renewable fossil fuels account for approximately 80% of primary energy consumption, traditional biomass fuels 10%, nuclear 6%, and renewable resources the remainder (Royal Netherlands Academy, 2010). In its annual global energy outlook series, the IEA has repeatedly noted that current reliance on non-renewable fossil fuels is unsustainable environmentally, economically and socially, and that there is an urgent need for action to bring about a wholesale global shift to low-carbon technologies.

Renewable energy sources are sometimes described as non-depletable, and in most cases this is a valid description. The most significant exception is biomass energy, where the rate of resource extraction often exceeds the rate of regeneration. A particularly important example of this occurs in the case of small-scale wood and charcoal use by rural poor households in developing nations world-wide (RISO, 2008). Over-harvesting forest resources means reduced availability of the biomass resource for use as a fuel, and leads to deforestation and ultimately to impacts such as soil degradation, soil loss, siltation of rivers, and changes in water availability.

3.1.2 Resource costs

The depletion of non-renewable energy sources has severe economic implications for all countries. According to the IEA, the wide fluctuations in non-renewable energy prices in recent years have demonstrated the importance of energy to global economic activity and our vulnerability to supply imbalances.

The steady fall of prices for renewables over the past decade has considerably improved the cost competitiveness of several renewable energy options. According to the IEA, small or micro hydropower and biomass combustion systems are already competitive in many wholesale electricity markets. In certain regions, wind and geothermal energy are cheaper than conventional energy sources on the retail consumer market (OECD, 2008).

3.1.3 Other natural resource issues

There are also other natural resource issues associated with energy production, including land and water use. For example, land use has been identified as an issue in the case of some renewable energy facilities, including wind farms and large scale PV. Land use conflicts can also be associated with construction of service roads and transmission lines for these facilities (as with any large scale electricity generation technology).

3.2 Other environmental impacts

Environmental impacts occur at each stage of the energy "lifecycle", including extraction, production, distribution and use. A number of illustrative examples of these impacts are listed below; a fuller discussion is provided in Appendix A.

3.2.1 Environmental impacts of resource extraction

The extraction of **fossil fuels** such as coal and petroleum has a significant impact on the environment. Coal mining is considered to be a major source of greenhouse gas emissions (IPCC, 2010), and surface mining also impacts land, surface water, and groundwater. Similarly, unconventional oil extraction (*i.e.* oil sands) is most often done through surface mining which impacts large tracts of land. Extraction of conventional oil and natural gas is done primarily through well drilling, which can cause localized erosion and loss of soil productivity, and carries a risk of spills which can cause serious environmental contamination.

Most renewable energy sources, including wind and solar, do not involve resource extraction activities in the conventional sense. However, **biofuel production** and other uses of biomass require a large input of "raw" biomass feedstock, the production and harvesting of which can have environmental impacts (depending on the biomass source).

3.2.2 Environmental impacts of energy production

Coal combustion for electricity production is considered to be the most significant source of greenhouse gas emissions of all energy sources (IPCC, 2010). Electricity production based on **combustion of other fossil fuels** is also associated with significant environmental impacts, including greenhouse gas and other air emissions. Production of **refined petroleum products** results in emissions of greenhouse gases, although proportionally more are released during end use combustion (CAPP, 2010). Production also emits sulphur dioxide, nitrogen oxide, and benzene among other pollutants, in addition to using a significant volume of water.

The impacts associated with production of renewable energy vary. In many development countries small-scale informal sector **charcoal production** is widespread. The production processes are often rudimentary, with low yields and significant emissions of methane, carbon monoxide, and other air pollutants. In contrast, there are significant environmental benefits associated with **wind and solar energy**, including virtually no emissions to air, land or water, unlike most conventional energy generation technologies.

3.2.3 Environmental impacts of energy distribution

Distribution of **fossil fuel** energy involves significant environmental impacts. For example, the trucks, railroads, barges and pipelines used to transport coal and coal slurry affect air and water quality, and the construction of coal slurry pipelines disturbs the local environment (Clean Air Task Force, 2001). The construction of oil and natural gas pipelines can also have ecosystem impacts, affecting habitat and disrupting land and water resources (Consumer Energy Report, 2010). The transmission and distribution of **electricity** also has environmental impacts, primarily related to land use, habitat, and related impacts of construction and maintenance of the transmission/distribution system. Most **renewable energy** technologies are either used on-site or use the established transmission/distribution system for electricity distribution. For remote generation sites, new transmission facilities may be required, with associated environmental impacts.

3.2.4 Environmental impacts related to end use

Generally, most fossil fuels have significant air emissions associated with their end-use. The refined petroleum products derived from oil are pervasive in the global economy. In particular, **gasoline (petrol) and diesel** dominate the transportation sector worldwide, and combustion of these fuels is associated with a range of emissions-related environmental challenges. **Natural gas** is the cleanest of all the fossil fuels. Compared to other fossil fuels, releases of carbon dioxide per unit of energy output are reduced.

With respect to the use of renewable fuels, in densely populated communities high emissions from **biomass burning** can result in elevated local pollution (IEA, 2007). Perhaps more significantly, when used indoors biomass fuels impact indoor air quality, with significant health impacts. The energy efficiency of biomass cookstoves is also very low compared with other fuel options. Other renewable energy sources, such as **solar heating and cooking**, have very low environmental impact at the point of use.

3.3 Climate change policy challenges for the energy sector

3.3.1 Contribution of the energy sector to climate change

Climate change is a global concern that is strongly linked to decisions on energy development priorities in all countries, developed and developing. Fossil fuel energy technologies emit greenhouse gases during production and end-use. In contrast, renewable (low-carbon) energy technologies including wind, PV, and geothermal contribute little to climate change. Nuclear power also has negligible greenhouse gas emissions.

Many countries concerned about climate change have set ambitious targets for increasing the contribution of renewable energy. These targets both decrease dependence on fossil-fuel energy resources, and deliver energy with significantly lower greenhouse gas emissions (RISO, 2008). The main opportunities to mitigate climate change in the energy sector are de-carbonisation of the power sector and end-use energy-efficiency investments. For developing countries these options should also lead to enhanced energy security, reduced dependence on foreign imports of fossil fuels, and creation of local economic activity through renewable power investments in micro-grid systems.

There are large overlaps between measures typically related to climate change mitigation and measures addressing other environmental challenges (Slunge and César, 2009). On the other hand, there is a tendency to attempt to deal with climate change as a stand-alone issue in both developed and developing countries. This could potentially limit cross-sectoral capacity development and co-ordination opportunities between environment, energy, agriculture and finance sectors/ministries of a country. For maximum impact, responses to climate change require national policy co-ordination at the highest political and

organisational level in a country. This offers opportunities for Ministries of Environment to work more closely with central agencies like Finance and Planning (or a Prime Minister's office, for example).

3.3.2 Climate resilience of energy resources and infrastructure

Every existing source of energy has some vulnerability to climate variability. Renewable energy sources such as wind or PV are directly sensitive to climate variables in obvious ways. In the case of wind energy, changes in seasonal wind patterns or strength would likely have significant positive or negative impacts because wind energy generation is a function of the cube of the wind speed. For PV systems, potential impacts require further research; however some experts anticipate that climate change could cause a decrease in global solar radiation which would lead to a corresponding decrease in solar cell output (US DOE, 2007).

Conventional electrical generation is also affected. Decreased or unreliable rainfall will affect hydroelectric generation. In thermal generation, the thermoelectric cooling process that is critical to maintaining high generation efficiencies is affected by increased temperatures (US DOE, 2007). And higher overall temperatures will increase air conditioning loads in many countries, putting additional demand on the system.

Changes in water availability will impact the production of fossil fuels, since large volumes of water are required in mining, processing, and distribution. Coupled with the water required for cooling in thermal generation, it is likely that the future holds increased conflicts and competition for water.

Biomass energy systems that rely on agriculture crops could also be affected by climate change due to a rise in average temperatures, more extreme heat days, and changes in precipitation patterns and timing. More generally, extreme weather events can have adverse effects on energy production, distribution, and transportation infrastructure, regardless of energy source.

Overall, the effects of climate change on the existing energy infrastructure might be categorized as modest. However, local and industry-specific impacts could be large, especially in areas that may be prone to disproportionate warming (such as northern regions) and other areas prone to frequent weather disruptions (such as coastal areas). It is important to design future energy infrastructure with flexibility to accommodate these potential impacts, including technologies that minimize the impact of increases in ambient temperatures on power plant equipment; technologies that conserve water use for power plant cooling processes; planning at the local and regional level to anticipate storm and drought impacts; improved forecasting of the impacts of global warming on renewable energy sources at regional and local levels; and adoption of action plans and policies that conserve both energy and water (US DOE, 2007).

CHAPTER 4. KEY ACTORS AND THEIR ENVIRONMENTAL MANAGEMENT FUNCTIONS

This chapter considers the key actors with roles and responsibilities related to environmental management and governance in the energy sector. The discussion considers, in turn, national governments, sub-national and local governments, energy suppliers, the private sector, and civil society.

4.1 National governments

4.1.1 Key actors and their functions

Energy touches all sectors of the economy, and consequently a wide range of **sectoral ministries** have responsibilities related to environmental management in the energy sector. The structure and responsibilities of government ministries/departments vary from country to country, but the agencies responsible for the following sectors are all "key actors":

- environment;
- energy;
- natural resources (forestry, water, land, mining);
- agriculture;
- rural Development;
- energy using sectors (transportation, industry, housing, etc.)

In addition, the various **central agencies** of government are key actors in the energy sector. This would include the agencies responsible for:

- development planning;
- finance;
- infrastructure

Finally, many countries have independent or partially independent **regulatory bodies** such as an environmental regulatory authority and/or an energy regulatory authority. In other countries these functions are vested in the sectoral ministries or central agencies.

At a higher level, national **legislative bodies** establish legal requirements or adopt policies that define the environmental goals to be met, provide the necessary authority to meet those goals, and establish the level of funding available. Legislative institutions can impose certain duties and responsibilities on the executive institutions, and impose deadlines that executive institutions must meet (OECD, 2009).

In some countries **judicial institutions** have the right to interpret the laws. They may also impose requirements on the executive institutions. Courts may take enforcement action, enforce administrative orders, and play a significant role in assessing sanctions (OECD, 2009).

