



## Multilateral Working Group on Solar and Wind Energy Technologies

# Capacity Needs Assessment working group

## Concept Paper

### “The role of Capacity Needs Assessments for the accelerated deployment of renewable energy”

#### **INTRODUCTION**

This concept paper suggests that the change process from traditional energy markets to sustainable, renewable energy markets can be accelerated by systematic capacity development interventions at system, institutional and individual level. It introduces “Capacity Needs Assessments” as an analytical process to determine specific capacity needs of the renewable energy sector at national level and which provide the necessary information for planning concrete and efficient capacity development strategies and measures.

The Multilateral Working Group on Solar and Wind Energy Technologies initiated a dialogue on the role of capacity development for the development of the solar and wind sector and the necessity to address capacity development in a systematic way. In this context, the Capacity Needs Assessment working group was created (members: GIZ, IDAE, IRENA and NREL) and received the mandate to coordinate a multi-stakeholder dialogue on this issue and to put forward concrete proposals for capacity assessment related activities in the wind and solar sector.

This concept paper is the first results of the working group. On October 20<sup>th</sup>, 2011 this paper was distributed among a large number of international, public, private and non-governmental organizations and experts. The aim of this consultation process is to create a common understanding and exchange ideas and views on the role of demand-oriented capacity development for the solar and wind sector. A first round of comments was finalized on November 9<sup>th</sup>, 2011 and many valuable comments and inputs from multiple actors have reached the working group, which are summarized at the end of this document. To share the first results and extend the discussion on the issues outlined in this paper, the working group has opened its working platform and invites interested experts to register and participate in this process (<http://ca.energypedia.info>).

In order to facilitate the implementation of capacity needs assessments in interested countries, the working group proposes the elaboration of a “Handbook & Toolbox for Capacity Needs Assessments for the Solar and Wind Sectors” to be published in 2012. Insights gained and experiences

and lessons learned gathered from the multi-stakeholder discussions would form an important part of this project. Wherever possible, organizations and experts will be interviewed individually and asked to contribute with methods, tools, case studies and lessons learned to the Handbook & Toolbox.

## **CHALLENGES TO ACCELERATED RENEWABLE ENERGY DEPLOYMENT**

The large scale deployment of solar and wind energy technologies and ultimately the introduction of renewable energy technologies in a country's energy supply system is a challenging process, which requires significant changes to long established policy, institutional and market structures. The energy sector and all the different stakeholders involved, such as government officials, private renewable energy project developers, financial institutions, technical staff, etc. are subject to a long-term process of transformation and adaptation to the specific needs of a growing rate of renewable energy demand and supply. Thus, the **capacity** to successfully establish renewable energy technologies in the energy system of a country naturally evolves with time (see Box 1).

In the wake of the international climate change discussion, many governments have formulated very ambitious targets for the deployment of renewable energy technologies, such as solar and wind. The bottleneck for achieving these targets is often found in the fact that the necessary system, institutional, and individual capacities needed develop at a comparatively slow pace. Although global investments in renewable energy have experienced a

significant increase in recent years, renewable energy markets still face a wide range of barriers that hinder their rapid and constant growth. There is a lack of comprehensive, long-term planning, often due to poor knowledge about renewable energy technology options, the dynamics of the sector, etc., which is reflected in insufficient legal and regulatory frameworks and an absence of attractive fiscal or financial incentives for accelerating investments (lack of system capacity). This results in investors facing high levels of uncertainty and risks. Additionally, especially in developing countries, there are often shortages of professionals and technicians skilled in the field of renewable technologies, which can deliver their expertise and services along the value chain of e.g. solar and wind technologies, posing additional constraints to an accelerated development of the renewables sector (lack of individual capacities). For example, a lack of professionals and technicians experienced in operation and maintenance puts the sustainability of renewable energy projects at high risk.

### **Box 1 – Definition of Capacity**

**Capacity** can be defined as “the ability of people, organizations and society to manage their affairs successfully” (OECD-DAC 2006).

## **CAPACITY DEVELOPMENT FOR RENEWABLE ENERGY**

Direct, strategic interventions that intensify and accelerate the **capacity development process** can help overcome these hurdles and boost the deployment of renewable energy technologies. This can be achieved by a systematic planning and shaping of

the transformation process to a renewable energy based system, and setting the right priorities at all levels. Through the design and implementation of demand-oriented **capacity development strategies** and programmes, governments (e.g. energy ministries) can contribute to the reduction and even removal of capacity gaps and hence to creating the optimal conditions for a fast development of the sector.

