CAPACITY DEVELOPMENT NEEDS DIAGNOSTICS FOR RENEWABLE ENERGY – CADRE

Wind and solar energy

VOLUME II: THE TOOLBOX

giz

IDAE
Instituto para la Diversificación y Ahorro de la Energía

IRENA
International Renewable Energy Agency

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NATIONAL RENEWABLE ENERGY LABORATORY

TOOLBOX

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VOLUME II: THE TOOLBOX

This *Toolbox* is part of the publication *Capacity Development Needs Diagnostics for Renewable Energy* – CaDRE – *Wind and solar energy* and complements the CaDRE *Handbook*. The publication was jointly developed by GIZ, IDAE, IRENA and NREL. The *Clean Energy Ministerial's* (CEM) *Multilateral Solar* and *Wind Working Group* provided the framework for the cooperation on *Capacity Assessment* of the four institutions, with GIZ in a coordinating role. Representatives of more than 35 organizations supported and provided input to this initiative.

Acronyms

ADB	*Asian Development Bank*
BOO(T)	*Build-Own-Operate-(Transfer)*
BTU	*British Thermal Unit*
CaDRE	*Capacity Development Needs Diagnostics for Renewable Energy*
CDM	*Clean Development Mechanism*
CEM	*Clean Energy Ministerial*
CHP	*Combined Heat and Power*
CSP	*Concentrated Solar Power*
EIA	*Environmental Impact Assessment*
ESPRO	*Energy Service Provider*
EU	*European Union*
FTE	*Full Time Equivalent*
GIS	*Geographical Information System*
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit (Germany), GmbH*
GTZ	*Deutsche Gesellschaft für Technische Zusammenarbeit (Germany), GmbH*
GJ	*Giga Joule*
GWh	*Gigawatt hours*
HRD	*Human Resource Development*
I/O	*Input-Output*
IEA	*International Energy Agency*
IDAE	*Instituto para la Diversificación y Ahorro de la Energía (Spain)*
IRENA	*International Renewable Energy Agency*
MJ	*Megajoule*
Mt	*Megaton*
MW	*Megawatt*
MWGSW	*Multilateral Working Group on Solar and Wind Energy Technologies*
MWh	*Megawatt hours*
NAMA	*Nationally Appropriate Mitigation Action*
NGO	*Non-governmental Organisation*
NREL	*National Renewable Energy Laboratory – U.S. Department of Energy (DOE)*
O&M	*Operation and Maintenance*
OECD	*Organisation for Economic Co-operation and Development*
PPA	*Power Purchase Agreement*
PPP	*Public Private Partnership*
PSPP	*Pump Storage Power Plants*
PV	*Photovoltaic*
R&D	*Research and Development*
RE	*Renewable Energy*
RPS	*Renewable Portfolio Standards*
tCO_2	*Tons CO_2*
toe	*Tons of Oil Equivalent*
ToR	*Terms of Reference*
UNDP	*United Nations Development Programme*

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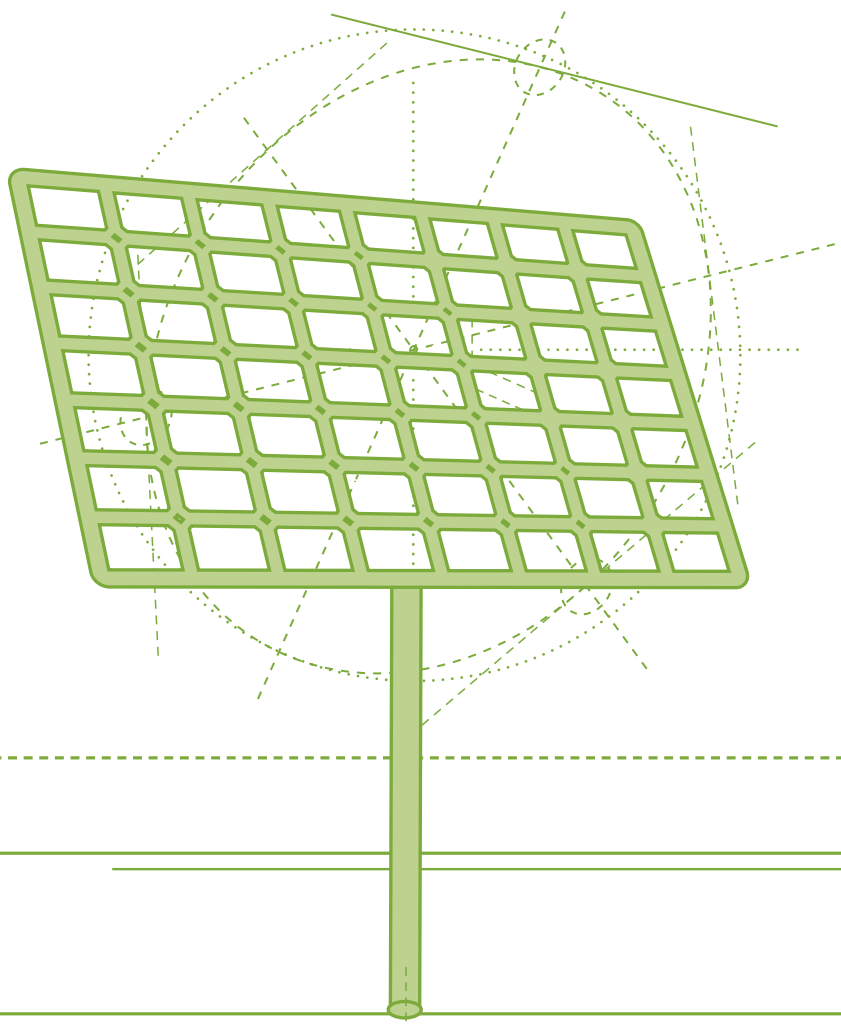

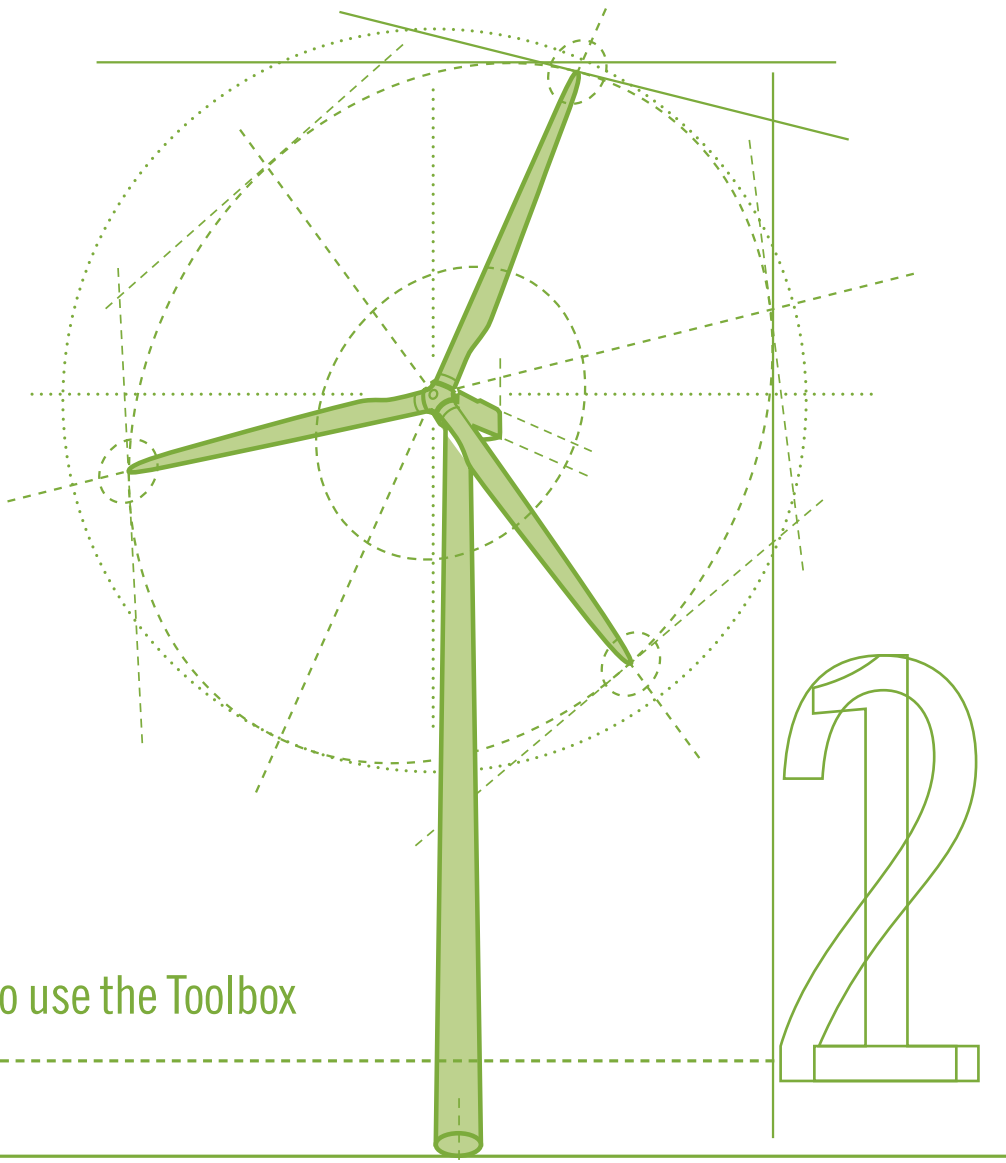

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How to use the Toolbox

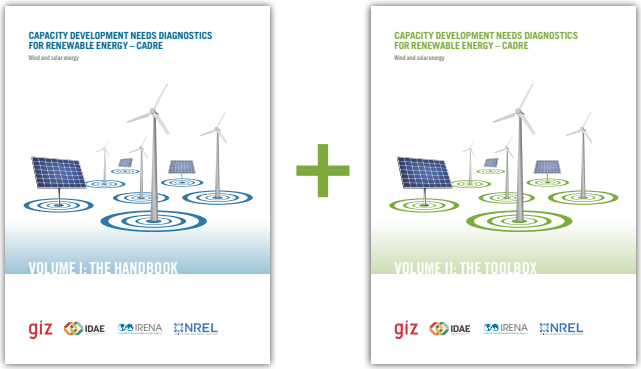
How to use the Toolbox

The *Capacity Development Needs Diagnostics for Renewable Energy* (CaDRE) is designed as a country-driven, comprehensive approach to analysing the capacity already in place, predicting future capacity needs, identifying capacity gaps and providing recommendations for creating capacity development strategies.