Table 4.1 outlines selected core environmental management functions of sectoral ministries. Some of the functions are specific to environmental management; others are applicable to any sector but still relevant to environmental goals. This exhibit is based on prior OECD work (OECD, 2009), with minor amendments to the functional category descriptions.

Table 4.1. Core Environmental Functions

I. Policy and programme formulation	▪ Formulating environmental policies ▪ Developing legal frameworks ▪ Creating the evidence base for problem analysis and decision-making ▪ Conducting economic analysis of policies and programmes ▪ Analyzing and addressing social effects of environmental policies ▪ Applying strategic financial planning ▪ Managing public environmental expenditure
II. Environmental policy integration (mainstreaming)	▪ Balancing environmental with development and sectoral strategies ▪ Greening territorial development policies ▪ Integrating environmental and security policies ▪ Promoting environmentally sound product policies ▪ Ensuring preparedness and response to disasters and accidents
III. Policy and programme implementation	▪ Establishing environmental standards ▪ Conducting environmental assessments at the project level ▪ Setting company-specific requirements ▪ Correcting market failures through economic instruments ▪ Creating markets to achieve environmental goals ▪ Promoting environmental goals through “Information” regulation ▪ Facilitating corporate initiatives to improve environmental performance ▪ Enabling the provision of environmental services
IV. Compliance assurance	▪ Conducting the identification and profiling of the regulated community ▪ Compliance assistance to the regulated community ▪ Detecting non-compliance ▪ Ensuring non-compliance response
V. Overall management	▪ Defining organisational structures and providing leadership ▪ Ensuring intra-agency activity and budget planning ▪ Organising effective interaction, internally and externally ▪ Coordinating international co-operation efforts ▪ Managing human resources ▪ Monitoring and reporting performance

4.1.2 Current Capacity

This study has not identified any recent international assessments of government capacity related to environmental management in the energy sector. However, experience and evidence in the literature suggest that while capacity varies greatly among developing countries, most often capacity is relatively low. In view of the major environmental challenges outlined in Chapter 3, and the key role of government in addressing these challenges, capacity development in government is a high priority. (Chapter 5 discusses key capacity requirements.)

The issue of scarce staff resources is often a limiting factor in the functioning of environmental management systems in government. In addition, cross sectoral co-ordination among ministries and sectors is often weak. Identifying and addressing key constraints to environmental management outside the environmental agencies will contribute to improved capacity. Important ingredients include high level policy co-ordination and institutional arrangements that assign greater responsibility for environmental management to sectoral and central agencies (Slunge and César, 2009).

4.2 Sub-national and local governments

4.2.1 Key actors and their functions

Among countries there is great variation in the extent of decentralization to sub-national and local governance structures. Due to vast differences in social, cultural, political, and economic situations, it is not possible to identify a standard level of, or approach to, decentralisation of environment and energy responsibilities.

Many countries have a **state or provincial structure.** At this sub-national level, potential responsibilities cover the full suite of functions identified in Exhibit (Table 4.1). However, actual functions depend on the decentralization policies in each country, and these functions are commonly restricted with respect to range of responsibility and/or level of authority.

Most countries have some form of **local government.** At this level powers are typically delegated by legislation or directive of a senior level of government. In developed countries it is common for these local authorities to have responsibility for such environmentally-related matters as land-use planning, wastewater treatment, solid waste management, and in some cases management of local energy utilities. However, local governments in developing countries often have more restricted responsibilities, levels of authority, and resources.

4.2.2 Current capacity

As noted above, there is great variation among countries in the degree and nature of government decentralization. Notwithstanding this variability, it can be argued that sub-national governments in developing countries are often disempowered relative to national governments, and often operate with significant resource constraints. Given this, capacity at these levels is likely to be more limited than at the national level.

4.3 Energy suppliers

4.3.1 Key actors and their functions

For the purposes of this paper, energy suppliers include electric utilities, oil and gas companies, suppliers of biomass fuels, suppliers of renewable energy equipment, and providers of energy efficiency services. These suppliers range from large utilities to small-scale charcoal producers.

Electric utilities are private or state-owned companies responsible for generation, transmission, and/or distribution of electricity, generally in a regulated market. Individual utilities may be engaged in all or only some aspects of the industry. In many countries electricity generation is competitive with multiple producers; however, in a given service territory transmission and distribution are usually the responsibility of private or public sector monopolies.

Oil and gas companies produce and/or import petroleum and petroleum products. They may also be involved in refining, distribution, and marketing. In most countries, privately-owned oil and gas companies (often part of multinational groups) co-exist with national publicly-owned companies, and public-private ventures are common.

In developing countries the **suppliers of biomass fuels** are a diverse group. At one end of the spectrum are larger scale suppliers such as, for instance, sugar producers who supply waste bagasse; at the other end of the spectrum are wood and charcoal sellers in the informal sector.

Suppliers of renewable energy equipment provide both hardware and service, as do providers of energy efficiency services. These providers are essential to any shift towards greater reliance on renewable energy sources, and towards more efficient energy end use.

4.3.2 Current capacity

In developing countries the electric utilities and the oil and gas companies often (but not always) have good capacity in areas directly related to their core mandates. However, there may be gaps in areas such as system efficiency, distribution losses, and revenue collection, and in broader capacity related to environmental management and governance. Although this capacity may have been improving over time, often with donor support, significant gaps remain relative to the range of capacity needs outlined in the next chapter.

The suppliers of biomass fuels, and specifically the small scale producers and vendors in the informal sector, will generally have extremely low environmental management capacity. Many if not most of these small scale entrepreneurs are poor with few options and likely no access to alternative livelihoods. They are unlikely to have knowledge of environmentally improved technologies, nor the means to adopt these technologies.

Suppliers of renewable energy equipment and of energy efficiency services are typically under-represented in developing countries. The suppliers that do exist may lack access to the latest technologies and expertise, and may lack access to business capital. Often the policy drivers required to create demand for their products and services are not in place, and high levels of poverty and low levels of economic activity severely restrict the potential market demand. Barriers often exist to the adoption of innovative financing mechanisms such as the Energy Service Company (ESCO) model.

Taken together, these points indicate that capacity for improved environmental performance in the energy sector is limited among the energy suppliers in most developing countries.

4.4 Private sector

4.4.1 Key actors and their functions

The **formal private sector** is an important stakeholder group. In many of the countries where notable improvements in public sector capacity have been attained, private sector demand for competent public services and better governance has been a major stimulus to change. Private sector investment has also been a major source of funds for capacity building (OECD, 2006).

Aside from the energy suppliers discussed above, private sector actors do not typically have formal environmental management functions in the energy sector. However, many private firms provide services to the sector (consulting, engineering, construction, equipment, etc.). Moreover, the private sector is a consumer of energy services, and as such can contribute to a shift towards more sustainable energy sources and more efficient energy use.

Local entrepreneurs in the **informal sector** are a very important part of the economy in many developing countries. They have low operating costs and can adapt quickly to changing markets, although they often work without business support and have limited technical and financial management skills. In a country where energy supply gradually shifts away from imported oil to indigenous sources, benefits to the local economy can be expected, and the local informal sector will be among the beneficiaries.

Private sector associations can be important intermediaries, working at the national or local level and offering support to businesses and liaison with other stakeholders. Similarly, **local development**

agencies (which may be sponsored by the private sector, by government, or by both) can also serve as local intermediaries with good potential to contribute to sound environmental management in the energy sector.

4.4.2 Current capacity

As in the case of the utilities, larger companies in the formal sector often (though not always) have good capacity in areas directly related to their core mandates. Some of these companies may also have good capacity related to specific aspects of environmental management, but not necessarily related to environmental management in the energy sector. The informal sector for the most part will not have expertise or capacity related to the environmental dimensions of the energy sector. They are unlikely to have knowledge of, or access to, environmentally improved technologies.

4.5 Civil society

4.5.1 Key actors and their functions

Citizens can play a major role in shaping and implementing environmental management programmes in the energy sector. They have a stake in environmental quality and energy planning, since both affect people's health, environment, and livelihoods. Citizens can also play an important role in communicating their needs and concerns with respect to energy resource planning, which can in turn result in better decision-making. In many countries **traditional leaders** play an important role in representing the interests of their communities.

Environmental NGOs and other civil society organisations have in many countries engaged deeply in environmental management issues in the energy sector. These organisations often seek to influence environmental policy and legislation through lobbying efforts. NGOs also play an important role in disseminating technical and non-technical information to decision-makers and to citizens who are concerned about the environment (OECD, 2008).

Many **development NGOs** have become deeply involved in project and programme delivery in the area of sustainable energy. This includes, for instance, introduction of improved woodstoves; development of managed woodlots and forests for fuelwood and other community needs; promotion of biogas, solar, wind and other renewable technologies; off-grid rural electrification based on renewable electricity; introduction of efficient technologies such as compact fluorescents; and development of low carbon Clean Development Mechanism (CDM) projects in many sectors.

4.5.2 Current capacity

As is the case with other groups discussed in this chapter, the capacity of civil society varies greatly between countries. Nonetheless, a number of general observations may have broad applicability. In the case of individuals, the difficult economic situation in many countries, limited access to information, limited access to resources, and low awareness of environmental issues related to the energy sector all serve to disempower and limit capacity – and the most vulnerable members of the community will typically be the most disempowered.

In the case of environmental NGOs and community-based organisations (CBOs), capacity is very country specific. In some countries with a strong tradition of participation and involvement, NGOs are key contributors to policy and program development in the country. In other countries the role of civil society organisations is severely constrained.

Finally, in the case of development NGOs, capacity is again variable, but often these groups are key players in national development, delivering projects and programmes that address national priorities. The most effective of these groups have developed their own organisational capacity over time, evolving to become trusted partners of governments and international donors.