The energy sector is characterized by entailing several distinct value chains, which need to be taken into account i.e. different technology options (such as solar, wind, hydropower, biomass, biogas, fossil fuels, etc.), different modes of energy supply options (on-grid and off-grid electricity supply, motive power supply, traditional household-based cooking energy supply, etc.) and respectively diverging financing needs and options. Furthermore, the energy sector is governed by many different public and private sector actors, with often diverging interests. On one hand, energy service provision is in the hands of market-driven enterprises that aim to maximize profits. But on the other hand, high quality, low cost, energy services are a precondition for economic and social progress, which makes access to energy an equity issue. Thus, governments need to watch over public interests, such as access to energy, security of energy supply, competitiveness and environmental protection through regulatory mechanisms. To be efficient, a market driven but publicly regulated energy sector must ensure the realization of public interests, while creating the space and conditions to support competitive market development.

## WHICH CAPACITIES TO BUILD?

To be successful, capacity development should be seen as a **holistic process**.

### Box 2 – Definitions of Capacity Development

“**Capacity development** encompasses the country’s system, institutional, human, scientific, technological, and resource capabilities. A fundamental goal of capacity development is to enhance the ability to evaluate and address the crucial questions related to policy choices and modes of implementation among development options, based on an understanding of environment potentials and limits and of needs perceived by the people of the country concerned” (UNCED, 1992).

“**Capacity development** is a holistic process through which people, organisations and societies mobilise, maintain, adapt and expand their ability to manage their own sustainable development.” (GIZ, 2009)

It should address:

- issues concerning the enabling conditions (**system level**) for renewable energy, such as the availability of appropriate laws, regulations and standards for facilitating market penetration of renewable energy, as well as the nature of the relationship between the relevant organizations and institutions in the sector landscape;
- issues at **institutional level**, such as the existence of required institutions (regulatory authorities, service providers and front line agencies, research, private sector representatives, educational institutions, etc.), that are capable of effectively coping with their mandate and able to adjust their operations to changes,

- issues of knowledge and skills at **individual level**, such as enabling the staff in regulatory agencies to develop and manage smart tariff and incentive structures for feed in systems and or training local engineers on renewable energy issues.
- issues of network, such as leveraging existing, functioning networks assessing the need of establishing new networks that can support the achievement of targets.

Furthermore, the capacity development process involves various stakeholders relevant to the renewable energy deployment process (government representatives, private sector, banks and other financiers, technicians, etc.), whose interest, interactions and interdependencies need to be properly taken into account, and incorporates national energy policy and governance issues. The definition of capacity development clearly goes beyond the enhancement of individual knowledge and skills. Individual abilities depend on the organizations, in which they work. Organizations are influenced by incentives and vicious or virtuous circles within the institutional and structural environment. Consequently, capacity development interventions must strategically address all levels of capacity, namely the individual, organizational and system level

Capacity is related to the specific challenges, shortcomings but also assets of a country with a view to available skills and abilities. When it comes to designing capacity development strategies that enhance the ability to cope with future tasks and challenges, the *specific* national development goals for renewable energy are an important reference point for the definition

of future capacity needs, as well as a thorough understanding of the different actors governing a specific energy market and their respective interests. There is no “one- fits-all” solution for capacity development. Capacity development strategies need to be demand-oriented and tailor-made to address the specific capacity needs of the country. Developing a country’s capacity is a long-term process, which is subject to constant changes over time and depends on the participation and constant interaction between all involved stakeholders.

## **THE ROLE OF CAPACITY NEEDS ASSESSMENT**

In order to be able to formulate appropriate and successful capacity development strategies, it is imperative that policy makers have a comprehensive overview over the strengths and weaknesses, i.e. the readiness of a country to cope with renewable energy targets.

Conducting **capacity needs assessments** can be useful to gather and provide the information necessary for strategic planning and decision-making on capacity development interventions. Capacity needs assessments need to take into account a) the specific characteristics of the energy sector and b) the different levels of capacity, namely system, institutional and individual level.

Therefore, capacity needs assessments should not only focus on the availability of individual skills and knowledge (individual capacities) but should also take into account framework conditions, political, regulatory and economic environment (system capacities), the level of prepared-

ness of relevant institutions and organisations (institutional capacities), and technological options and business models.