Its approach is based on the notion that the successful development of a renewable energy sector is only possible when the required capacities are present at each of the following four levels: the system level, the organisational level, the individual level, and the network level.

This *Toolbox* is an annex to the CaDRE *Handbook*. It consists of a collection of tools that can be used for the different CaDRE tasks. The *Handbook* makes references to the *Toolbox*, outlining which tools can be used throughout the CaDRE process.

Tools are numbered according to their order of appearance in the *Handbook*. However, some of the tools can be used for different tasks.



Each tool is described using the same scheme, which includes:

- The **function** of the tool with a short description and outline of what it will contribute to the capacity needs diagnostic.
- **When to use it?** Makes reference to the steps and the tasks in the *Handbook* in which the tool can be used.
- **Who should use it?** Suggests the people to whom the tool is most suited.
- **How to use the tool?** Gives step-by-step instructions on how to apply the tool and, where useful, makes reference to other tools.
- **What information is needed and/or what are the possible information sources?** Refers to checklists from the *Handbook* and indicates where information can be found.
- **Good to know** provides hints on success-factors and practical recommendations for applying tools.
- **Templates, figures and tables** for the tool including detailed instructions and interpretation guidelines.


grid
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cooperation
target model
core areas
capaci
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lack
framework
stakeholder
organisations
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cooperation
proc
change
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Toolbox

Tool 1 – Terms of Reference (ToR)

Function

The terms of reference document defines all aspects of how a consultant or team will conduct a CaDRE. It defines the objectives and the scope, outlines the responsibilities of the consultant or team and provides a clear description of the resources available to conduct the study. Developing well-specified ToR is a critical step in managing CaDRE.

When to use it?

Step I - Task 1 - Hire or designate a technical team for scoping

Task 9 - Scoping workshop wrap-up (if a diagnostics step is intended)

Who should use it?

Initiator/lead.

How to use it?

- Draft the ToR *(see Checklist 1)*.
- Make sure the tasks described are feasible considering the financial resources available *(see also Checklist 3 in Tool 8 - Plan of operation)*.
- Check with appropriate key stakeholders for content and if required for financial commitments.

What information is needed and/or what are the possible information sources?

Case specific.

Good to know

- There should be an agreement with all partners regarding who will prepare (sections of) the draft ToR. The draft should be checked, reviewed and revised according to the agreed process to assure quality and match with the organisational requirements.
- All parties involved should have ownership of the contents. Therefore, establishing a consultative process for reviewing and finalising this document is very important. It is also crucial to perform a strategic consultation among the key stakeholders to include their opinions and recommendations and reflect these in the ToR, where possible.

Checklist 1 Content and structure of terms of reference for CaDRE

The ToR should be structured as follows
1. Title of the mission.
2. Length and timing of the work.
3. Context of the CaDRE – broad picture of events and situations which have led to the formulation of the ToR.
4. Overall organisation chart to avoid unclear roles that may undermine effective accountability, governance and transparency.
5. Objective – answering the question *What will be done with the results of the CaDRE?*
6. Scope of the CaDRE – including: a) type of CaDRE b) analytical depth c) levels in focus d) core areas, applications and processes e) overall methodology and approach addressing how the participation of stakeholders, clients and staff is envisaged, which data collection methods and sources are to be used and the overall sequencing of the process.
7. Purpose including the participation of stakeholders, clients and CaDRE staff.
8. Contents: this section should outline the organisaion and networks to be included, as well as the scope and contents of the CaDRE.
9. Tasks of the consultant(s).
10. Interim and final outputs of the consultant(s), describing the results that have to be delivered.
11. Compentencies required: this section should contain a description of a description of the necessary qualifications of each member of/role in the CaDRE team. Details of the team would include the number of team members and functions such as team leader, required specialist.
12. Bibliography.
13. Miscellaneous.

Source: customised version from EuropeAid, 2009

Tool 2 – Fact finding sheet

Function

Information of different quality and from various sources will be needed throughout the CaDRE. The fact finding sheet helps users to organise, plan and track the information collection process. It supports the CaDRE team to identify what information is needed/available for the different steps of CaDRE, where the possible sources for the required data (documents, interviews, surveys) are found, and who is responsible for scheduled deliverables.

When to use it?

Step I – Task 2 – Conduct preliminary analysis

Step II – Task 12 – Identify missing types and sources of information necessary for the diagnostics

Who should use it?

- Technical team.
- One person should be assigned to make sure the fact finding sheet is regularly updated.

How to use it?

- Fill in the **overview version** of the **fact finding sheet** *(see Template 1)*. It is advisable to
  - assign a code to each information item to be collected. The code makes it easier to file and track information and can be used in a file name or to mark up the hard copy.
  - make a note of quotations and document references used right from the start. This will save time when the reports have to be compiled.
- Fill in the **detailed version** of the **fact finding sheet** for each information item listed in the overview *(see Template 2)*.

What information is needed and/or what are the possible information sources?

Case specific.

Good to know

- Always compare the value of the information to the cost of acquiring it.
- The fact finding sheet can also be used for planning and keeping track of interviews, performance analyses and surveys.

Template 1 Fact finding sheet – overview

Title of CaDRE						
Code	**Information item**	**Type**	**File name and/or website**	**Responsibility**	**Deadline**	**Status**

Template 2 Fact finding sheet – detailed version

Title of the CaDRE		
Person responsible:		
Code:	**Deadline:**	**Status:** **Open, in process, partially finished, finished.**
Required information	- Describe the information required - list which facts should be collected - indicate, if applicable, for which observation level it is required (system, organisation or individual).	
Uses of the information	- State briefly why the information is needed and what it will be used for. - Refer to core area and applications/processes according to Target Model.	

Method of information collection	- What needs to be done to collect the required information?
	  - Collection or own elaboration of concepts and studies
	  - interviews
	  - surveys
	  - field visit
	  - request (email, letter, and meeting)
	  - request with supporting letter from the lead, interview, own research study etc.	

Sources	- What are the (possible) sources for the information required (an organisation, a person, the web, books, studies or databases)? - Record the contact details of each source e.g. experts, departments, enterprises/utilities. - Note the references for each document or piece of data.	
File name	- If the information is available in digital form, give it a file name, preferably using the assigned code, to ensure traceability.	
Implication if not available on time	- State how important the information is. - State what the consequences are if it is not available? Are there alternatives?	
Resources needed	- If resources (manpower, financial budget, supporting letter) are needed, specify them here.	

Source: own design

Tool 3 – Energy data templates

Function

The energy data templates help to create an overview of the energy mix and the power generation and consumption of a region, country or province and of the relevance of renewable energy within the analysed energy sector.

When to use it?

Step I - Task 2 - Conduct preliminary analysis

Who should use it?

Technical team.

How to use it?

- Identify possible sources *(see Tool 2 - Fact finding sheet)* for more information and collect data. The key questions outlined on the follwing pages provide initial guidance.
- Complete *Templates 3*, *4*, *5*, *6 and 7* using the information gathered. If data is available going back several years, use a spreadsheet programme to calculate trends.
- If possible, use visual aids such as pie charts or similar graphics.
- Write an explanatory text. Provide references to data sources and an evaluation of how up-to-date and reliable the data is. Indicate where data is not available.

What information is needed and/or what are the possible information sources?

Ministry and/or departments of (renewable) energy, industry associations, statistical agencies, ministry of finance.

Template 3 Primary energy supply mix

Year:		
Source	**Tons of Oil Equivalent (toe)**	**Percent of total energy supply (%)**
Coal , lignite, oil, petrol		
Nuclear		
Diesel		
Gas		
Hydro		
Wind		
Solar		
Biomass		
Biogas		
Geothermal		
Other		

Key questions

- What is the country's energy mix?
- What is the share from renewable energy sources?
- What is the share of total energy supply by source?

Template 4 Power generation – installed capacity and gross generation

Year:		
Source	**Tons of Oil Equivalent (toe)**	**Percent of total energy supply (%)**
Nuclear power		
Thermal (coal)		
Thermal (lignite)		
Thermal (diesel)		
Gas		
Hydropower (<10MW)		
Hydropower (>10MW)		
Wind power (onshore)		
Wind power (offshore)		
Solar power (PV)		
Solar power (CSP)		
Biofuels		
Geothermal		
Other		
	Total power generation (MWh)	

Source: own design

Key questions

- What is the installed (renewable) energy capacity by technology?
- How much power is produced by source (gross power generation)?

Template 5 Power consumption by sectors

Year:		
Source	**Tons of Oil Equivalent (toe)**	**Percent of total energy supply (%)**
Industrial		
Residential		
Commercial		
Agriculture		
Public services		
Other		
Total power consumption (MWh)		

Source: own design

Key questions

- What is the actual electricity demand? What are trends for the future if several years of data is available?
- What is the energy consumption by sector?
- What is the share of total energy consumption by sector?

Template 6 Power generation – total energy consumption vs. imports and exports

Year:						
	Import			Export		
Source	Volume (MWh)	Value of total power import (currency)	Percent of total power consumption (%) *see Template 5*	Volume (MWh)	Value of total power export (currency)	Percent of total power generation (%) *see Template 4*
Nuclear power						
Thermal (coal)						
Thermal (lignite)						
Thermal (diesel)						
Gas						
Hydropower (<10MW)						
Hydropower (>10MW)						
Wind power (onshore)						
Wind power (offshore)						
Solar power (PV)						
Solar power (CSP)						
Biofuels						
Geothermal						
Other						

Source: own design

Key questions

- Is the country importing/exporting electricity?
- If so, from/to which country/countries?
- Which are the specific sources of energy (if detailed data is available) and what are the volumes (amount and value)?
- How profitable is the import/export of electricity?

Template 7 Key energy indicators

Year:	
Indicator	**Value**
Energy per capita (tons of oil equivalent (toe)/cap)	
Energy intensity (toe/currency)	
Energy import dependency (%)	
CO_2 emissions (Mt)	
CO_2 intensity (tCO_2/toe)	
CO_2 per capita (kg/cap)	

Source: European Commission, 2011, energy mix fact sheets

Tool 4 – Report guidelines

Function

Good reports are the most important part of the documentation of the CaDRE. A standardised format makes it possible to compare all reports produced during a CaDRE. This is particularly useful if CaDRE is extended or repeated periodically.

Furthermore, use of a standardised documentation makes it possible to compare the results of CaDREs conducted in different countries.