4.6 Other actors

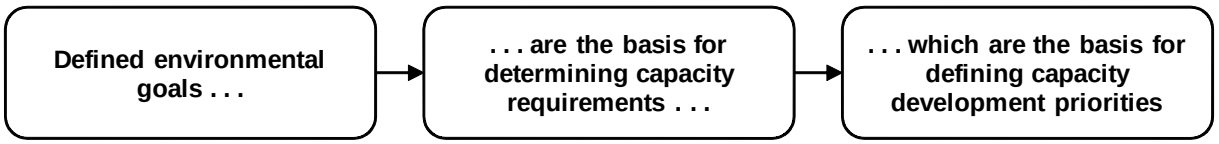
Regional groupings of countries (ECOWAS, SADC, CARICOM, etc.) can sometimes play a significant role in policy guidance and technical support to individual countries. This support spans a wide range of important issues, including energy and environmental management/ governance. These organisations are not discussed in detail in this paper (which is focussed on actors within a country), but their potential role should nonetheless be recognised and considered in the development of CDE initiatives in the energy sector.

PART III: GOALS, CAPACITY REQUIREMENTS AND ENTRY POINTS: A FRAMEWORK FOR CDE IN THE ENERGY SECTOR

CHAPTER 5. CDE GOALS AND RELATED CAPACITY REQUIREMENTS

Capacity development is not an end in itself. It is simply a step, albeit a critical one, towards some larger goal or set of goals. As such, an underlying premise of this paper is that environmental capacity development at the sectoral level must be framed within the context of these larger goals, and must begin by considering what capacity is required to meet these goals.

This Chapter therefore first examines the high level goals to be achieved through improved environmental management and governance in the energy sector (Section 5.1), and then discusses the capacity required to achieve these goals (Section 5.2). Subsequent Chapters will build on this foundation by discussing the activities (including entry points and approaches) that can contribute to development of the required capacity and ultimately contribute to achievement of the defined sectoral goals.



5.1 Environmental goals

The first building block for CDE in the energy sector is a clear understanding of the ultimate goals to be achieved through improved environmental management and governance in the sector. We suggest that there are at least five such goals:

Box 5.1. Environmental management and governance goals in the energy sector

Energy supply:

- A shift towards more environmentally sound and sustainable energy sources and technologies.
- Reduced environmental impact at all stages of the energy supply chain (production and distribution) for all in-use energy sources and technologies.

Energy use:

- A shift towards increased end use energy efficiency.
- Reduced environmental impact associated with all energy end uses through adoption of environmentally sound technologies and practices.

Cross-cutting

- Improved resilience of energy supply to the impacts of environmental change (including in particular climate change).

It is important to note that these goals are directional and dynamic, with no specific endpoint (the shift to more sustainable energy sources, for instance, is an ongoing long term process).

The five proposed goals demonstrate an important and fundamental point: that sound environmental management in the energy sector goes well beyond a narrow and more traditional focus on the direct environmental impacts of energy extraction, production and use. Sound environmental management also encompasses major goals such as significantly expanded use of sustainable energy sources and increased energy demand management.

5.1 Capacity requirements

5.1.1 Introduction and boundaries

To achieve these goals/objectives, capacity is needed within each of the groups of key actors discussed previously in Section 4 (*i.e.* government, energy suppliers, the private sector, and civil society). This section considers these capacity requirements, first for the government sector and then for energy suppliers, the private sector, and civil society.

To maintain focus on the energy sector, the capacity requirements discussed here have been bounded as follows:

- This section does not discuss capacity requirements related to the "overall management" functions of governments and other actors, as articulated previously in Section 4.1. These capacity requirements touch on matters such as organisational structure, leadership, and management of human resources. These requirements are critical, but they are not specifically related to the energy sector and as such are better addressed in a broader, cross-sectoral discussion of environmental capacity requirements.

- This section also does not discuss specific energy-related capacity requirements of other sectors (industrial sector, transportation sector, etc.). Although increased end use energy efficiency and reduced end use environmental impact are among the goals articulated above in Section 5.2, the sector-specific capacity requirements to achieve this are beyond the scope of this paper. Instead, the focus here is on higher level capacity requirements related to end use efficiency and environmental impact.

5.1.2 Governments

This sub-section considers capacity requirements of governments, including sectoral ministries and regulatory authorities at both the national and sub-national levels. The capacity requirements can also be considered to be broadly applicable to local authorities, although the degree to which this is the case will be highly variable depending on the nationally-specific roles and responsibilities of the local authorities.

Box 5.1 below provides an initial indicative list of the key capacity requirements for governments, based on the environmental management and governance goals presented in the previous section. These requirements are defined on a functional basis and are broad in scope, in keeping with the multi-faceted reach of the energy sector.

Box 5.1.: Government capacity requirements for sound environmental management and governance in the energy sector

Energy supply:

- capacity for the creation and maintenance of an enabling environment for sustainable energy (policies, legislation, regulation, finance, promotion, etc.).
- capacity for energy supply planning (forecasting, full cost economic analysis, technical assessments, evaluation and selection of options, etc.);
- capacity for program delivery (implementation of sustainable energy policy commitments);
- capacity to provide environmental oversight of the development of new energy sources;
- capacity to monitor environmental performance of the energy supply sector and support improved performance through enforcement and compliance activities.

Energy use:

- capacity for the creation and maintenance of an enabling environment for energy efficiency (policies, legislation, regulation, finance, promotion, etc.);
- capacity for demand side planning (end use analysis, economic and technical assessment of energy efficiency potential, etc.);
- capacity for program delivery (implementation of energy efficiency policy commitments) ;
- capacity to provide oversight of energy demand management programs and projects;
- capacity to monitor technical and environmental performance of energy end use and support improved performance through enforcement and compliance activities.

Cross-cutting:

- capacity to undertake integrated planning (demand and supply);
- capacity for strategic and project environmental assessment;
- capacity to assess climate vulnerability and risks to energy infrastructure (demand and supply);
- capacity to engage and communicate with stakeholders.

The relevance of these requirements will vary between agencies of government. Agencies with a mandate for attracting investment in the energy sector, for example, will require different environmental capacities than an energy regulator or an environmental assessment agency. But on a government-wide basis, all of the capacities presented in are necessary to help ensure sound environmental management and governance in the energy sector.

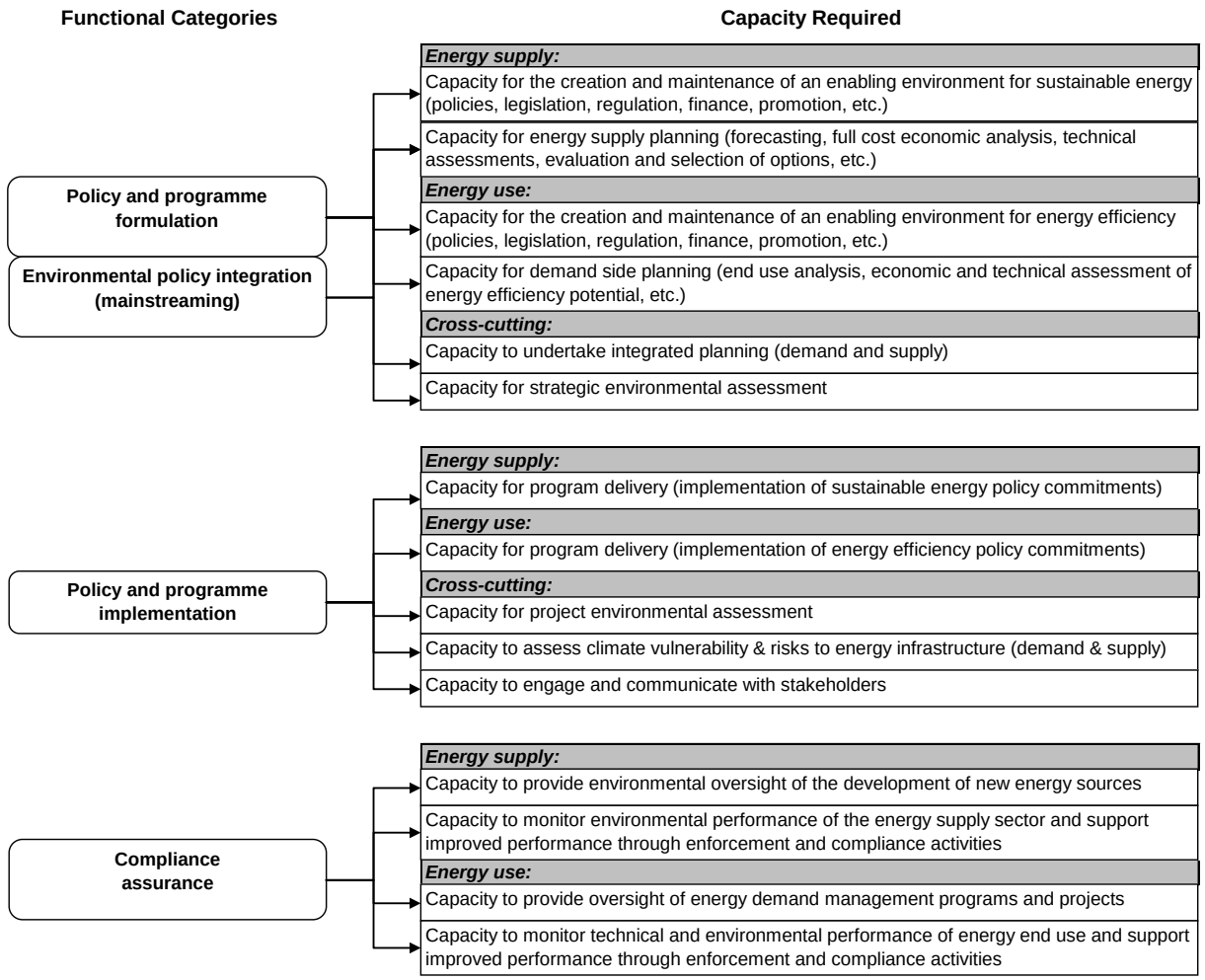
It is also important to note that the required capacities are defined on a functional basis, and as such are largely independent of the current energy supply and demand patterns in the country. The substantive content of the analysis, planning, and other activities referred to in Exhibit 2 (Table 5.1) will differ substantially between countries, and within countries will differ over time, but the functional requirements are broadly applicable.

It is useful to compare the functions implied by the sectoral capacity requirements presented above with the generic functions defined by the OECD for public authorities in the area of environmental management. These generic functions have been previously presented in Section 4.1 and Exhibit 1 (Table 4.1), and consist of functions organised into four categories:[1]

- policy and programme formulation;
- environmental policy integration (mainstreaming);
- policy and programme implementation;
- compliance assurance.