In order to be successful, capacity needs assessments should consist of three main steps.

- First, it is necessary to define the boundaries of the assessment. In this context, an in-depth understanding of national renewable energy development goals and related required capacities is of utmost importance.
- The second step consists of determining the “capacity gap”, i.e. the difference between existing capacity and the capacity that is needed for achieving renewable energy targets. It is equally important to determine the level of commitment of all stakeholders and identify eventual sources of opposition, which could ultimately influence the success or failure of capacity development measures. With that information at hand, different scenarios for developing the needed capacities can be designed. It is also important to consider capacity development strategies/measures that might already be in place and could be build-upon and/or leveraged.
- At last, a decision needs to be made, as to which capacity development path is the most strategically suitable, ultimately leading to the formulation of capacity development targets, the elaboration of capacity development strategies and the planning and implementation of concrete capacity development measures. The latter can be prioritized according to their level of impact (some measures might have a greater impact than others), their level

of complexity (some measures might be easier to implement than others), as well as to time considerations (some measures might require long term professional or academic development while others are short term needs that could be addressed, e.g. in a workshop)

- Furthermore, capacity development should also be flexible and allow for adaptations and corrective actions, as the demand for capacities might vary and even change over time. Periodic capacity needs assessments ensure that capacity development is at all times aligned with the prevailing challenges of the sector.

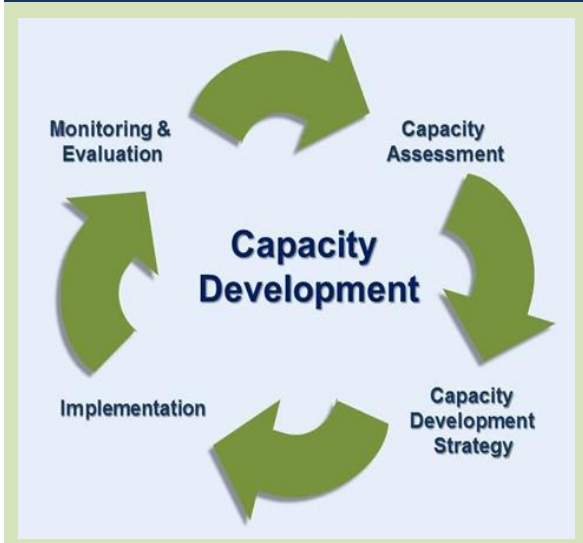
The capacity needs assessment process is also a learning process, during which involved actors can gain new insights about the different issues that influence the energy sector. Furthermore, by bringing together and initiating a dialogue between representatives of all relevant stakeholder groups from a very early stage, the capacity assessment process can contribute to establishing a common “development consensus”, laying the foundations for the formulation of commonly agreed capacity development targets and the execution of concerted, concrete capacity development responses at all levels.

Capacity needs assessments are, thus, an inherent part of the capacity development process (see Box 3) as they:

- provide a comprehensive overview of national sector strategies and required capacities
- provide a comprehensive picture of existing capacities

- enable the identification of lacking capacities (capacity needs)
- enable a negotiation and dialogue process between public and private actors of the energy sector and the formulation of common sector goals
- provide a solid baseline for the formulation of capacity development objectives
- enable to design and decide on the most relevant and effective capacity development measures
- enable for periodic reviews of the development of capacity demand and for adaptations to capacity development strategies and measures

### Box 3 – Capacity Assessment as Part of the Capacity Development Process



### **GUIDELINES FOR CAPACITY NEEDS ASSESSMENTS**

When formulating national targets and strategies for renewable energy deployment, capacity development is usually not on the top of the priority list. Financing is often the center of attention, rather than the question of how public and private resources can be better funneled into the energy sector by improving framework

conditions and capacity development. The necessity and advantages of planning the capacity development process are evident, but the debate about capacity development still does not form inherent part of national energy planning. Additional efforts are needed in the field of capacity development with an active support of development partners assisting countries in taking ownership over their capacity development process and in finding the best route to achieving renewable energy targets.

In the field of development cooperation, the meaning and benefits of capacity development are well known and over the years, organizations active in this field have developed a large number of general methods and tools to assess capacity development needs, in order to formulate their strategies at programme, national and regional levels. Though the concept of capacity needs assessments seems to be wide-spread, there is little documented experience on capacity needs assessments specific to the solar and wind sectors.