When to use it?

Step I – Task 2 – Conduct Preliminary Analysis
Task 9 – Scoping workshop wrap-up
Step II – Task 20 – Make a synthesis and recommendations and draft final report

Who should use it?

The team leader(s), supported by the technical team.

How to use it?

- Start with making an outline for your report *(see Checklist 2)*. A description of the recommended content is provided in the *Handbook (Checklist 2 – Suggested content of the preliminary context analysis* and *Checklist 17 – Suggested outline for the final CaDRE report* as well as *Task 9 – Scoping workshop wrap-up)*.
- The executive summary should be short but at the same time capture the most important issues to provide a quick understanding. It should be written once the main report is complete. If the report is being produced in a language other than English, the executive summary at least should be translated into English for distribution.
- Be as precise and short as possible. All background material and longer compilations should be annexed to the report. The report has to be understandable. The purpose of annexes is to provide further background material that could be of interest to some readers.
- Check at the end:
  - Does the report cover all the topics prescribed in the ToR?
  - Are all the required logos and addresses in the appropriate places?
  - Is the report clearly structured?
  - Are observations, comments and suggestions for improvement realistic?
  - Is a complete list of participants of all meetings/workshops annexed to the report?
  - Is all the background material included in the annexes?

What information is needed and/or what are the possible information sources?

Case specific.

Good to know

- The reports should be as complete as possible and strictly document all references used.
- Time requirements for good reports are often underestimated. When setting-up the timeline for a CaDRE sufficient time should be assigned for commenting on and discussing draft reports as well as for approving the final report.
- Normally one or more draft versions will be produced for the initial discussions with the team leader or initiator. The final report is normally an officially approved report that can be distributed to a (limited) public.
- The results are part of the final report, especially in the chapters *General policy situation* and *Strategies, processes, planning and implementation* *(see Checklist 17 – Suggested outline for the final CaDRE report).*

Checklist 2 Content of a comprehensive CaDRE report

Topic	Main questions for the overview
Cover pages	☑ Title with contract number, date, authors (with addresses) ☑ clear reference to clients (if existing: other contributors, donors) ☑ logo of the implementing institutions (and others).
(Not all the topics are needed in every case)	
Imprint	☑ Authors (with addresses) ☑ editor ☑ contributing authors, source of pictures, acknowledgements.
Foreword(s)	☑ Typically written by someone other than the primary author of the work, e.g. the initiator or funder of the CaDRE.
Table of contents	☑ Headlines ☑ tables ☑ figures.
Acronyms/glossary	☑ The use of special terms may mean including definitions.
Executive summary	☑ Including objectives and main points to allow a quick understanding. Normally executive summaries do not have subheadings.
Introduction	☑ Short introduction, giving an overview about the topic and reasons for the report.
Objectives	☑ Objectives and expected results (with reference to the ToR).
The topics and methods	Topics covered, including description of: ☑ What was done and when (agenda)? ☑ How was it done (description of the method)? ☑ The distribution strategy. ☑ The difficulties and obstacles.
Outcome	☑ The stakeholder description *(see Tool 7.3)* including the specific capacity needs and gaps ☑ the Target Model *(see Tool 6)* ☑ the synthesis of the capacity gaps ☑ the recommendations proposed and discussed in the final CaDRE workshop.
Discussion	☑ Difficulties and obstacles encountered and the ways these difficulties were resolved.
Next steps	☑ What are the next steps and suggestions for follow-up and how can the findings be used?
Evaluation and suggestions	☑ A brief evaluation of the work and suggestions for improvements ☑ lessons learnt.
References	☑ Reading list including background literature, internet addresses used (with date).
Annex	☑ List of background material ☑ lists of participants at meetings and workshops ☑ list of resource people interviewed and team members (with job title, institutional address, email and telephone) ☑ list of the material produced in electronic and hard copy ☑ photo and media documentation (with date and reference) ☑ brochures or flyers ☑ the ToR ☑ if required, the budget, timelines and plan of operation *(Tool 8 – Plan of operation)*.
Always supply documents in electronic and hard copy.	

Source: own design

Tool 5 – Type of CaDRE – decision guidelines

Function

This tool is a decision-making aid to help the lead and other decision-makers choose the most appropriate type of CaDRE. The selection of a quick, partial or full CaDRE will depend on the purpose of the diagnostics, the core areas, applications and processes in focus, the budget availability and the need for quantitative data.

When to use it?

Step I – Task 3 – Work out the type of CaDRE required

Who should use it?

The lead/initiator with the support of the technical coordinator (or other experts).

How to use it?

- Five types of CaDRE are defined below. The demands on time, professional and financial resources differs in each case:
  - **Type 1**: Quick diagnostics.
  - **Type 2**: Partial qualitative CaDRE.
  - **Type 3**: Partial quantitative CaDRE.
  - **Type 4**: Full qualitative CaDRE.
  - **Type 5**: Full quantitative and qualitative CaDRE.
- Discuss the optional entry points for the CaDRE by using *Table 1*.

What information is needed and/or what are the possible information sources?

A preliminary overview of the renewable energy sector is required. The motivation to look into capacity development needs of the wind and/or solar energy sector should be clear. Budget availability should be clear, as well.

Table 1 Types of CaDRE

	Definition	Purpose	Conditions/requirements	Approach and duration anticipated
Type 1 Quick diagnostics	A cursory review of core issues and functional capacities at both the system and the organisational level.	A quick assessment is used to get an initial overview of the potential and structure of the wind and/or solar energy sector. It can also be applied when it is not clear – or if there is no agreement on – which areas should be prioritised and/or when there is little overview and information on the sectors. It generates a high-level view that enables decision-making regarding capacity areas that may be assessed in more detail in the future.	- Lack of human or financial resources. - Unclear situation concerning the wind and/or solar energy sector. - Absent or rudimentary policy goals for the sector. - Not much knowledge/ information available. - The setting of priorities is not possible.	Limited qualitative data collection/ interviews. One to two stakeholder workshops. No assessment at the individual level. (two to four weeks)
Type 2 Partial qualitative CaDRE	In-depth assessment with qualitative information focused on single core areas or specific applications and processes.	A partial qualitative assessment is appropriate if there is a need to better understand and develop single processes or settings specific to the core area.	- Detailed information is available and accessible. - Professional knowledge exists (there is no need to start from scratch). - Specific core areas of the Target Model need special development or adjustment.	Detailed qualitative data collection/ interviews. Various stakeholder workshops. May include an assessment at the individual level. (three or more months)
Type 3 Partial qualitative and quantitative CaDRE	As above but includes a quantitative analysis.	A partial qualitative and quantitative assessment is appropriate if the purpose is the same as Type 2 plus: Decisions on capital investment depend on the CaDRE.	As above - Lack of quantitative information requires of intensive research to varying degrees. This can create substantial additional demands on time and budget.	Detailed quantitative and qualitative data collection/interviews. A number of stakeholder workshops. May include an assessment at the individual level. (four of more months)

	Definition	Purpose	Conditions/requirements	Approach and duration anticipated
Type 4 Full qualitative CaDRE	A full qualitative assessment of the whole wind and/or solar energy sector.	A full qualitative assessment is appropriate if there is a need for a thorough analysis of the whole (national) wind and/or solar energy sector as well as its goals, and the existing development strategies.	- Detailed information is available and accessible. - Professional knowledge exists (there is s no need to start from scratch).	Detailed qualitative data collection / interviews. A number of stakeholder workshops. Assessment at the individual level. (four to six months)
Type 5 Full quantitative and qualitative CaDRE	A full quantitative and qualitative assessment of the whole wind and/or solar energy sector.	A full qualitative and quantitative assessment is appropriate if the purpose is the same as Type 4 plus: Decisions on capital investment depend on the CaDRE.	- Detailed information is available and accessible. - Professional knowledge exists (there is no need to from scratch). - Lack of quantitative information requires intensive research to varying degrees. This can create substantial additional demands on time and budget.	Detailed quantitative and qualitative data collection/interviews A number of stakeholder workshops. Assessment at the individual level. (six or more months)

Tool 6 – Target Model

Function

The creation of the Target Model is the principal feature of the CaDRE. The Target Model serves as a reference throughout the diagnostic process and helps to summarise results. It consists of core areas of the wind and/or solar energy sector and corresponding applications and processes. This ranges from policy making to the use of electricity by different customers. A CaDRE can consider all core areas of the wind and/or solar energy sector (full CaDRE) or focus on one or several core areas (partial CaDRE).

The Target Model incorporates:

- The definition of the target: What will be achieved? What is achievable?
- An overview of the capacities needed to achieve the defined target (including organisations, processes and procedures, assets and infrastructure, financial resources and planning processes, and human resources).
- An overview of the existing capacities relevant to the defined target.
- An overview of the capacity gaps: the capacities that still need to be developed to achieve the defined target.
- Recommendations to close the capacity gaps (as input to a capacity development strategy).

When to use it?

Step I – Task 4 – Draft the Target Model and map the key stakeholders
Task 8 – Conduct the scoping workshop
Step II – Task 10 – Adapt and refine the Target Model
Task 19 – Extracting existing and lacking capacities

Who should use it?

Technical coordinator, technical team, wind and/or solar energy experts.

How to use it?

- Choose or adapt the core areas and applications/processes that best describe the system to be analysed (depending on the scope and type of CaDRE). **Make a separate row for each application/process you add** *(see Template 8* and the example of core areas and applications/processes in *Table 2)*.
- List the institutions/stakeholders that cover functions related to each of the core areas and the applications and processes.
- Set the targets for each of the core areas.
- Assess the capacities that would be needed to reach the targets, distinguishing between the system level the organisational level and individual level.
- Assess the existing capacities that contribute or could contribute to the defined targets.
- Work out the capacity gaps (such as lacking institutions, and a lack of adequate regulations) by comparing the capacities needed to the existing capacities.

The Target Model can also be used to:

- To plan information collection *(see Checklist 9 – Topics to be considered in a plan of operation)*.
- To suggest capacity development measures like training, adapting goals and regulations. (*Task 19 –Extracting existing and lacking capacities* and *Task 20 – Make a synthesis and recommendations and draft final report*).

What information is needed and/or what are the possible information sources?

The information needed for the Target Model is gathered and compiled in different stages of the scoping and diagnostics step of CaDRE. The Target Model should be completed at the end of *Step II*.