Figure 5.2 "maps" these functional categories to the specific required capacities outlined above.

Figure 5.2. Mapping OECD functional categories to required capacities in the energy sector



5.1.3 Energy suppliers, private sector, and civil society

It is evident that the overall capacity requirements of energy suppliers, the private sector, and civil society differ from the requirements of government. However, in the specific case of the environmental management and governance goals defined in Section 5.1, there is substantial overlap between the functional capacity requirements of these various actors.

Using the framework of the capacity requirements outlined above for governments, Exhibit 4 (Table 5.3) presents an initial indicative list of the requirements for energy suppliers, the private sector, and civil society.

Table 5.3: Energy Suppliers, Private Sector, and Civil Society Capacity Requirements

Capacity Required	Government	Energy Suppliers	Private Sector	Civil Society
Energy supply:				
Capacity for the creation and maintenance of an enabling environment for sustainable energy (policies, legislation, regulation, finance, promotion, etc.)	√	√	√	√
Capacity for energy supply planning (forecasting, full cost economic analysis, technical assessments, evaluation and selection of options, etc.)	√	√		
Capacity for program delivery (implementation of sustainable energy policy commitments)	√	√	√	√
Capacity to provide environmental oversight of the development of new energy sources	√	√	√	√
Capacity to monitor environmental performance of the energy supply sector and support improved performance through enforcement and compliance activities	√	√	√	√
Energy use:				
Capacity for the creation and maintenance of an enabling environment for energy efficiency (policies, legislation, regulation, finance, promotion, etc.)	√	√	√	√
Capacity for demand side planning (end use analysis, economic and technical assessment of energy efficiency potential, etc.)	√	√		
Capacity for program delivery (implementation of energy efficiency policy commitments)	√	√	√	√
Capacity to provide oversight of energy demand management programs and projects	√	√	√	√
Capacity to monitor technical and environmental performance of energy end use and support improved performance through enforcement and compliance activities	√	√	√	√
Cross-cutting:				
Capacity to undertake integrated planning (demand and supply)	√	√		
Capacity for strategic and project environmental assessment	√	√	√	√
Capacity to assess climate vulnerability and risks to energy infrastructure (demand and supply)	√	√	√	√
Capacity to engage and communicate with stakeholders.	√	√	√	√

CHAPTER 6. ENTRY POINTS

This chapter considers entry points for enhancing capacity for environmental management and governance in the energy sector. The discussion is intended to provide an overview of the topic, not a comprehensive catalogue of options.

As discussed previously, the 2005 Paris Declaration committed to reform the way aid is delivered and managed. One of the key commitments related to strengthening and using country systems, recognising that successful development depends on a country's capacity to implement policies and manage public resources through its own institutions (IISD, 2010a). If capacity development is to focus effectively on country systems, it follows that the entry points for capacity development should also be found within this country systems framework.

The accepted characterization of the core country systems has evolved over time. The current Joint DAC-EPOC Task Team on Developing Capacity for Environment and Natural Resource Management has proposed the following core country system categories (OECD, 2010):

- strategic planning;
- public financial management;
- monitoring and evaluation;
- social and environmental procedures.

In the case of governments, the discussion of entry points in this chapter considers each of these country system categories in turn, and provides specific linkages to the capacity needs outlined in the previous chapter.

In the case of non-governmental actors in the private sector and civil society, the country system "lens" can also be applied. To date, however, there is no accepted formulation of core country systems that reflects the distinct roles of the private sector and civil society within the overarching country system framework. Accordingly, for these non-governmental actors the entry point discussion in this chapter is informed by country systems concepts, but is organised by stakeholder group (energy suppliers, other private sector, and civil society) rather than by defined country system categories.

6.1 Governments

6.1.1 Strategic planning entry points

National and sub-national strategies and plans

In the past, environmental capacity development and energy sector support have often been project-oriented, supply driven, and slow to respond to Paris Declaration principles. In terms of environmental capacity development in the energy sector, programme-based approaches that correspond with long-term

national development planning are likely to be more effective than project-based approaches (IISD, 2010a).

Most governments put in place processes to develop **national development strategies and plans**, which normally include energy supply and access issues (due to the central role of energy in the economy and in development). These strategies/plans may also explicitly address environmental considerations either as a stand-alone topic or, less commonly, as a cross-cutting factor in national and sectoral development.

In countries with empowered sub-national government structures, **state or provincial development strategies/plans** and/or **local development strategies/plans** will also commonly address energy supply and access issues.

Beyond the broad national and sub-national strategies and plans, most developing countries have prepared a range of sectoral and issue-oriented strategies and plans, often with donor support (and sometimes donor driven). Examples of **energy sector strategies** include the following:[2]

- national energy strategies;
- national renewable energy strategies (or similar strategies for other energy supply options);
- national rural electrification strategies;
- national energy efficiency strategies.

Other sectoral strategies and plans will have major explicit or implicit energy components, including for example:

- national forest strategies (of particular relevance in countries that are heavily dependent on fuelwood and charcoal);
- national agriculture strategies (of particular relevance in countries producing or planning to produce biofuels);
- national environmental strategies.

Other **strategies relating to governance and to management of the economy** also can have profound impacts on the energy sector and its environmental performance. This would include, for example:

- strategies relating to privatization and liberalization of markets (of particular relevance in countries where utilities and other energy suppliers are wholly or partially government owned, or where competition is currently limited in the energy sector);
- investment promotion strategies;
- public sector modernization and reform strategies;
- capacity development strategies (e.g. skills development, professional training, etc.).

Finally, many **issue-oriented strategies** address energy sector issues, including for instance:

- national climate change-related strategies;
- poverty reduction and rural development strategies.

The particular mix of national, sub-national, sectoral, and issue oriented strategies/plans will vary from country to country, as will the significance of individual strategies/plans to the energy sector. **But in all cases these strategies/plans are important country system-based entry points for environmental capacity development in the energy sector.** This conclusion applies both to the processes that are put in place to develop these strategies and plans, and to the ongoing national actions required to implement the plans.

Supply and demand planning

National and sub-national energy sector policies and strategies provide the policy framework and strategic guidance required by the sector, but more detailed energy supply and demand planning is still required. This need arises in part because of long lead times in the energy sector (for instance, the time required to build new electrical supply or to establish a managed forest for fuelwood). This need also arises because of the costs involved: major capital costs for energy infrastructure; significant ongoing energy costs; and high economic, social and environmental costs associated with insufficient supply (or excess supply).

Supply and demand planning is made more complex by the range of choices that are available, each with very distinct technical, social, environmental, and cost attributes. As a result, this planning process leads to decisions with significant environmental consequences, positive or negative. For example, choices that are made about new investments in electrical generation, about new investments in energy efficiency/demand management, and about new investments in alternatives to fuelwood and charcoal in vulnerable environments, all present the possibility of either positive or negative environmental outcomes.

The role of government in supply and demand planning varies from country to country. Where the energy sector is fully privatized, the front line planning will fall to the energy suppliers, but the role of government as both a policy driver and a regulator is significant. In countries where government is more directly involved in the energy sector (*e.g*. parastatal electrical utilities and oil companies), government has a much more direct role in supply and demand planning. And finally, in the case of non-commercial biomass fuels, government is the only entity with *de facto* responsibility for supply and demand planning at the country level (though few governments approach the fuelwood/charcoal issue from this perspective).

Because of the environmental significance of energy supply and demand planning, and because of the important government role, the **energy supply and demand planning process is an important country system-based entry point for environmental capacity development**.

Informal opportunities to link to national priorities

Donors will sometimes encounter situations when partner country governments show low interest in environmental issues. Environmental ministries may be interested, but may be marginalized within government. Some analysts suggest that in such situations an important role for development agencies can be to support analytical work that links environmental issues with key national priorities such as economic growth and poverty reduction (Ahmed and Triana, 2008 and other references in Slunge and César, 2009). Such studies could examine, for example, the cost of environmental degradation, cost of climate change adaptation, or the potential for local economic activity as a result of new energy supply options. Other

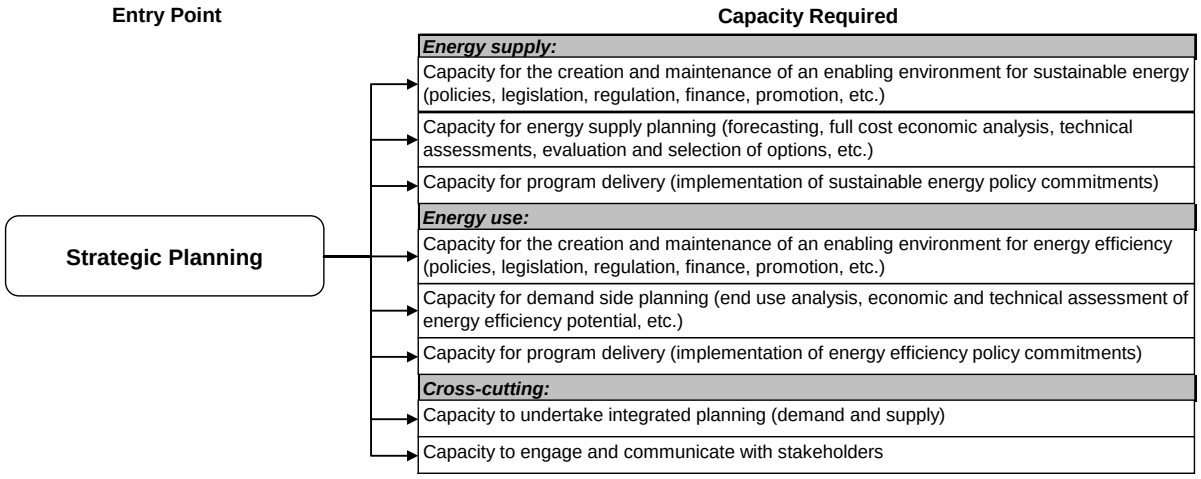
informal entry points for development agencies include linkage of environmental and regulatory assistance to donor-supported investments in infrastructure.