With the aim of facilitating the process of capacity development in the solar and wind sectors globally, the working group proposes the elaboration of systemized guidelines, gathering existing methods and tools for capacity assessments and illustrating how they can be used within the context of solar and wind technologies, including practical examples, best practices and lessons learned from experts and organizations active in these sectors. The proposed “Handbook & Toolbox for Capacity Assessments for the Solar and Wind Sectors” should enable key stakeholders, such as consultants, process advisors and

institutions, to support policy makers, public institution, organisations, universities, training facilities and the private sector in funneling their capacity development strategies into the right direction.

In particular an organization as IRENA, mandated by governments world-wide to improve pertinent knowledge and technology transfer and promote the development of local capacities through offering capacity building measures, might benefit of the added value of a systemized approach allowing to catalyze renewable energy deployment on a global scale.

#### **NEXT STEPS**

The Multilateral Working Group on Solar and Wind Technologies will hold its next meeting in Berlin on November 22<sup>nd</sup>, 2011. The Capacity Needs Assessment working group will present the results of the dialogue and a proposal for the elaboration of a “Handbook & Toolbox for Capacity Assessments for the Solar and Wind Sectors”. It is envisaged that handbook and toolbox could be completed in the first quarter of 2012.

In autumn 2011, GIZ and IRENA will conduct pilot capacity assessments, in Algeria and Senegal, respectively. The results and lessons learned during these pilot projects will be fed into this process.

The working group welcomes comments and suggestions for methods/ approaches and tools, as well as concrete experiences with capacity assessments that could be relevant to this work.

## **PRELIMINARY RESULTS OF THE CONSULTATIVE PROCESS**

The following are the main preliminary results (as of Nov. 13<sup>th</sup>, 2011) and conclusions from the consultation process initiated on October 20<sup>th</sup>, 2011 through the dissemination of the concept paper “The role of Capacity Needs Assessments for the accelerated deployment of renewable energy”. It is planned to extend the consultation process until February 2012, through the continuation of the discussion of the concept paper in the capacity assessment working group’s Wiki-site and the conduction of individual interviews. The concept paper will, thus, be updated regularly as the discussions advance. The following and additional inputs received will form an important part in the elaboration of the proposed Handbook and Toolbox for Capacity Assessment for the Solar and Wind Sectors.

### ***Respondents***

The call for comments on the concept paper was sent to over 150 contacts provided by the working group, including all members of the Multilateral Working Group on Solar and Wind Technologies and IRENA’s Technical Focal Points.

Additionally, the call for comments was distributed through Energy-L, a large network of energy experts and practitioners.

As of November 14<sup>th</sup>, 2011 twenty-one (21) actors have responded to the call for comments:

- Governments (e.g. Mauritius, Niger, UAE, Togo)
- International organizations (e.g. EC, ILO, several UN organizations, etc.)

- Research Institutes (e.g. Institute of Energy Economics (Japan), Fraunhofer ISE, GWS, etc.)
- NGOs (e.g. CINER)
- Private Sector (e.g. ESTELA) and individual consultants/experts

### ***Summary of submitted comments***

All responders agreed that capacity needs assessments are a powerful tool for designing capacity development measures in the solar and wind sectors in a systematic way. The concept that capacity development is needed at system (framework conditions), institutional and individual level, was broadly accepted by all respondents.

With regard to the biggest challenges to solar and wind energy deployment in their countries, the majority of respondents mentioned the lack of transparent framework conditions (policies and regulations) and political support to be one of the greatest hurdles and stressed upon the importance of capacity development at government/institutional level, in order to guarantee that the right preconditions are developed and the necessary institutional framework for an quick and effective dissemination of solar and wind technologies is in place. For instance, one respondent pointed out: “The more the policy makers know the benefits of RE technologies (direct and macroeconomic impacts) the stronger their support will be. The better they can plan and conduct the implementation process -alone or with specific external support- the better results will be achieved” (ESTELA).The second most named challenge was the lack of awareness and knowledge about solar and wind technologies within govern-



ments, which can be regarded as the main cause for poor framework conditions. Equally rated, especially from a developing country perspective, was the insufficient availability of skilled personnel at all levels of the solar and wind value chains (from strategic planning capacities at governmental level to technical capacities on resource evaluation and site assessment (meteorology, anemometry; GIS; modeling and simulation of RE resources)) and, related to that, little availability of adequate professional formation options and technical trainings. Other hurdles named were the lack of appropriate feed in tariffs, the difficulties to remove long existing subsidies on fossil fuels, the failure of current grid infrastructure to manage load variations from some renewable energy sources (as wind), ability to attract foreign investment and low public awareness about the benefits of renewable energy.