Good to know

- This tool is used in all the CaDRE steps and can be amended, if required.
- The work requires a high level of expert knowledge.
- Other required information (such as an overview of the whole system, challenges and existing initiatives) that makes reference to the applications and processes should be compiled in explanatory documents. This information is useful for the stakeholder description and the analysis of competence areas as well as for presentations and reports.

Template 8 Basic Target Model

		Stakeholders	Target	Required capacities	Existing capacities	Capacity gap
Applications and processes	Core area 1					
	Applications and processes of relevance for a functioning system. List main applications and processes (one per row) to be analysed.	Name, if available, the stakeholder(s) responsible/ relevant to the applications and processes specified in the first column.	What should be achieved? Set the target, e.g. improve the enabling conditions for renewable energy investors.	What capacities are required to reach the targets at the: - *System level:* e.g. processes and procedures, budget, existing institutions, new institutions etc. - *Organisational level:* Tasks institution(s) need to perform, internal processes and procedures needed etc. - *Individual level:* e.g. specific knowledge and skills, number of qualified people needed etc.	What capacities exist at the: - *system level* - *organisational level* - *individual level.*	What capacities are missing – what is the gap at the: - *system level* - *organisational level* - *individual level.*
	...	...	...	...	...	...
	Core area 2					
	...	...	...	...	...	...

Table 2 Core areas and applications and processes for the wind and/or solar sector (not exhaustive)

Core areas	
Applications and processes relevant for implementation of wind and/or solar energy systems.	**Institutions/organisations** with responsibilities and/or mandates in the respective fields (examples).
A robust strategy for the deployment of wind and/or solar energy systems has to be integrated into the wider **energy, economic and development framework**. It needs sufficient political support, budgetary provisions and an implementation strategy.	
Policy formulation	
- National goals for renewable energy deployment - renewable energy strategies and sector development plans.	- Energy or environment ministry - sector agencies (e.g. transportation, industry, economic development, finance, renewable energy, rural electrification) - (renewable) energy or environment ministry.
Legal framework	
- Renewable energy related laws - rules and regulations - financial incentives.	- Cabinet and government - ministries or agencies (specifically name these).
Implementation strategy	
- Guidelines - incentive structures for renewable energy supply (feed-in tariffs) - mandates, codes and standards - regional and local energy planning processes - funding and budgetary policy - government renewable energy support programmes - coordination between public and private agencies and civil society - technology transfer - incentive structures for research and innovation - regulatory and legal processes for approving the development and operation of projects.	- The renewable energy department in the energy or environment ministry - utilities and electricity system regulators - project developers and technology suppliers - technical and academic institutions - the climate change unit - (renewable) energy agency - renewable energy institute.
Investment and financing	
- National financing programmes and mechanisms - private investments - international (donor) programmes - energy tariffs for renewable - sources, availability and cost of finance for projects (including microfinance where appropriate) - ability of investors to assess and manage investment risk (including policy risk).	- Financial institutions (banks) - investors - international donors - renewable (energy) electrification fund.

Core areas	
Applications and processes relevant for implementation of wind and/or solar energy systems.	**Institutions/organisations** with responsibilities and/or mandates in the respective fields (examples).
Wind and solar energy production is only possible if the necessary **solar and wind resource potential** (solar radiation and reliable and sufficient wind speed) is available and access to potential sites is not too difficult. Extensive on-site measurements are required to select reliable generation sites, especially for wind.	
Natural resources (assessment and reliability)	
- Wind speed and frequency - solar radiation potential - performance of alternative system designs.	- Research institutions - project developers - meteorological institutions and agencies - competent ministries.
The enactment of a policy for wind and/or solar energy systems requires **effective institutions and regulatory bodies**. These allow policy objectives to be translated into clear rules that help guide decision-making without creating undue barriers.	
Regulatory structure (including technical standards and controlling the quality of electricity production and supply)	
- Regulation guidelines and control mechanisms - control mechanisms - standards, quality testing and certification systems.	- Energy agencies - electricity regulators - standards agencies - testing and certification institutes.
Spatial and technical planning of wind and/or solar energy systems	
- Site selection (spatial planning) - plans for civil engineering - technical planning of plants (and supply systems) - technical and spatial planning of local or national grid system - areas in which concessions will be given.	- Planning departments - utilities and system operators - project developers - transmission system developers and operators.
If wind and solar radiation resources are available and have been assessed, **suitable technologies** to harness these resources and adequate supporting infrastructure need to be available.	
Renewable technologies	
- Production and value chains - availability of local producers - technologies needed to exploit resource potential (availability of appropriate technologies, associated supply chain) - imported technology.	- Technology producers and suppliers - project developers - providers of basic raw materials - investors.

Core areas	
Applications and processes relevant for implementation of wind and/or solar energy systems.	**Institutions/organisations** with responsibilities and/or mandates in the respective fields (examples).
Human skills are needed for management, planning, administration, construction, asset operation and management, supervision and control and service delivery. Education, vocational training and research and development require the necessary infrastructure, curriculum, and teaching methods as well as experienced trainers and researchers.	
Education and human resource development	
- Curriculum development - human resource management - education plans including certification procedures and requirements - vocational training system.	- Universities - technical schools - training institutions - vocational training institutions - government research programmes.
Research and Development	
- Research infrastructure - research funding processes - research culture/skills.	- Companies - universities - research and development institutions.
Without a suitable **energy market structure** and rules for utilities, project developers, construction companies and technology developers (or importers), deployment is difficult or impossible. Scaling up renewable energy requires energy services to be affordable and cost-effective to satisfy user demand. At the same time it also needs to provide a viable economic model that allows project developers to recover costs and encourages further investment.	
Market structure	
- General business conditions - commercial viability of existing or planned business models, taking into account end-user affordability and available policy incentives - market demand for renewable energy - public acceptance of renewable energy technologies - business models for utilities like Public Private Partnership [PPP], concession model, PPP- leasing model, Build-Own-Operate-(Transfer) [BOOT] - import of technologies - employment patterns and regulations.	- Energy Service Providers [ESPRO] (utilities, independent third party producers, micro-generation) - public or private utilities - project developers.
Economic, environmental and social impacts	
- Assessment of economic and social impacts of deployment - environmental impact assessments.	- Ministry of social affairs - ministry of economy - ministry of labour - environmental departments/ministries.

Core areas	
Applications and processes relevant for implementation of wind and/or solar energy systems.	**Institutions/organisations** with responsibilities and/or mandates in the respective fields (examples).
If all the above factors are in place, renewable energy projects then need to be **planned, built operated and maintained**. This requires access to financial resources and the availability of people with the right professional/technical profiles and specialised knowledge of wind and/or solar energy technologies.	
Project design	
- Available test facilities and demonstration projects - technical and site planning - environmental impact assessment.	- Project developer - technical consulting - licensing authorities.
Business case development	
- Business framework conditions - operation models - required procedures.	- Approving authorities - project developer - asset owner.
Access to finance	
- Utility-scale financing - risk reduction - microfinance possibilities and requirements.	- Finance institutions - insurance companies.
Building and construction	
- Technical equipment production and delivery - quality assurance processes.	- Project developers - construction firms.
Operation and maintenance	
- Existing business models for O&M - maintenance requirements.	- Energy Service Providers (ESPRO) - energy committees.
Distribution and grid	
- Ability of existing transport/ grid network infrastructure to accommodate renewable energy policy ambitions - storage facilities - regulation of grid capacity - grid access.	- Project developers - utilities - system operators.
Electricity and thermal users - demand	
- Acceptance – information about consumers - energy efficiency - price - reliability of supply chains.	- Civil society - cities and villages - local communities - public sector - large and small businesses.

Source: own compilation – see also GTZ-ESRA 2009

Tool 7.1 – Stakeholder landscape

Function

The stakeholder landscape provides a simplified graphical overview of key stakeholders, their functions in the system, their type and their importance. Constructing the landscape ensures that the organisational boundaries of the solar and/or wind energy sector are identified. Different categories of organisations are considered (front line and central agencies, monitoring bodies, the political system, civil society organisations representing demand for services, private enterprise and trade associations.

The tool builds on the assumption that sectors have to be understood in a holistic and comprehensive manner. This is because relationships within the sector are the key to its dynamics, as are relationships between the sector and its setting.

The stakeholder landscape informs the *Detailed description of selected stakeholders (Tool 7.3)* and the governance map and relationships *(Tool 7.4)*.

When to use it?

Step I – Task 4 – Draft the Target Model and map the key stakeholders
Task 8 – Conduct the scoping workshop
Step II – Task 11 – Detailed stakeholder description
Task 19 – Extracting existing and lacking capacities

Who should use it?

Technical team.

How to use it?

- **Identify** the key organisations which play a significant role within the core areas of the Target Model. Identify the *contributing* organisations with a significant direct role and the *outer layer* of organisations which have a less significant role.
- **Consider** the following types of organisations:
  a) Civil society organisations and interest groups representing demand for services or to whom accountability maybe important.
  b) Front line agencies and units actually delivering services; both public and private suppliers like generation, production, distribution, maintenance or supervision.
  c) Central level agencies/institutions with roles in policy-making, central planning and governance like central departments and directorates.
  d) Monitoring organisations (regulators, auditor-general, standard setters, ombudsmen, the complaint and redress system, the judiciary) that keep operations in line.
  e) The political system (parliament or other political structures with a role in policy formulation and supervision).
  f) Private sector and business (service delivery, utilities, production, planning and consultancy). Depending on their function, international cooperation partners and donors should be classified as frontline agencies or the political system.
- **Locate** the organisations graphically *(see Template 9)*.