Summary: strategic planning entry points

The development of **national and sub-national strategies/ plans** is an important entry point related to the enabling environment (especially) and organisational dimensions of environmental capacity development. **Energy supply and demand planning** is an important entry point related to the organisational dimension of capacity development. Informal opportunities to **link to national priorities** can be seen as catalytic in nature, building towards broader future engagement. In all cases, these entry points also provide opportunities for capacity development at the level of the individual, depending on the specific approach taken.

These entry points within the general area of strategic planning provide opportunities to help address several of the capacity requirements identified in Chapter 5:

Figure 6.1. Entry points in the area of strategic planning



6.1.2 Public financial management entry points

Public financial management (PFM) can be understood to include all components of a country's budget process. As such it includes national systems for the management of funds, implemented as part of the line management function of government. Improved PFM is at the core of good governance and as such underpins national efforts to achieve the United Nations' Millennium Development Goals.

In common with all functions of government, environmental management can be expected to benefit from improved public financial management. Given this important though non-specific good governance link, much of the capacity building that is required for improved PFM can be considered to be supportive of sound environmental management.

More importantly for the purposes of this paper, the value of explicitly integrating environment into public financial management is increasingly recognised. At an **operational level** this could include, for instance, use of regular public expenditure reviews to identify environmental aspects and implications of these expenditures; guidelines for managing public procurement that include environmental attributes; and policies to ensure that budgetary processes use performance data to improve procurement practices (IISD, 2010b).

At a more fundamental level, national budget processes offer an opportunity for "greening the budget," also known as ecological or **environmental fiscal reform** (EFR). OECD describes EFR as a range of taxation and pricing measures which can raise fiscal revenues while furthering environmental goals (OECD, 2005b). Other sources focus exclusively on the environmental goals of EFR,[3] and indeed EFR programs are often designed to be revenue neutral ("tax shifting"). EFR measures include natural resource pricing, reform of product subsidies and pricing, cost recovery measures, and pollution charges among others. All of these measures have applicability to environmental management in the energy sector.

"Greening the budget" also includes the expenditure side of national budgeting processes. **Capital and programme expenditures** can be used to achieve environmental goals in general, and environmental goals in the energy sector specifically.

A number of the specific budgetary tools that are available to encourage sound environmental management and governance in the energy sector are discussed in Chapter 7.

Donor funding and public financial management

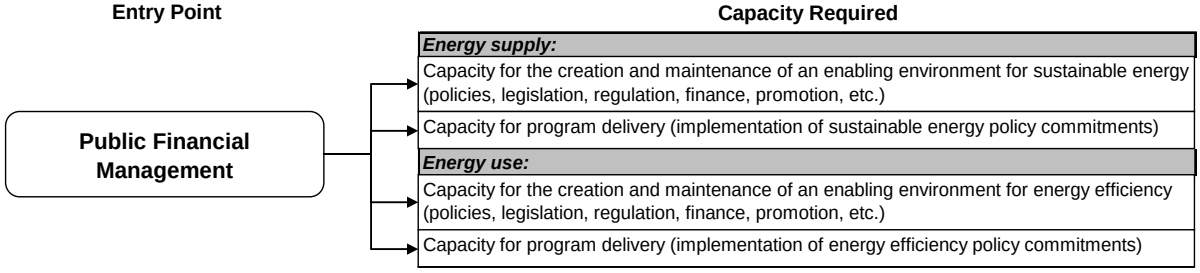
The budgets of environmental agencies in developing countries frequently include a relatively large portfolio of externally financed projects, coupled with low budgets for core agency functions. This can result in a diversion away from national environmental priorities, and implies that a large part of the resources available for environmental action are beyond the direct control of central agencies and the national budget process. These observations support calls for donor agencies to harmonise their efforts and make use of country systems, and in particular to enable environmental authorities' to access donor funds through the national budgetary system (Lawson and Bird, 2008).

Summary: public financial management entry points

The setting of **national (and sub-national) budgets** is an important entry point related to the enabling environment and organisational dimensions of environmental capacity development. A number of **operational aspects of public financial management** provide entry points related to the organisational dimension of capacity development. In both cases, these entry points also provide opportunities for capacity development at the level of the individual, depending on the specific approach taken.

These entry points within the general area of public financial management provide opportunities to help address several of the capacity requirements identified in Chapter 5:

Figure 6.2. Entry points in the area of public financial management



6.1.3 Monitoring and evaluation entry points

From a country systems perspective, "monitoring and evaluation" refers to national systems established by countries to assess their programmes and activities. The monitoring and evaluation process

is intended to determine how effective the government and its programmes have been in meeting the needs of citizens and achieving defined objectives (OECD, 2010).

This monitoring and evaluation function is not sector specific, and as such it does not provide a primary entry point for capacity development relating to environment in the energy sector. That said, the environmental performance of the energy sector is likely to be subject to periodic review through this national monitoring and evaluation mechanism, offering a useful though periodic entry point for capacity development support.

6.1.4 Social and environmental procedures entry points

Within government, all agencies that have environmental responsibilities are potential entry points for capacity development relating to social and environmental procedures.

There are many such agencies, as has been outlined previously in Sections 4.1 and 4.2. The most obvious entry points are the **environment and energy** ministries/departments, but **other line agencies** also present important opportunities. This includes the ministries/departments responsible for natural resource management (forestry, water, land, mining); for agriculture and rural development; and for the key energy-using sectors (transportation, industry, etc.).

In addition, in some countries the **central agencies** (development planning, finance) play a key role in defining environmental procedures and requirements. And finally, depending on the degree of decentralization in the country, **sub-national and local governments** may also play a role in establishing and implementing environmental procedures.

Within these various agencies, there may be an environment or energy desk that acts as a co-ordinating responsibility centre, and provides a potential doorway into the organisation.

Aside from the central and line ministries/departments, certain other government and quasi-government organisations have a role to play in capacity development, and as such may be potential entry points of interest. This would include, for instance, **training and education institutions,** and **standards writing organisations**.

6.2 Energy suppliers

As indicated in Section 4.3, energy suppliers include electric utilities, oil and gas companies, suppliers of biomass fuels, suppliers of renewable energy equipment, and providers of energy efficiency services. The entry points for each of these groups will likely be different.

In the case of the larger energy suppliers (utilities and oil and gas companies), effective engagement is most likely when it involves peer-to-peer relationships, facilitated by government and development agencies, but not controlled by them. For smaller suppliers, direct ongoing involvement of government in the relationship is likely to be more acceptable (if not expected).

In the case of larger national utilities, the planning and environment departments likely provide the most relevant entry points. In the case oil and gas suppliers, entry via an industry association (if one exists) can be effective and efficient. In addition, working through associations can avoid issues of perceived favouritism and market distortion that could come from direct engagement with individual companies.

In the case of smaller energy suppliers, in some cases these businesses may be organised in an association, which provides a positive entry point. Where the sector is not organised, indirect channels may

provide mechanisms for engagement. This could include, for instance, various linkage activities involving government, suppliers, micro-finance organisations, and training providers.

6.3 Private sector

As indicated in Section 4.4, both the formal and informal private sector are of interest in the context of this paper, and both are important entry points for CDE in the energy sector.

The discussion above concerning entry points for energy suppliers is broadly applicable to the formal private sector. Engagement with the informal sector can be more challenging, but again the comments above regarding smaller energy suppliers are broadly relevant. It is also important to recognise that in many countries governments and donors have in recent years developed an experience base related to engagement with the informal sector. Much of this experience should be transferable, on a country-by-country basis, to the issues and initiatives associated with energy and environment.

6.4 Civil society

As discussed in Section 4.5, key civil society actors include community-based organisations (CBOs), environmental NGOs, development NGOs, and of course individual citizens.

The CBOs and NGOs are, by their very nature, key entry points for engagement with civil society. Selection of which organisations to work with is not always straightforward, but organisational mandate and geographic focus often limit the number of potential candidates. Beyond this, interest of the partner in engagement/collaboration would be a key selection factor.

In addition to NGOs and CBOs, other important civil society entry points include the media and other groups that provide relevant services. These additional channels could include, for instance, government agencies, energy suppliers, some private sector groups (e.g. micro-finance), and training/ education providers.

PART IV: DEVELOPING ENVIRONMENTAL CAPACITY IN THE ENERGY SECTOR

CHAPTER 7. APPROACHES

This Chapter presents a number of approaches to enhancing capacity for environmental management and governance in the energy sector. The information is organised into sections based on the three dimensions of capacity defined in Chapter 1:

- strengthening the enabling environment (with separate sections for energy supply and use);
- strengthening organisational capacity;
- strengthening individual capacity.

This chapter is not intended to provide a comprehensive catalogue of possible approaches. Instead, this chapter is intended to illustrate the range of options and opportunities that are available, and in so doing demonstrate that capacity development is indeed a multi-dimensional process that can support meaningful change.

7.1 Strengthening the enabling environment (energy supply)

As indicated in Chapter 1, "enabling environment" is the term used to describe the broader system within which individuals and organisations function. It refers to a country's policy, legal, regulatory, economic and social framework.

This section provides a selection of possible approaches to strengthening the enabling environment as it relates to environmental management and governance in the energy sector. This section focuses specifically on energy supply; the next section considers energy use. The approaches and tools presented here address, in turn, the policy, regulatory, and economic dimensions of the enabling environment.

7.1.1 Policy approaches/tools

Develop a national energy policy that includes a strong commitment to renewable energy. Expansion of renewable energy use in developing countries is crucial, since renewables are an important part of the solution to many sustainability challenges, including energy security, socio-economic development, and environmental protection. National energy policies should integrate renewables into the country's energy portfolio, engage the private sector in technology development, build confidence in the financial community about renewable technologies, and where appropriate co-ordinate investments across national boundaries (IEA, 2001). Such policies can support co-operation among institutions and provide guidance in selecting low-carbon options tailored to unique country circumstances and priorities. For instance, Mali has formulated the Action Plan for Renewable Energy Promotion, which sets a target of increasing the contribution of renewable energy to total energy supply from less than 1% in 2002 to 15% by 2020 (NEPAD-OECD, 2009).