**Box 4 – Hurdles to RE in remote areas  
Comment from the Ministry of Public  
Utilities of Mauritius**

“Mauritius had an unfortunate experience in the implementation of solar systems in one of the outer islands, [...] where there was no local capacity for the maintenance of the systems, which had thus to be abandoned. This example amply demonstrates the importance of capacity development for sustainability in the fields of RE. While it is recognized that capacity building applies to the whole market chain in wind and PV, comprising project planners, service providers in installation and maintenance, regulatory professionals and professionals in banking institutions, it is equally or even more important to build capacity at the level of grass-root users, the more so as very often solar and wind technologies have effective decentralized application in remote areas”

As mentioned above, most respondents have a common understanding of the importance to systematically assess capacity needs, in order to deliver demand-oriented, country specific capacity development solutions for solar and wind technology deployment. It is commonly accepted that capacity assessments provide important information for elaborating domestic strategies, prioritizing actions at policy level, supporting efforts of organizational development, building and the strengthening of institutions.

Furthermore, the proposal of elaborating guidelines for capacity needs assessments aligned to the specific needs of the solar and wind sectors, was welcomed by the majority of respondents. It was often mentioned that these could be especially useful for countries which lack planning capacity and/or have little experience /knowledge about renewable energy.

Nonetheless, important issues that should be taken into account when developing such guidelines were clearly outlined, mainly:

- **Flexibility:** toolkits are often rigid and do not respond to the dynamic national circumstances. Additionally, worldwide “solar and wind technologies are in a development phase”(YIL Agence) Therefore, methods and learning need to be flexible enough to adapt to changing circumstances.
- **Translating results into concrete measures:** capacity needs assessments “...will be useful only if the necessary steps are taken to translate [them] into [...] concrete energy policies that will trigger market development”. Capacity needs assessments

are “...the first step in the evolution of energy policies”. (Frauenhofer Institute for Solar Energy Systems ISE). It is therefore necessary to “...create instruments, which push for a ‘beyond reporting’ commitment, so as to make assessments be followed by real action on the ground” (UNCTAD).

- Look beyond the targeted sector: other sectors or non-renewable energy related policies in a country also have an influence on the speed of development of renewables. For instance, the general investment climate plays an important role on e.g. whether foreign firms are willing to invest in a country. In addition to that, “...assessments [should] take into account factors which in principle lie outside the boundaries of the investment decision itself, such as cultural preferences, aesthetics, religion, etc. since that might be key for the social acceptance of new sources of energy in these areas”. (UNCTAD)
- “Cattle cycle”: “One of the major constraints of targeted capacity measures is the danger to create a “cattle cycle”. This economic term describes the lack of something leading to increased production whilst other measures lead to decreasing demand – so that a couple of years later a lot of unemployed specialists are available. Therefore, “targeting” is really difficult.” (Gesellschaft für Wirtschaftliche Strukturforchung - GWS)
- Donor dependency: “...often such handbooks are used by international consultants which are funded by donors, go into the country, perform a neat study and then leave -resting

only a document in the hands of policy makers”. Therefore, it is important to “...enable local technicians/economists/engineers to perform the bulk of the assessment - this way costs can be minimized and donor dependency reduced” (UNCTAD)

- Continuity: Capacity needs will vary over time and capacity development strategies need to be flexible and adjustable. Therefore, capacity assessments “...should be a continuous process undertaken in parallel to, rather than sequentially to capacity building, with “marker moments” to evaluate the rate of progress” (Energy Research Centre of the Netherlands – ECN).

#### Box 5 – Need for practical action! Comment from CINER, Bolivia

“[...] in Bolivia the lack of capacity is so evident that not too much resources (including time) should be spent on further diagnostics, assessments, and evaluations. What Bolivia needs are practical solutions and hands-on solutions, no more theoretical approaches”

Last but not least, the respondents shared some interesting information on capacity needs assessment related experiences they or their organizations have had, ranging from the recommendation of specific approaches and tools to anecdotes from concrete projects and countries. During the envisaged personal interviews, the focus will be on gathering more detailed information on these experiences and ask about specific methods and tools used, approaches to transform needs assessment results into concrete capacity development measures and lessons learned throughout these processes