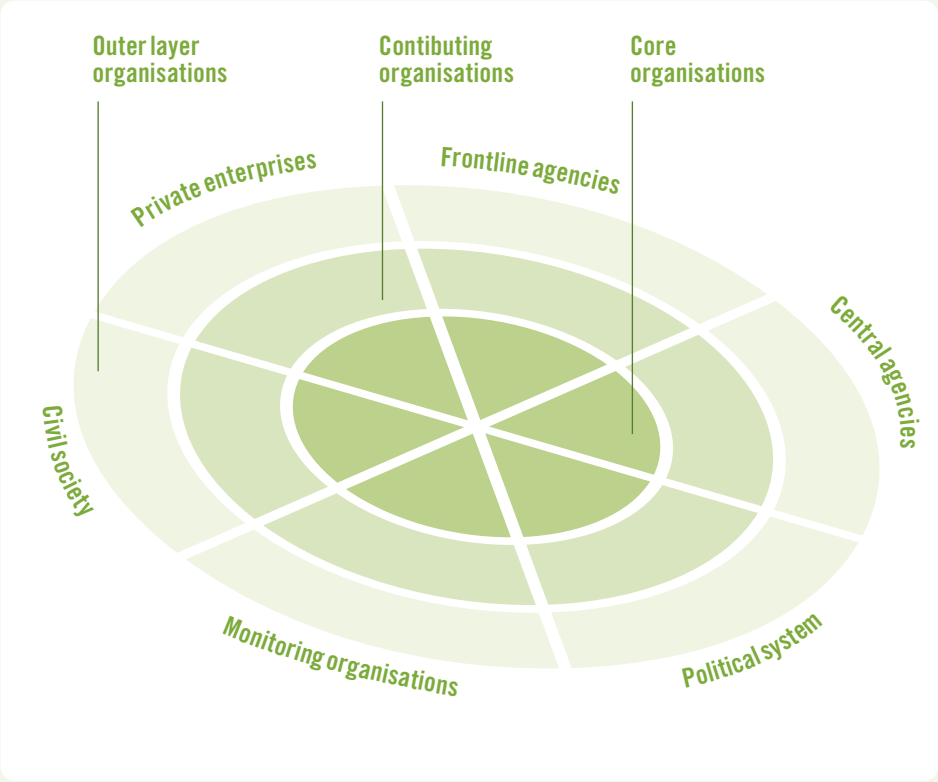
What information is needed and/or what are the possible information sources?

List of stakeholders in the sector or core area. It is advisable to use this tool alongside the Target Model.

Good to know

- The sector categories in *Template 9* (private enterprises, front line agencies) can be replaced by others, if another perspective is suitable.
- The tool can be used in workshops for jointly constructing the landscape (proposed in the scoping workshop *in Task 8 – Conduct the scoping workshop*).

Template 9 Stakeholder landscape



Sources: customised from ADB, 2007, OECD-DAC, 2006

Tool 7.2 – Stakeholder selection according to their role and interest in CaDRE

Function

Based on the stakeholder landscape (*see Tool 7.1*), it is possible to identify who are the important stakeholders in relation to CaDRE.

This tool helps categorise the stakeholders according to their interest and power to support or oppose capacity development strategies and measures.

The results can underpin various decision-making processes of the CaDRE team, such as who should be invited to meetings and workshops and who should get a prominent role as the CaDRE progresses.

When to use it?

Step I – Task 7 – Organisation of the scoping workshop

Who should use it?

Political leader/initiator.

How to use it?

- List names of stakeholders for workshops/meetings or interviews (*Template 10*).
  - Whose contribution is needed?
  - Whose contribution is strategically and technically relevant?
- Fill in the columns. The following questions may help:
  - Which role should the stakeholder have in the CaDRE process?
  - What is their specialisation and function in relation to renewable energies/wind and solar energy systems?
  - What interest does the stakeholder have in CaDRE? For what purpose does the stakeholder want to use the results of CaDRE?
- Give priority scores. The priority will depend on the purpose of selecting the stakeholder.
  - What influence does the stakeholder have on the CaDRE?
  - Is the influence weak or strong?
  - Is the influence positive or negative?

  Tool 12 – Zone of influence of organisations helps understand the interests, power and prominence of key players.

What information is needed and/or what are the possible information sources?

- A brief review of background literature can provide a useful understanding of the country's political economy.
- Personal knowledge, meetings and discussions with stakeholders involved in the specific area.
- Interview local experts in the field who have knowledge about the issue and the important groups and individuals involved.

Fill in the following form. Suggestions can be found in *Table 3 – Possible functions and roles and interests in CaDRE*.

Template 10 Stakeholder prioritisation

Stakeholder (expected contribution)	**Possible role in the CaDRE process**	**Function in relation to wind and solar energy**	**Interest in CaDRE**	**Priority score** 0 = not relevant to 3 = very relevant
See Table 3 for possible criteria to be used to fill in this form.				

Table 3 Possible functions and roles and interests in CaDRE

Function in relation to wind and solar energy	- Policy maker - manager of … - technical advisor - energy supply planning - technical planning - utility systems - production of technical equipment - regulation of electricity supply - grid systems (distribution) - operation and maintenance - training and education - construction of assets - financing/budget expert (including budget planning) - renewable energy market expert - media and communication - lobbyist or advocate - legal system expert - others.
Possible role in the CaDRE process	This could include numerous roles/functions: - political lead – initiation and overall coordination of the processes (essential) - project coordinator – day-to-day coordination and responsibility for technical implementation (has to be full time) - technical team – core team; expert on (name field) - expert to provide background technical information (energy [wind, solar], energy planning, research) - expert to provide background policy information - expert to provide background economic information - expert to provide background (vocational) training and education - representative of a key stakeholder (essential) - communication expert - administration and assistance - others.
Interest in CaDRE	Ability to improve capacities of the following: - political system including the legal system - renewable energy market - education (and vocational training) - institutions that upgrade performance and supply - others. Score each one as follows: opposing (-2), no interest (-1), inert (0), some interest (1), highly interested (2).
Priority score	Give an overall score from 0 = not relevant to 3 = very relevant according to the political, technical and operational requirements of the CaDRE. Specify reasons for the score; consider also that those stakeholders who get a negative interest score could be priority stakeholders. The scores can help set priorities.

Source: own design

Tool 7.3 – Detailed description of selected stakeholders

Function

This tool helps identify and define the functions, perspectives and performance of all the relevant stakeholders in the wind and/or solar energy sector. It also helps refine the selection of the core stakeholders/target groups of the CaDRE. The stakeholder description should outline their role in the work process, function and responsibilities in the renewable energy sector. It should also assess their interest in CaDRE and in engaging in capacity development measures.

The stakeholder description can be used once the *Stakeholder landscape* has been drawn-up *(Tool 7.1)* and will inform the *Governance map and relationships (Tool 7.4)*. It will be used in the main text of the final CaDRE report.

The description of the stakeholders is one of the important parts of the analysis and feeds into the Target Model (existing capacities), the recommendations *(see Task 20 – Make a synthesis and recommendations and draft final report)* and the final report, especially in the report chapter The target institutions and organisations in the system *(see Checklist 17 – Suggested outline for the final CaDRE report)*.

The tool also underpins decisions on who is of priority interest for workshops, interviews and meetings *(see Tool 7.2 – Stakeholder selection according to their role and interest in CaDRE and Tool 10 – Organising an efficient meeting or workshop)*.

When to use it?

Step II – Task 11 – Detailed stakeholder description

Task 19 – Extracting existing and lacking capacities

The detailed description of the key stakeholder is also useful for the preparation of interviews and surveys.

Who should use it?

Technical team.

How to use it?

- Use the stakeholder landscape to select relevant stakeholders. Others can be added in the course of the CaDRE.
- Describe them according to *Template 11 – Stakeholder description*.

What information is needed and/or what are the possible information sources?

Several methods can be employed to collect data on stakeholders in a comprehensive and efficient manner. A brief review of background literature can provide a useful understanding of information sources before data is collected through:

- interviews *(see Tool 13 – Interview)*
- local experts who are knowledgeable about the stakeholders and their characteristics and the important groups and individuals involved in the area
- interviews with local and international experts and/or the stakeholders themselves required, unless resources and time do not permit it.

Good to know

- Use results as an entry point for organisational analysis.
- Be aware that you are just creating a snapshot.

Key questions

- What are the public and private organisations (names and mandate/missions) interested in studying, evaluating, promoting and implementing renewable energy?
- How successful are they in fulfilling their mandates/missions?
- Is there any role missing/not being played at the institutional level? Is there a (perceived) need for further institutions?
- Do they have an adequate number of skilled staff to fulfil their mandate/mission?
- Do they have an appropriate budget to fulfil their mandate/mission?
- What is the relationship with other stakeholders in the sector? Are there any known good cooperation examples or existing conflicts?
- Is there good coordination among public institutions involved in the energy sector? Are responsibilities laid out clearly?
- Does the organisation have the potential to expand its mission regarding renewable energy development and deployment? How?

Template 11 Stakeholder description

Name and acronym of the organisation				
The depth of the information required depends on the type of CaDRE and the general role in the wind and/or solar energy sector. Bold = essential information independent of the depth of analysis.		**Assessment**		**Perspectives/future plans and targets**
		Strengths	**Weaknesses/ gaps**	
Legitimacy	- Institutional position and status - mandate - legal position - responsibilities - governance/accountability.			
Organisation	- **Organisational structure (how many departments or units, organograms)** - **management structure** - **number of staff** - organisational culture.			
Human resources	- **How many staff and, what positions (management level, operational level, administration)** - **qualifications (titles, skills level)** - human resource management - staff turnover - training possibilities - salary level compared to national average - unions and activities and role - motivation level.			
Financial and material resources	- **Financial resources/** budget to fulfil their mission - **budgeting processes** - material resources.			
Networks and position in the system	- **Dependencies** - **direct and indirect connections** - **cooperation and relationships with other organisations** - **member of associations or other networks** - position in production and value chains.			
Conflicts and position	- Major conflicts, competition and competitors - unofficial dependencies.			

Source: own design

Tool 7.4 – Governance map and relationships

Function

This tool helps analyse and describe governance relationships (governance/accountability) within the wind and/or solar energy sector (system level capacities). The analysis of governance relationships and the creation of a governance map give insight into the dependencies and power structures of the solar and wind energy sector and other sectors that interact with it (rules of the game).

The results of this analysis can be used for diagnosing capacity development needs at the system level and can provide important hints for the preparation of interviews i.e. for the diagnostics of related organisational and individual capacity development needs.

Stakeholders can use the tool to expose and discuss strategic options on how to strengthen governance and accountability relationships in the sector.

When to use it?

Step II – Task 11 – Detailed stakeholder description

Who should use it?

Technical team.

How to use it?

- By viewing your stakeholder landscape *(Tool 7.1 – Stakeholder landscape)*, decide which stakeholder relationships to focus on. Simplify by clustering them according to groups and by focusing on the most important stakeholders.
- Graphically depict the formal relationships resulting from what is stipulated in the constitution and in legislation and policies.
- Identify the existing governance/accountability relationships by asking the following questions:
  - Who directs whom: governance?
  - Who reports to whom: accountability?
- Display your results in the governance map *(see Figure 1 – Example of a governance map and relationships)*
- Apply *Template 12* to assess the rules of the game using the following criteria:
  - mix of governance mechanisms
  - information about and clarity of sector governance
  - responsiveness of governance
  - accountability culture
  - capacity for governance and accountability.
- Draw conclusions in the text for capacity development interventions *(see Module 2.3 – Capacity needs analysis – Task 19 – Extracting existing and lacking capacities)*.