Develop a national strategy to meet rural and urban energy needs in an environmentally sustainable manner. In many developing countries, and especially in many of the least developed countries, rural populations depend almost entirely on wood and charcoal to meet most energy needs. Often in these same countries a significant portion of the urban population depends on charcoal from the rural areas for cooking (and heat if required). As discussed elsewhere in this paper, these demands for fuel wood and charcoal often lead to widespread deforestation and severe degradation of the natural resource base. These problems require a strategic, sustained, and well supported response involving such measures as ongoing tree planting and reforestation, improved charcoal production practices, and introduction of affordable alternative energy sources (particularly in urban areas). Participatory development of a national strategy provides a mechanism to identify options, set priorities, and begin to address this complex and extremely important issue.

7.1.2 Economicy approaches/tools

Reform subsidies provided to energy producers. Many governments in developed, emerging and developing countries provide direct or indirect subsidies to energy producers. While targeted incentives designed to achieve a defined policy objective can help overcome market barriers, large ongoing incentives can create serious market distortions. Energy sector subsidies have tended to favour traditional non-renewable energy sources, sending the wrong price signals with respect to sustainable low carbon energy supplies. Subsidies will also tend to reduce the cost of energy, leading to inefficient use. By removing subsidies for non-renewable high carbon energy sources, governments level the playing field among energy sources, encourage more efficient use of energy, and free up financial resources for other purposes.

Implement environmental fiscal reform. Environmental fiscal reform (EFR) was discussed briefly in sub-section 6.1.2. It is an approach that redirects a government's taxation and expenditure programs to create an integrated set of incentives to support the shift to sustainable development. Successful application requires clear definition of policy objectives and careful tailoring to the country's unique regulatory, market and jurisdictional profiles. Also called "green tax reform" or "greening the budget", EFR has been identified as a key framework condition for sustainable development (NRTEE, 2005).

EFR encompasses a broad suite of potential instruments. It can involve broadly-based measures that send signals across the full economy, or more targeted measures. Carbon pricing and tradable carbon emission permits are examples of broadly based measures related to environmental management in the energy sector. This type of measure may have longer term applicability in many developing countries, but in the near term most countries will focus on more targeted measures. The following paragraphs provide a number of examples.

Develop the market for sustainable energy through targeted use of economic instruments. There are a variety of economic instruments available to increase sustainable energy supply. One relatively simple option is to waive import duties and value-added tax to minimize the investment burden on the private sector and stimulate an increase in the supply of decentralized renewable energy technologies. The Government of Kenya has had much success using this approach to attract private sector investment for PV systems: over 200 companies and thousands of technicians now promote small solar systems for rural households. Imported solar panels are installed in combination with locally manufactured batteries to power small television sets and electric lights and to charge mobile phones. The solar systems have become directly affordable for many rural households, leading to over 200 000 systems installed. Similar measures have been undertaken by governments in Mali and Tanzania; both have observed a rapid growth of the solar market (OECD, 2008).

Provide incentives to spur private investment in renewable energy. Targeted incentives can encourage private investment in development of the renewable energy sector. Incentives could include, for

instance, long-term power purchase agreements that provide renewable energy developers with a secure market for their power. India has been referenced by the OECD as a country that created a positive investment climate for wind energy. In the mid-1980's, India's Ministry of Non-conventional Energy Services formulated a series of policy and fiscal incentives that were successful in the development of the wind power sector, contributing to a surge of private investment. Today, India is fifth in the world wind energy rankings, with over 11 000 MW of installed capacity (INWEA, 2010).

7.1.3 Regulatory approaches/tools

Implement regulations to improve the environmental performance of energy production. Weak environmental regulations governing energy production, or weak enforcement of existing regulations, contribute to unnecessary environmental impacts in many developing countries. Depending on the structure of the national economy, energy sector emissions may represent a significant portion of total releases to air and/or water. For example, China and India both have a high reliance on coal power: 80% of China's and 70% of India's electricity comes from coal (IISD, 2008). Nonetheless, in India there are no current regulations on NO_X or SO_2 emissions from power plants, and in China many of the coal power plants are outside the jurisdiction of the central government and are seldom required to conform to strong environmental standards (Watson et al, 2007). In these and other countries, a strengthened environmental regulatory framework would yield significant air and water quality benefits.

Deregulate/liberalize the energy market to create an enabling environment for independent power producers to develop new low carbon supply options. The unbundling of generation, transmission and distribution is often considered a key first step in the promotion of clean energy in the electricity sector. Power generation is usually the first part of the utility system to be opened to competition. In this liberalized framework, distribution utilities buy power from independent power producers (IPPs), often wind, solar, small hydro and cogeneration producers. New power generators can enter the market, and power generation choices are no longer based on the biases of the traditional utilities (who tend to favour conventional power generation options) (IISD, 2008).

Require electricity suppliers to obtain a minimum percentage of their electricity from renewable sources (a renewable portfolio standard or RPS). An RPS is a regulation that obliges electricity suppliers to obtain a specified portion of their electricity from renewable sources. Although the utility could generate the renewable electricity itself, in a liberalized market the new supply will normally be purchased from IPPs, stimulating competition, efficiency and innovation. This approach supports the growth of both the IPP and the renewables sector, and should deliver renewable energy at the lowest possible cost.

7.2 Strengthening the enabling environment (energy use)

This section continues the discussion of possible approaches to strengthening the enabling environment for environmental management and governance in the energy sector, with a specific focus on energy use. As in the previous section, the approaches and tools presented address, in turn, the policy, regulatory, and economic dimensions of the enabling environment.

7.2.1 Policy approaches/tools

Develop a national energy policy that includes a strong commitment to energy efficiency. Energy efficiency investments can generate significant economic dividends, including job creation, reduced exposure to energy supply volatility, reduced vulnerability to energy price fluctuations, and improved industrial and commercial competitiveness. A national energy policy will provide guidance to government organisations and other stakeholders in planning energy efficiency programmes and activities in the

industrial, institutional, commercial and residential sectors. The policy will also facilitate co-ordination among these groups, and increase investment opportunities for energy efficient technologies from both the domestic and international private sector. Greater policy certainty helps investors to develop long term plans, and the targets defined in the policy demonstrate to stakeholders that the government is committed to realising the benefits of increased energy efficiency.

7.2.2 Regulatory approaches/tools

Develop and implement energy efficiency standards. Energy efficiency standards can be applied at several levels. In many countries the first step has been minimum efficiency standards for equipment, appliances, and lighting. Such standards can address, for instance, motors, chillers, air conditioning equipment, and household appliances, all of which are significant energy users, have a long service life, and exhibit a range of efficiencies among available products. Minimum standards remove the most inefficient products from the market, providing permanent energy savings and ongoing environmental benefits. Energy efficiency standards can also be applied to buildings, which in many countries are significant and inefficient energy users, with a long service life.

Establish target-setting agreements in the industrial sector. Another approach that has found acceptance in many countries is the setting of energy efficiency targets via formal agreements between government and industry. In South Africa, for instance, the National Energy Efficiency Accord between government and 44 of the country's largest energy users committed the parties to work towards a 15% reduction in final energy demand by 2015. The Accord was considered an important element in the effort to improve energy efficiency and reduce greenhouse gas emissions in South Africa. This type of agreement could in future be strengthened by an initiative of the UN Industrial Development Organisation (UNIDO), which is developing an Industrial Standards Framework. The Framework will include, among other elements, an energy management standard that will link to the ISO 9000/14000 quality and environmental management systems standards. This would be a voluntary standard, available to support and strengthen industrial efficiency initiatives (UNIDO, 2008).

7.2.3 Economic approaches/tools

Use public procurement to support growth of private sector energy efficiency services. In most countries governments are significant energy users, and government operations present significant opportunities for efficiency improvements. By procuring energy efficiency services from the private sector, governments can help build capacity and critical mass within this important service sector. This is a win-win option, since energy use is major public sector expense. Investments in energy efficiency will reduce energy costs, creating fiscal space for other governmental priorities.

Facilitate establishment of Energy Service Companies (ESCOs). Opportunities for energy efficiency improvements in existing buildings are significant. However, there are a number of factors that discourage investment in energy efficiency, including a lack of capital for the up-front costs, a desire for very rapid payback periods, and financial risk aversion. ESCOs provide the necessary expertise to identify, implement and maintain efficiency measures, and fully developed ESCOs provide financing and reduce customer risk by taking payment on an energy performance basis. In countries with high interest rates and/or unstable currencies, the need for an ESCO-type mechanism is greatest, but the challenges involved in establishing an ESCO will also be particularly significant.

Support "green" small scale enterprise. "Green" small scale entrepreneurs can be part of the enabling environment at the local level. These entrepreneurs can contribute to improved environmental performance in the energy sector by offering environmentally beneficial goods and services. For example, a project in Ethiopia's Benishangul-Gumuz region trained small-scale entrepreneurs in the production of

efficient stoves that reduce demand for wood and thus help address deforestation issues. The project provided start-up equipment, materials and business support to help entrepreneurs establish a sustainable business model (Carbon Positive, 2010). Other small scale business opportunities exist in such areas as production and sale of waste biomass fuel pellets, seedling production in small scale community nurseries, fabrication of other types of equipment (*e.g.* solar cookers), and more.

Reform subsidies provided to energy users. Governments often subsidize consumer energy costs, most often by controlling the prices charged by suppliers.[4] This can lead to poor financial performance by these suppliers, reducing their ability to invest in new capacity (including renewable energy capacity). In addition, subsidies result in artificially low energy prices, which negatively impact the environment by encouraging excess energy use and limiting adoption of energy efficient technologies. Egypt, for instance, is known for having very high energy subsidies, and the country's carbon intensity is two-and-a-half to three times the OECD average (World Bank, 2009a). Phasing out subsidies would reduce energy consumption, make energy use more efficient, and enhance security of supply. Overall, energy price reform would provide correct pricing signals to producers, consumers, and investors, creating the preconditions for a more competitive economy with reduced environmental impacts.

Focus on market transformation. In most developing countries, the markets pay little attention to energy efficiency and other environmental attributes of the goods and services that are sold. "Market transformation" refers to a process leading to lasting changes in the structure of the market, specifically by increasing the market share of energy efficient products, services, and practices. For example, a World Bank programme – the Efficient Lighting Initiative (ELI) – built the capacities of institutions in seven countries to be effective advocates of energy-efficient lighting. ELI changed consumer perceptions of compact fluorescent lamps (CFLs), increased market availability, and improved quality through the development and implementation of a new lighting product standard. Avoiding subsidies, the ELI program concentrated on sustainably transforming local markets for CFLs (World Bank, 2009b).