What information is needed and/or what are the possible information sources?

- Several methods can be employed to collect data on stakeholders in a comprehensive and efficient manner. A brief review of background literature can provide a useful understanding of formal dependencies before data is collected. Additional information can be gathered in interviews with relevant stakeholders.
- Another method is to interview local experts in the field who have knowledge of the issues and of the important groups and individuals involved in the area.

Good to know

- Be careful when working on informal relationships, as they are politically highly sensitive. Use guided interviews with like-minded experts.
- Use results as an entry point for organisational analysis.

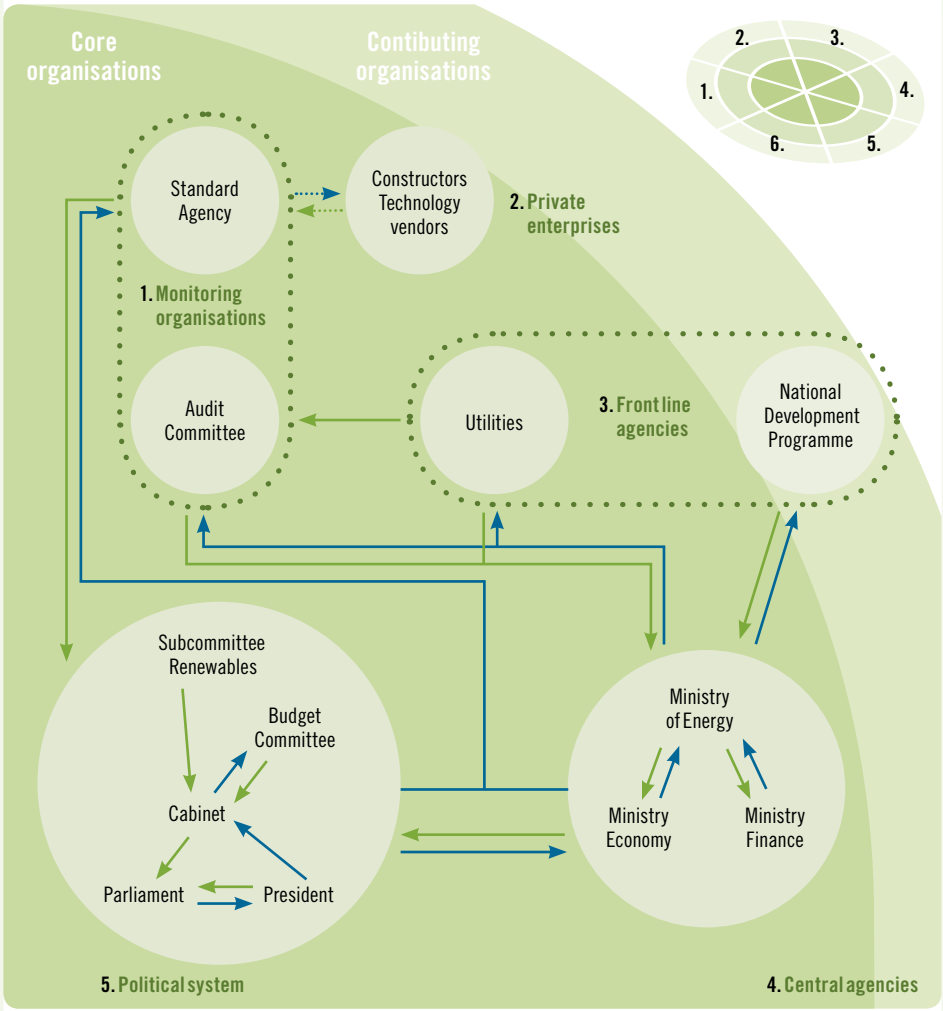
Template 12 Assessment of formal and informal governance/accountability relationships

Parameters	Questions	Assessment
Mix of governance mechanisms	- To whom is loyalty primarily owed by key stakeholders (supervisory organisations, funding agencies, pressure groups)? - Is it clear who exercises formal governance? - Are there informal governance structures? - Are formal governance mechanisms stronger or weaker than informal mechanisms? - Are informal governance mechanisms largely complementing or competing with formal governance?	
Information on governance	- Are clear, comprehensive and detailed governance directives provided for the sector? - Is there a timely and ongoing inflow of governance directives? - Are governance directives publicly available and appropriately shared in the organisations?	
Responsiveness of governance	- Are stakeholders subject to predictable central guidance or to arbitrary/discretionary orders and control? - Are the governance directives in line with overall formal policies?	
Capacity for governance	- Are resources and capacity available in sufficient quantity, quality and timeliness in order to enable agents to follow governance directives? - Are resource flows and resource management transparent?	
Accountability culture	- Is the accountability system (responsibilities, frequency, format and accounts disclosure) congruent with the governance mechanisms? - Do governors effect and enforce sanctions, rewards or other measures based on accounts disclosure?	
Information on accountability	- Is information relating to the accountability function publicly available and suitably distributed to relevant stakeholders in and outside the public sector? - Is accountability information produced on time?	
Accountability responsiveness	- Does accountability respond to the key governance directives, allowing compliance to be assessed? - Does accountability appropriately cover inputs, processes and results?	
Capacity for accountability	- Are resources and capacity adequate to fulfil accountability obligations? - Are the resources and capacity dedicated to accountability appropriate as a proportion of overall resource availability?	

Source: EuropeAid, 2008

Figure 1 Example of a governance map and relationships

Simplified example of a governance map for the renewable energy sector in Afghanistan; it depicts the governance (blue) and accountability (green) of main organisations in the sector and was used to understand the power structure in the sector.



Source: customised from GTZ-ESRA, 2009

Tool 8 – Plan of operation

Function

A plan of operation is important to ensure that all stakeholders involved have a clear understanding of the tasks that need to be completed and the results that need to be achieved in every step of the CaDRE. The plan of operation should also include information about roles and responsibilities *(see Tool 9 - Roles and responsibilities)*, as well as required resources. Finding the right balance between time, cost and quality is crucial for a successful CaDRE.

The plan of operation should be created and agreed upon with all stakeholders. It serves as a control and reference system for the entire diagnostic process.

When to use it?

Step I - Task 6 - Draft a plan for the CaDRE
Step II - Task 13 - Refine the plan of operation

Who should use it?

Technical coordinator and technical team.

How to use it?

- List all the main activities and complete a **Gantt-Chart** *(Template 13)* by answering the following questions:
  - Which activities are needed for each step of the CaDRE?
  - What is the minimum and maximum time frame required for each activity? Is there a special order in which actions need to be carried out?
  - What results are expected from each activity? What are the indicators for measuring the results?
  - When should each result be delivered?
  - What are the major milestones (reports and meetings)?
  - Who is responsible for the completion of each activity?
  - What human and financial resources (operational cost, labour days) are needed for each activity *(Checklist 3)*?
- Subdivide the main activities into sub-activities.
- Write an **explanatory text** for each activity, including detailed explanations, constraints, risks, and indicators to measure success/completion.
- Get a **formal agreement** of the plan from all key stakeholders involved.
- **Update the plan** of operation regularly when new activities arise, the timeline needs to be changed, or resource requirements change. Check with the lead whenever there are substantial changes to resources or timeline/milestones.

What information is needed and/or what are the possible information sources?

Case specific.

Good to know

- Remember the need to balance time, cost and quality.
- Every activity in the plan needs to be assigned to at least one responsible person.
- For presentations to stakeholders and decision-makers, not all detailed (sub)activities are relevant. Make the plan in such a way that in can be reduced to an overview version (only the main activities).
- Do not forget that setting-up the organisation, preparatory activities, report and presentation, preparation and coordination with the lead are processes that take time.
- Regular up-dates should always indicate the most recent activity status.

Template 13 Gantt-Chart for the plan of operation

Plan of operation:																	
Time period:													Version No and date:				
Step	Action	Result	Timeline												Respon-sible	Human resources	Financial resources	Status
			J	F	M	A	M	J	J	A	S	O	N	D				
											◆ Constructors							

Source: own design

Symbols used: Timeline for main activity: ▬ Timeline for sub-activities: ▬

Deadline for result delivery/milestone: ◆ Technology vendors Status: open, in process, finished, cancelled.

Checklist 3 Possible cost centres for CaDRE

Checklist
☑ CaDRE technical coordinator
☑ CaDRE technical team
☑ external experts (including fees and travel expenses)
☑ travel costs for field visits (interviews, site visits)
☑ workshop costs (venue, technical equipment)
☑ hotel and travel for participants of workshops, meetings and catering
☑ translation costs (interviews, workshop, and publications)
☑ costs for research studies
☑ data to be purchased
☑ copy, graphic design and print costs.

Tool 9 – Roles and responsibilities

Function

Clarifying the roles and responsibilities for the work within the CaDRE team and for the external experts involved is one of the important management tasks of the technical leader. In some cases, key stakeholders (non-core CaDRE team members) might also take certain responsibilities. The roles and responsibilities should be formulated precisely and clearly and agreed with the people who have final responsibility. This ensures that right person is accountable and helps reduce or avoid confusion concerning roles.

When to use it?

Step I – Task 6 – Draft a plan for the CaDRE
Step II – Task 13 – Refine the plan of operation

Who should use it?

Technical coordinator.

How to use it?

Define the roles and responsibilities for the CaDRE as follows (*Template 14* and *Checklist 4*):

- **Decision-makers** define strategic orientation, assign responsibilities and allocate resources for the CaDRE. Under optimal circumstances national key decision-makers, senior advisors and representatives of other executive agencies should be involved.
- **Coordinators** are in charge of the day-to-day management of the CaDRE and liaise between and within the decision-making body and the technical team.
- **Technical staff/experts** in charge of implementing the CaDRE. Usually external international and national consultants.
- **Other resources:** representatives from key stakeholder groups that provide input.
- If required, any other groups with clear roles (such as communication).

What information is needed and/or what are the possible information sources?

Case specific.

Good to know

- Give individuals their designation and indicate the organisation they work for. Avoid naming only the institutions. When it comes to work and delivery, it is people that perform, not institutions.
- Provide regular up-dates and inform key stakeholders.

Template 14 Key roles and responsibilities for CaDRE

Role	Name, designation	Function/ organisation	Function in the CaDRE	Communication details
Decision-makers				
Coordinator/ day-to-day manager				
Technical staff/ experts				
Communication/ information officer				
Others				

Checklist 4 Suggestions of responsibilities

Decision-makers	Coordinator	Technical staff/experts
Responsibilities include but are not restricted to: ☑ authorising the CaDRE ☑ defining its purpose and scope ☑ allocating resources for conducting CaDRE ☑ assigning responsibilities for the CaDRE ☑ managing the pace of progress ☑ approving of reports ☑ approving of findings ☑ deciding capacity development priorities.	Responsibilities include but are not restricted to: ☑ maintaining a close liaison with the technical team and keeping abreast of progress, issues and activities ☑ acting as a communication channel to the decision-making body on behalf of the team. ☑ carrying out any action required by the decision-making body ☑ acquiring and coordinating external assistance ☑ planning the CaDRE process in consultation with the technical team.	Responsibilities include but are not restricted to: ☑ applying specific methods and tools ☑ analysing findings and preparing recommendations ☑ presenting and reporting on findings and recommendations ☑ providing data ☑ writing reports or parts of them.

Sources: customised version of GTZ, 2005: Guidelines on capacity building in the regions

Tool 10 – Organising an efficient meeting or workshop

Function

Workshops and meetings are the platform for plans, discussions, reaching agreements and creating commitment and motivation. Careful planning ensures a meeting and/or workshop is run efficiently and effectively. This tool gives suggestions for organising meetings and workshops effectively. It gives an overview of the information, time, resources, format, participants and logistics needed.

When to use it?

Step I - Task 7 - Organisation of the scoping workshop
Step II - Task 22 - Prepare the final CaDRE workshop

Who should use it?

Technical team, organiser of a workshop or meeting and administrative staff.

How to use it?

Checklists 4, 5 and 6 provide guidelines to organise your work:

- before a meeting or workshop
- during a meeting or workshop
- after a meeting or workshop.

What information is needed and/or what are the possible information sources?

Case specific.

Good to know

- Clarify upfront whether there is a need for professional translation services with interviewees/ focus group participants.
- Be prepared for the unexpected. Meetings may need to be postponed.

Checklist 5 Issues to consider before a meeting or workshop

Agenda	Type of work
- Define clear objectives, expected results and content of the meeting/workshop.	Coordination and planning.
- Identify the participants needed to reach the results *(see Tool 7.2 – Stakeholder selection according to their role and interest in CaDRE)* experts, guest of honour. Make a list including contact information. Be aware that the number of participants has an influence on the time, infrastructure and technical equipment and logistics needed.	Coordination and planning.
- Define the type of meeting or workshop (plenary sessions, group work, planning tasks). This has consequences for the preparation time, need of facilitator, costs.	Coordination and planning.
- Plan what content is needed (key topics, presentations, key questions, discussion points) and who should deliver/prepare it.	Content preparation.
- Be clear about the technical and organisational requirements to reach the goals.	Coordination and planning.
- Be clear about protocol issues – depending on the rank and position of participants or key speakers.	Protocol.
- Check the availability of participants and speakers/contributors beforehand.	Coordination and planning.
- Identify a facilitator or moderator (well in time; check the budget) – for workshops likely to include discussions or group work.	Coordination and planning.
- Inform the contributors and discuss with them the details of their contributions.	Coordination and planning.
Prepare an agenda for the meeting/workshop and include: - date and time (from – to) - location - format of meeting (workshop, seminar, interview, focus group discussion, briefing, presentation) - participants (name, organisation and function) - working language - persons responsible for reception, technical issues, protocol.	Content preparation.
- Start the invitation with a formal letter. Include the material for the workshop.	Coordination and planning.
- Reconfirm participation.	Coordination and planning.
- Delegate and prepare an individual to write the minutes (rapporteur) and take care of the reception desk.	Coordination and planning.
- If required, inform and invite media and/or prepare press release.	Coordination and planning.
- Finalise the workshop process with the facilitator/moderator.	Coordination and planning.

Agenda	Type of work
Organise the logistics and technical equipment: - required logistics (transport/travel arrangements) - projector, internet, loudspeaker, translator, visual aids, screen, planning equipment like Metaplan - reception desk - seating arrangements - hotel and transport for guests and participants - photo documentation - refreshments, food - reception or arrangements for a social event after the workshop social.	Technical organisation/ logistics.
- Print handouts.	Technical organisation/ logistics.
- Check room and that technical equipment works.	Technical organisation/ logistics.

* Not every step is necessary on every occasion.

Checklist 6 Issues to consider during a meeting or workshop

Agenda*	Type of work
Inauguration/start: - welcome - participant introduction - initial presentation of the objectives and expected results (lead, technical coordinator).	Content.
Main workshop: - methods should be as interactive as possible - group work, small discussion groups should be organised to elaborate on special topics.	Content.
End of workshop: - always plan the next step. Make the follow-up transparent. Make a brief summary of the results (lead and technical coordinator).	Content.
Do not forget: - photo documentation. - coffee/tea breaks are important opportunities for informal communication. - ensure that people keep strictly to the time allotted for presentations and discussions. - be prepared for conflicts and opposing views *(see Tool 7.2 – Stakeholder selection according to their role and interest in CaDRE)* and prepare a strategy to deal with them.	Technical organisation/ logistics.

* Not every step is necessary on every occasion.

Checklist 7 Issues to consider after a meeting or workshop

Agenda	Type of work
- Write and check workshop draft report of minutes of meeting.	Content.
- If required, get approval of the report or minutes.	Content.
- Send to participants.	Coordination and planning.

* Not every step is necessary on every occasion.

Source: own design

Tool 11 – SWOT analysis

Function

The Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis tool helps identify internal (weaknesses and strengths) and external (threats and opportunities) factors that may influence the success of an organisation, organisational unit, process, person or group, specific goal or activity. The results are depicted in a box containing four squares. The tool can be applied flexibly and repeatedly, for instance to look at a series of individual components in a sector, in order to measure progress at given points in time and to provide a basis for discussion.

When to use it?

Step I – Task 8 – Conduct the scoping workshop
Step II – Task 19 – Extracting existing and lacking capacities

Who should use it?

Technical team for their analytical work or during workshops jointly with the participants.

How to use it?

- Decide what organisation, unit, process, group of people needs to be analysed. For example: An engineering company that plans and installs solar home systems in rural areas.
- Use the SWOT box (*Template 15*) to guide the analysis. If you are analysing several issues, prepare one SWOT box for each issue.
- If required, compare the boxes and discuss the results.
- Draw conclusions and formulate strategic options.
- If several of these are conducted, all the findings can be summarised in one overview table (*Template 16*). For each SWOT a summary about the consequences relevant to CaDRE should be prepared.

For strategic options you can use a variation of the SWOT, the Strategic Alternatives approach outlined *Template 17*.

What information is needed and/or what are the possible information sources?

Knowledge about the subject of the SWOT analysis like an organisation, a process, a component, persons or groups.

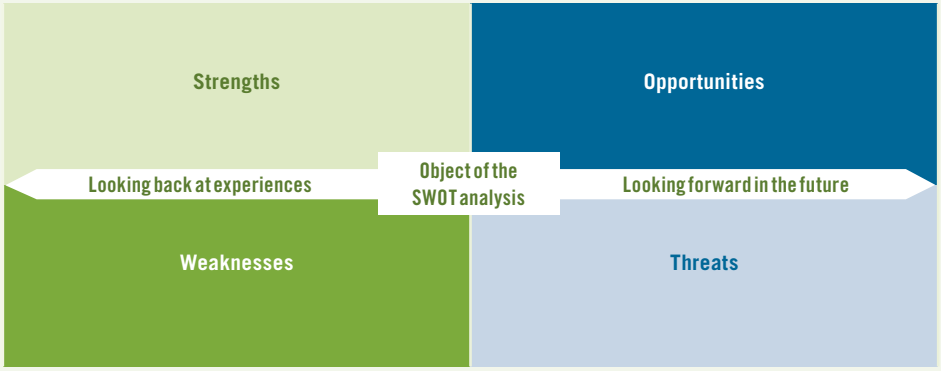
Good to know

- Focus attention on key matters.
- Undertake analysis jointly with key stakeholders during workshops.
- If more than one SWOT analysis is carried out, the results can be compiled in a table for better comparability.

Questions for the SWOT analysis

Strengths What was done well? What unique assets/resources can you draw on? What do others see as strengths? What differentiates you from others?	**Opportunities** What opportunities are open to you? What trends could be an advantage? How can strengths be transformed into opportunities? What actual changes present interesting opportunities? Which opportunities can be transformed into strengths?
Weaknesses What can be improved? Where are resources (human, institutional, financial) lacking? What are others likely to see as weaknesses?	**Threats** What obstacles do you face? What is your competition doing? What threats are the weaknesses exposed to?

Template 15 The SWOT box



Template 16 Overview of results from several SWOT analyses

Topic/theme	Strengths	Weaknesses	Opportunities	Threats	Consequences relevant to CaDRE

Source: own design

A variant of SWOT: TOWS – Strategic alternatives

If you want to develop the analysis further, you can ask the question: What are the strategic consequences of the internal and external factors identified?

Using the SWOT methodology, you can develop strategic alternatives.

1. Identify the internal and external factors that support or obstruct an organisation/team or development processes by asking the following questions:
   a) What are internal strengths and weaknesses, e. g management structure, resources, competencies, strategies and policies, structures, processes, cooperation systems, qualifications of staff?
   b) What opportunities and threats (market development, reform programmes and priorities, administrative hurdles, priorities of donors) exist in the external environment?
2. List the results in a square as shown in the TOWS *(Template 17 – Strategic alternatives)*.
3. Ask the following questions and list the answers in the respective fields:
   c) Strengths and Opportunities (SO) – how can you use your strengths to take advantage of the opportunities?
   d) Strengths and Threats (ST) – how can you take advantage of your strengths to avoid real and potential threats?
   e) Weaknesses and Opportunities (WO) – how can you use your opportunities to overcome the weaknesses you are experiencing?
   f) Weaknesses and Threats (WT) – how can you minimise your weaknesses and avoid threats?

Template 17 Strategic alternatives

	Strategic Alternatives	
	External opportunities (O) 1. List … 2. …	External threats (T) 1. List … 2. …
Internal strengths (S) 1. List … 2. …	**SO** **(Maxi-maxi strategy)**	**ST** **(Maxi-mini strategy)**
Internal weaknesses (W) 1. List … 2. …	**WO** **(Mini-maxi strategy)**	**WT** **(Mini-mini strategy)**

Sources: The Strategic Alternative method is based on *www.mindtools.com/pages/article/newSTR_89.htm* – more material can be downloaded from the *Mindtools* site.