7.3 Strengthening organisational capacity

There are a great many opportunities and approaches available for strengthening organisational capacity. This section presents a few examples related to environmental management and governance in the energy sector. The first four examples are planning and analytic tools that organisations can use to help achieve environmental goals in the sector. The remaining examples discuss the capacity of certain organisations with potential roles in energy sector environmental management. The tools and organisations presented are intended to be illustrative only; the list should certainly not be considered complete or comprehensive.

Use Strategic Environmental Assessment in the energy sector. Strategic Environmental Assessment (SEA) is a process for incorporating environmental considerations into decision-making concerning policies, plans and programmes. SEA enables countries to take strategic decisions that are consistent with sound environmental management and governance. SEA can also identify opportunities for further consideration of sector-based issues within national policy and strategy, whilst highlighting any capacity needs. Of particular importance to the energy sector, SEA provides an opportunity to introduce a "climate lens" in the review of policies, plans and programmes.

Use software tools to assess the feasibility of energy alternatives. A variety of assessment tools are available to assist in energy planning. One readily available product is the RETScreen Clean Energy Project Analysis Software developed by the Government of Canada. This decision support tool, available free-of-charge, can be used worldwide to evaluate energy production and savings, costs, emission reductions, financial viability and risk for various types of renewable-energy and energy-efficient technologies. The software is available in thirty-five languages, and includes product, project, hydrology

and climate databases, a detailed user manual, and a case study based college/university-level training course, including an engineering e-textbook (NRCan, 2010).

Undertake a Conservation Potential Review (CPR). A CPR is a detailed regional or national end use study that estimates the potential contribution of conservation to meeting future energy requirements (energy and capacity). A CPR examines the benefits and feasibility of energy efficient technologies; alternative energies and fuel switching; and behaviour and lifestyle changes. CPRs are important system planning tools for utilities, and would have particular relevance in emerging economies with large energy sectors (such as India, China, South Africa or Brazil).

Undertake an Energy and Environment Review. An Energy and Environment Review (EER) is a specific approach proposed in the *World Bank's Fuel for Thought: an Environmental Strategy for the Energy Sector* as an instrument to help mainstream the environment in the context of the World Bank's policy on support to the energy sector. An EER process caters to the needs and priorities of the developing country, and involves: analysis of the current situation and growth prospects with regard to energy generation and use; identification of environmental issues and associated cost estimates; evaluation of the extent of contribution to climate-change through emission of greenhouse gases; evaluation of the proposed mitigating measures for the previously identified environmental problems; conclusions and recommendations; and a proposal for an action plan.

Co-ordinate the work of finance, planning, energy and environment ministries. Often, climate policy is led by environment ministries, energy planning is led by energy ministries, national planning is led by planning ministries, and country finances are managed by finance ministries. However, it is important that these various agencies work together to address the multi-faceted and economy-wide nature of energy and environment issues. Collaboration will allow finance and planning personnel to better understand how energy, environment, and climate change can be addressed in national and sub-national planning processes and through fiscal (i.e. budgetary) and investment decision-making (UNEP, 2008).

Strengthen the capacity of local authorities to improve energy service delivery and monitoring. Building the capacity of the local authorities with incentives, training, and wider exposure can improve planning and management of energy service delivery, including the environmental management dimensions. In Nepal, for example, decentralizing the delivery of energy services in rural areas dramatically increased efficiency and created local empowerment to plan, implement and monitor local energy programmes. This required dedicated support to build capacity of local organisations involved in the supply chain of energy service delivery (United Nations, 2007).

Strengthen the capacity and role of Designated National Authorities (DNAs). DNAs are the national focal points for implementation of the Clean Development Mechanism (CDM). They are responsible for host country approval of projects before submission to the CDM Executive Board for formal registration. Consequently a well-functioning DNA is essential to successful CDM implementation in any developing country. Beyond this core function, DNAs can be a vehicle for stimulating development of CDM projects, by for instance managing a database highlighting project and investment opportunities and sharing best practices (NEPAD-OECD, 2009). Since the CDM can support a wide range of carbon emission reduction projects in the energy sector, with a strong focus on sustainability, a strengthened DNA can be a vehicle for improved environmental management in the sector.

7.4 Strengthening individual capacity

Notwithstanding the importance of the enabling environment and organisational levels of capacity development, strengthening individual capacity remains an important priority (and is often a pre-condition for successful capacity development at the other levels).

Individual capacity and expertise are required in all of the capacity areas identified previously in Exhibits 2 and 4. For each of these areas, a mix of technical, economic, and governance-related skills, knowledge, and experience are required. However, although the specific required capacities may be unique to the energy sector, the approaches to developing these individual capacities will be similar to those required in all areas of CDE. As such, this topic is not explored further here, but is instead left to the broader cross-sectoral discussion of capacity building approaches included in the OECD's guidance document.

7.5 Final words: the importance of an integrated approach

This chapter has presented a range of approaches and tools that will strengthen capacity for environmental management in the energy sector. These approaches/tools will help encourage a shift in the energy sector towards more environmentally sound and sustainable energy sources, towards more efficient energy end use, and towards reduced environmental impact at all stages of energy production and use.

Each of the approaches presented is valuable and worthy of consideration, and there is also a wide range of other approaches and options that warrant attention. But in reviewing these individual measures, it is important to recognise that each one on its own is likely to have limited impact. The "shift" in the energy sector described in the previous paragraph is in fact a transformation that will require an integrated approach incorporating a range of capacity building measures.

The World Bank Institute's *Capacity Development Results Framework* (World Bank Institute, 2009) also underlines the importance of an integrated approach. The framework identifies a number of important success factors, including:

- conduciveness of the socio-political environment, which determines the priority given to the defined development goal by the government, private sector and civil society;
- efficiency of the policy instruments or formal mechanisms used to guide stakeholder actions toward achievement of the development goal, including administrative rules, laws, regulations, and standards;
- effectiveness of organisational arrangements including the systems, rules of action, processes, personnel and other resources that government and NGO stakeholders bring together to achieve development goals.

In short, an integrated approach is essential to sound environmental capacity development in the energy sector. This integrated approach will need to focus on the needs of the full range of actors described in Chapter 4, keep a clear focus on the goals described in Chapter 5, and take advantage of the various entry points described in Chapter 6.

PART V: THE ROLE OF DONORS

CHAPTER 8. THE ROLE OF DONORS: CONCLUSIONS AND RECOMMENDATIONS

The role of donors in developing capacity for environmental management and governance in the energy sector is presented in the following subsections:

- basic concepts and principles;
- roles donors can play;
- monitoring and evaluation;
- challenges.

8.1 Basic concepts and principles

OECD guidance and thinking concerning capacity development for the environment incorporates a series of basic concepts and principles. Based on the review undertaken for this paper, it can be concluded that these concepts and principles are relevant and appropriate to CDE in the energy sector. For the record, this observation refers to the following key concepts and principles (among others):

- Capacity development should be "*part of an endogenous process of change, getting its main impulse from within*" (OECD, 2006). In this context, donors are expected to play a supportive role, with the partner country being primarily responsible for change.

- Capacity, and hence capacity development, occurs at three interdependent levels, all of which must be addressed: the enabling environment, organisational capacity, and individual capacity.

- In order to effect long term change, donor support should be delivered using a country-systems approach. This requires donors to understand country contexts and systems; to consider linkages between private and public sectors; to identify and support sources of country-owned change; and to align their interventions with each country's own priorities and strategies.

It can also be concluded that the CDE guidance and tools that are available and that are being developed by the OECD "fit" the energy sector. There are unique capacities required relating to environmental management and governance in the sector, and unique elements of the enabling environment. But the practical CDE tools that can help build capacity have relevance across sectors, and the energy sector in particular can be expected to benefit from the overarching CDE guidance currently under development.

8.2 Roles donors can play

Donors have a part to play in facilitating environmental capacity development and related change processes in the energy sector. Most importantly, this includes increased focus on sustainable energy sources of relevance to the majority of the population, and increased focus on efficiency of energy use.

Examples of possible donor roles, and how they are relevant to CDE in the energy sector, are outlined below, building on examples provided in other OECD guidance (OECD, 2006):

Increasing access to information / knowledge creation:

- facilitate access to information on environmental management and energy sector issues, for example through the use of targeted workshops, conferences, etc.;
- support increased availability of technical, environmental, and energy training programs in local academic institutions;
- help improve information flow to energy consumers on topics such as available lower-carbon energy choices, environmentally improved technologies such as efficient wood stoves, etc.

Mainstreaming environment / energy:

- support countries in the design of policies and strategies that demonstrate the link between environment and energy, in order to create an enabling environment and platform for government, private sector and donor-funded investments in improved environmental management and governance;
- broker multi-stakeholder agreements that remove blockages to sound environmental management in the energy sector;
- assist energy, environment and finance ministries of government to overcome inertia and encourage joint consideration of environment and energy linkages;
- encourage integrated, cross-sectional energy/environment policy reforms in national and donor forums relating to National Development Strategies, Poverty Reduction Strategies, Sector-wide Approaches, etc.;
- support capacity building for monitoring and evaluation of programme and policy initiatives in the area of energy sector environmental management and governance.

Facilitating change:

- facilitate policy dialogue or advocacy by getting all stakeholders to the table to discuss environment and energy issues and collaboratively develop priorities or plans of action;
- provide incremental resources that help overcome bottlenecks in change processes with respect to mainstreaming environment and energy planning;
- target financial support for transitional costs of reform in the private sector (for example, cleaner energy production in the private sector);
- collaborate with micro-finance institutions to make policies and instruments available for the rural poor to increase their access to improved energy choices.

8.3 Monitoring and Evaluation

Development agencies are increasingly aware of the importance of monitoring and evaluation (M&E) of development activities. M&E ensures development dollars are spent as efficiently as possible. M&E also provides a better means of learning from past experience, improving service delivery, planning and allocating resources, and demonstrating results.

Every donor has different guidelines concerning M&E standards to follow; however most are likely to include key aspects as outlined in the World Bank publication: *Monitoring and Evaluation: Some Tools, Methods and Approaches* (2004). The guidance addresses performance indicators, a performance framework, and approaches to gather information such as surveys, interviews, focus groups, participatory workshops, results-based-mapping, etc. More intensive M&E approaches are also outlined such as cost-benefit analysis and impact evaluation.

According to the World Banks' self-assessment publication: *Annual Review of Development Effectiveness 2009* the Bank has made limited progress in integrating environment into development programmes and much work needs to still be done in strengthening this connection. With respect to the Bank's M&E system, the review concludes that there has been an uneven record in strengthening the quality of performance information needed for a better assessment of results. To achieve improved results, the World Bank needs to better track indicators for projects across sectors, strengthen monitoring and reporting of outcomes, and build the capability to collect information at the country, regional, and global levels (World Bank, 2009c). Although these comments refer specifically to the World Bank, it would not be unreasonable to assume that other donors are also experiencing similar issues relating to M&E in general, and related to CDE specifically.

8.4 Challenges

Donors face numerous challenges in the context of CDE. The following paragraphs outline a number of these challenges, adapted in part from other OECD guidance (OECD, 2005):

In some instances there may be a **low commitment** by partner governments to environmental management in the energy sector, which may be compounded by inadequate institutional capacities. As well, **poor linkages** between environment and other ministries in government can result in poor co-ordination and non-complementary or competing objectives.

At times there may be **inconsistency** between energy policy and other national development policies of the country. This is a challenge for donors, since ideally energy policy should be integrated with key national policies such as Poverty Reduction Strategies, Economic Development Strategies, and other national policies.

Equally important is the issue of unco-ordinated, competing or **conflicting donor programmes**. It is vital that donors' support strategies and policies are harmonised, and that they work together to avoid duplication. Given the diversity of the energy sector, and the wide economic reach of the sector, this can be a challenging goal.

Certain reforms will generate **conflicting stakeholder perspectives**. This may be especially the case in the area of subsidy removal. Energy suppliers will not want to see their revenues from government subsidies drop, nor will consumers want to pay full price for a resource they are used to obtaining at a lower cost.

Finally, donors will face a number of specific **energy-related constraints** in the partner countries. In many situations, weak knowledge or fear of the unknown related to renewable and low carbon energy technologies is an issue to be overcome. The structure of the energy supply sector may also be challenging, with strong interests resisting change.

NOTES

[1] In addition, Exhibit 1 includes a category for "overall management", which includes functions that are important but not specific to the energy sector.

[2] The examples listed are at the national level, but in some jurisdictions similar strategies have also been developed at the sub-national level.

[3] For instance, Canada's National Roundtable defines EFR as "a strategy that redirects a government's taxation and expenditure programs to create an integrated set of incentives to support the shift to sustainable development." (NRTEE, 2005).

[4] In the case of private energy suppliers, the subsidy is provided (unwillingly) by the supplier, unless the government offers compensation.

REFERENCES

Ahmed and Sanchez Triana, (2008); EC, 2009; Poverty Environment Initiative, 2008; Drakenberg et al, 2009, as cited in Swedish Bilateral Support to Environmental Capacity Development – Overview of Key Results and Lessons Learnt (2009) University of Gothenburg, Gothenburg.

Canada's Oil Sands website www.canadasoilsands.ca accessed April 2010.

Canadian Association of Petroleum Producers (CAPP) website www.capp.ca accessed April 2010.

Canadian Centre for Energy Information website www.centreforenergy.ca accessed April 2010.

CANWEA (Canadian Wind Energy Association), Environment Fact Sheets website www.canwea.ca accessed April 2010.

Carbon Positive website www.carbonpositive.net accessed April 2010.

Clean Air Task Force (2001), Cradle to Grave: The Environmental Impacts from Coal, Clean Air Task Force, Boston.

Consumer Energy Report, Natural Gas Storage and Delivery, Effect on the Environment website www.consumerenergyreport.com/research/natural-gas-storage-and-delivery-effect-on-the-environment accessed April 9, 2010.

Hubbert Peak Oil Production website www.hubbertpeak.com accessed April 2010.

International Energy Agency (IEA) (2001), Toward a Sustainable Energy Future, IEA/ Organisation for Economic Co-operation and Development (OECD), Paris.

IEA (2004), World Energy Outlook 2004, (OECD /IEA, Paris, Chapter 10.

IEA (2007), World Energy Outlook 2007, OECD/IEA, Paris, Chapter 20.

IEA (2009), World Energy Outlook 2009, OECD/IEA, Paris.

IEA and the OECD Nuclear Energy Agency (2010), The Projected Costs of Generating Electricity: 2010 Edition - The Future of Global Power Supply: The Line-Up, OECD/IEA, Paris.

IEA Bioenergy Task 32, Biomass Combustion and Co-Firing: An Overview, IEA, Apeldoorn, Undated.

IISD (International Institute for Sustainable Development) (2008), Clean Energy Investment Project Synthesis Report, IISD, Winnipeg.

IISD (2010a), Aid Effectiveness and the Environment - Capacity Development for Environmental Sustainability: the Importance of Country Systems, Fact Sheet to Support the IISD Poverty Environment Partnership Meeting, OECD, March 2010.

IISD (2010b), Poverty Environment Partnership Meeting Bulletin, Vol. 171 No. 1, OECD, March 2010.

Indian Wind Energy Association (INWEA) website www.inwea.org accessed May 2010.

IPCC (Intergovernmental Panel on Climate Change) website www.ipcc.ch accessed April 2010.

Lawson and Bird (2008), as cited in Swedish Bilateral Support to Environmental Capacity Development – Overview of Key Results and Lessons Learnt (2009), University of Gothenburg, Gothenburg.

Mugo, F. and Ong, C. (2006), Lessons of Eastern Africa's Unsustainable Charcoal Trade. (ICRAF [World Agroforestry Centre] Working Paper no. 20. World Agroforestry Centre, Nairobi, Kenya.

NRTEE (National Round Table on Environment and Energy) (Canada) (2005), Economic Instruments for Long-term Reductions in Energy-based Carbon Emissions, NRTEE, Ottawa.

Natural Resources Canada (NRCan) website www.retscreen.net/ang/home.php accessed April 2010.

NEPAD-OECD (2009), African Investment Initiative, Ministerial Meeting and Expert RoundTable, Boosting Africa's Energy Sector Through Carbon Finance, OECD, Paris.

OECD (2005a), Capacity Development in Environment – Principles in Practice, OECD, Paris.

OECD (2005b), Ecological Fiscal Reform for Poverty Reduction, OECD, Paris.

OECD (2006), The Challenge of Capacity Development: Working Towards Good Practice, OECD, Paris.

OECD (2008), Natural Resources and Pro-Poor Growth: the Economics and Politics, OECD, Paris, Chapter 12.

OECD (2009), Assessing Environmental Management Capacity: Towards a Common Reference Framework, OECD, Paris.

OECD (2010), Developing Capacity for Environment and Natural Resource Management: A Country System Approach, Working Draft, Chapter 1.

Renewable Energy News website: renewableenergyworld.com "PV Costs Set to Plunge for 2009/10", December 23, 2008, accessed May 2010.

RISO National Laboratory for Sustainable Energy, Technical University of Denmark (DTU) (2008), Energy Report 7: Future Low Carbon Energy Systems, DTU, Roskilde.

Royal Netherlands Academy of Arts and Sciences, Amsterdam InterAcademy Council website.

www.interacademycouncil.net/CMS/Reports/11840/11901/11905.aspx accessed April 2010.

Slunge, Daniel and Emelie César (2009), Swedish Bilateral Support to Environmental Capacity Development -Overview of Key Results and Lessons Learnt, University of Gothenburg, Gothenburg.

Solarbuzz News website www.solarbuzz.com accessed April 2010.

Sovacool, B. K. (2009), "Contextualizing avian mortality: A preliminary appraisal of bird and bat fatalities from wind, fossil-fuel, and nuclear electricity". Energy Policy 37: 2241–2248.

United Nations (2007), United Nations Ministerial Conference of Least Developed Countries, Energizing the Least Developed Countries to Achieve the Millennium Development Goals: The Challenges and Opportunities of Globalization, UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States.

UNEP (United Nations Environment Program) - UNDP (United Nations Development Program) (2008). Making the Economic Case: A Primer on the Economic Arguments for Mainstreaming Poverty-Environment Linkages into National Development Planning. UNEP/UNDP.

UNDP / WHO (World Health Organisation) (2009), The Energy Access Situation in Developing Countries, A Review Focusing on the Least Developed Countries and Sub-Saharan Africa, WHO, New York.

UNIDO (United Nations Industrial Development Organisation) (2008), Policies for promoting industrial energy efficiency in developing countries and transition economies, UNIDO, Vienna.

United States Department of Energy Biomass Program, www1.eere.energy.gov/biomass/ accessed April 2010.

United States Department of Energy, Office of Biological & Environmental Research (2007), Effects of Climate Change on Energy Production and Distribution in the United States, The United States Climate Change Science Program, Washington, Chapter 3.

United States Energy Information Administration (US EIA), International Energy Statistics, website http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm accessed June 2010a.

United States Energy Information Administration (US EIA), World Energy Reserves, website www.eia.doe.gov/iea/res.html accessed June 2010b.

United States Natural Gas Supply Association informational website www.naturalgas.org accessed April 2010.

Watson et al., 2007, as cited in as cited in IISD (2008), Clean Energy Investment Project Synthesis Report, IISD, Winnipeg.

World Bank (2009c), Annual Review of Development Effectiveness 2009, World Bank, Washington.

World Bank (2009b), Beyond Bonn: World Bank Group Progress on Renewable Energy and Energy Efficiency, World Bank, Washington.

World Bank (2009a), Energy Sector Management Assistance Program, Annual Report 2009, World Bank, Washington.

World Bank Institute (2009), The Capacity Development Results Framework, World Bank Institute, Washington.

World Nuclear Association www.world-nuclear.org accessed April 2010.

Zah, Rainer Dr. (2007), Swiss Federal Laboratories for Materials Science and Technology (EMPA) factsheet: Research Programs - Materials for Energy Technologies. EMPA, Switzerland.