Tool 12 – Zone of influence of organisations

Function

Knowing and considering the interests of stakeholders, their prominence and importance to the wind and/or solar energy sector, as well as their power to influence the implementation and success of strategies and processes is highly relevant to capacity development. This tool analyses the relationship between these three issues and is an important input to the stakeholder description *(see Tool 7.3 – Detailed description of selected stakeholders)*.

When to use it?

Step II – Task 11 – Detailed stakeholder description
Task 21 – Characterise the areas of balanced interventions

Who should use it?

Technical team in cooperation with the lead and external experts.

How to use it?

- Define the processes, targets and strategies you want to analyse in terms of the interests, power and importance of stakeholders.
- Choose the stakeholders to focus on.
- Assess the interests of stakeholder *(see also Tool 7.2 – Stakeholder selection for their role and interest in CaDRE)*.
  - What are the aims and interests of the stakeholder?
  - Summarise your findings using a three point scale: supportive (+1), undecided/neutral (0), opposing (-1).
- Assess each stakeholder according to power and influence:
  - How and to what extent can the stakeholder's interests be pursued (formal authority, formal voice, formal access to decision making bodies, financial resources, informal networks/alliances)?
  - Summarise your finding using a three point scale: high (3), medium (2), low (1).
- Assess stakeholders according to the importance they accord to the development goal:
  - How strongly is the stakeholder engaged in driving the reforms?
  - Summarise you findings using a three point scale: high (3), medium (2), low (1).
- Summarise the stakeholder's score for power, influence and importance *(Template 18)*.
- Display your findings by placing stakeholders in the zone of influence *(Template 19)*.

What information is needed and/or what are the possible information sources?

Detailed information about the stakeholders from experts, interviews and also institutions which have experience of their performance.

Good to know

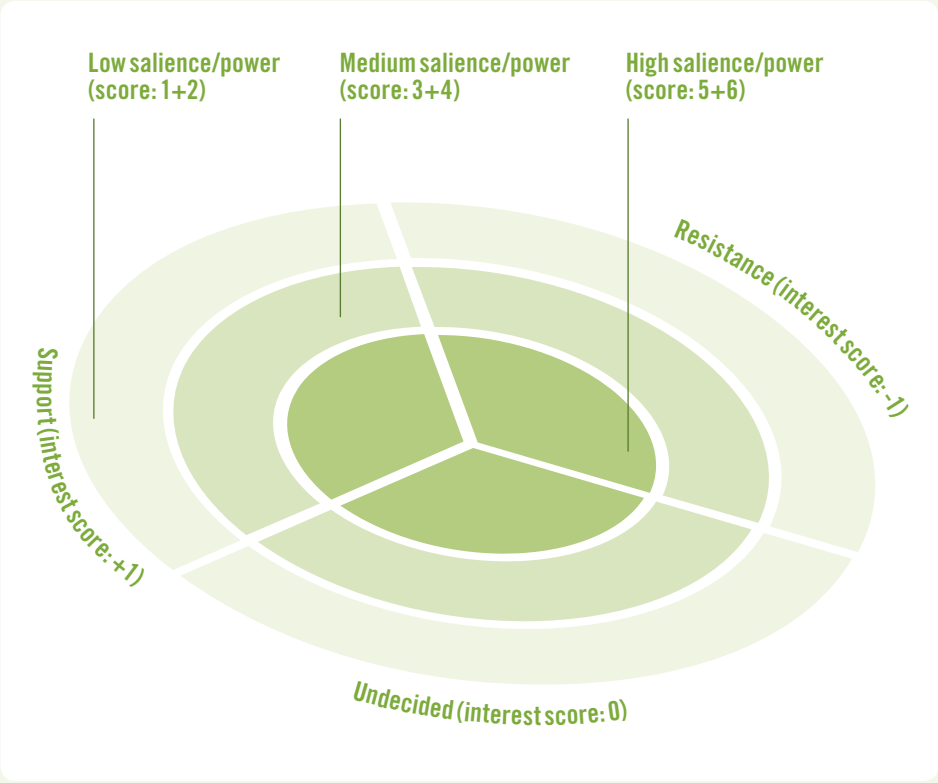
- Work out the zone of influence by analysing budgets/strategies, key political processes and through guided interviews.
- Focus on key stakeholders.
- Focus on facts and figures rather than anecdotal evidence.
- Be aware that you are just creating a snapshot.

Template 18 Zone of influence data table

Stakeholder	Interests pursued		Power & prominence				
			Power to influence		Importance/prominence		Total score
	Comment	Score (+1, 0, -1)	Comment	Score (1-3)	Comment	Score (1-3)	

Source: customised version of EuropeAid, 2009

Template 19 Zone of influence in visual format



Source: customised version of EuropeAid, 2009

Tool 13 – Interview

Function

One of the most effective ways to collect information and data from relevant stakeholders and experts is through interviews. This guideline gives suggestions for preparing and conducting interviews. It also provides a template for recording interviews in a structured way in order to facilitate their analysis.

When to use it?

Step II - Task 14 - Preparation and completion of interviews
Task 18 - Analysis of interviews, documents and surveys

Who should use it?

Technical team.

How to use it?

- Prepare each interview considering the level and function of the interviewee as well as the type of organisation he/she works in.
- Prepare an introductory statement that explains why the interview is important, the CaDRE aims and how it could benefit the interviewee and/or his/her organisation.
- Test the interview at least once with colleagues.
- During the interview, do not insist on your prepared questions but focus instead on getting the information you need.
- Distinguish between formal messages and personal views of the interviewee.
- Make a record of the interview as soon as possible in an interview report (*Template 20*). You can make records of similar interviews in one template if the areas and/or the organisation are the same.

What information is needed and/or what are the possible information sources?

A collection of key questions is in *Tool 25 - Compilation of key questions for CaDRE*.

Good to know

- Clarify upfront whether there is a need for professional translation services with interviewees.
- The assignment of two people is recommended, one to interview and the other to take notes.
- A digital recording of the interview is a possibility but the disadvantage of this is that the interviewee will probably withhold informal information. It is essential to agree to record the interview before it starts.
- Try to keep to the time that was agreed (between one and two hours). Important information is often unearthed within the last few informal minutes.
- In some cases, it may be useful to allow the interviewee to check the interview report.
- Do not hesitate to ask if you do not understand terms, names or places.
- Write a thank you letter after the interview.

Template 20 Interview document

(Not all topics provided below are relevant to all interviews – they depend on the specific aim of the information required – *see Tool 2 – Fact finding sheet*)

CaDRE interview report	
Date of interview	
Name of organisation	
Location	
Conducted by rapporteur	
Interviewee status and title contact data	

Basic information		
	Main information about the existing conditions and status	Problems, needs, deficits, perspectives
Mandate		
What is the product/output		
Organisational structure		
Management structure		
Infrastructure		
Staff hierarchy and numbers		
Business perspectives (opportunities, constraints)		
…		

1) System: policy, legal framework		
	Main information about the existing conditions and status	Needs, deficits, perspectives
Political and legal conditions		
Connections to other organisations - dependencies - clients - organisations reporting to them - customers		
External relationships and cooperation		
Association memberships		
Who is in charge?		
History of organisation		
…		

2) Organisation: organisational capacities		
	Main information about the existing conditions and status	Needs, deficits, perspectives
Formal and informal organisational structures (including management and administration) and cultures		
Work areas		
Internal processes: - budgeting - production and value chains - training - quality control		
Staff hierarchy, organograms		
Monitoring system		
…		

3) Individual: Human resources – staff profile		
	Main information about the existing conditions and status	Needs, deficits, perspectives
How many and at what which level? 0(engineers, assistant engineers, skilled and unskilled)		
Managerial competencies		
Technical competencies		
Administrative competencies		
Interpersonal skills: communication – teamwork – conflict management		
Staff training		
…		

Documents collected	Source, file name
Title and brief description ……	

Information still required	Potential sources

Ideas arising from the interview	

Source: own design

Tool 14 – Questionnaire

Function

Questionnaires are one of the cheapest and most practical ways of gathering information for research, market surveys and opinions. Questionnaires have to be well prepared as far as the target group, type of questions and the question design is concerned.

When to use it?

Step II – Task 15 – Preparation and operation of surveys

Task 18 – Analysis of interviews, documents and surveys

Who should use it?

Technical team.

How to use it?

- Prepare the questionnaire(s) and define (*Checklist 8*):
  - Get the objectives clear: What is the main purpose of your questionnaire? What do you want to know and why?
  - Target group: who do you want answers from? How many questionnaires are you planning to distribute?
  - Draft a set of questions. These could include multiple choice questions, questions with just a yes/no answer, rank scales or open ended questions.
  - See also *Checklist 8* containing hints on good questions.
  - Define a key for questions that use ranking systems, such as 5- excellent, 4- good, 3- average, 2- poor, 1- very poor.
  - Take into account that open ended questions are difficult to evaluate when large numbers of questionnaires are involved. On the other hand, scored questions can easily be evaluated using spreadsheet software.
- Test the questionnaire on a test group similar to your target groups in terms of position and education. Check whether the questions are easy to understand and whether the answers given by the people tested provide the desired information.
- Revise the questionnaire if necessary.
- Conduct the survey using the questionnaire.
- Analyse data.

What information is needed and/or what are the possible information sources?

A collection of key questions is provided in *Tool 25 – Compilation of key questions for CaDRE*.

Good to know

- Depending on the aims of the survey, the questionnaires should be anonymous. For larger surveys with questions about non-technical, more opinion-based issues, anonymous surveys are usually preferable, as respondents feel free to answer honestly without being identified.
- Be careful: Try to avoid free text options, as they will usually result in a low response rate. For technical questionnaires to experts, open ended options are normally necessary because longer explanations are required.

References and further reading:

- Survey design tutorial: *www.statpac.com/surveys*.
  This tutorial will teach you how to design a survey: the latest survey research techniques, what works and what does not and how to design a questionnaire.
- Sample questionnaire: *www.samplequestionnaire.com*.

Checklist 8 Characteristics of good questions

Use simple language	- Questions should be framed in a simple language and grammatical and spelling mistakes should be avoided.
Use direct questions	- Questions should be clear and must convey the same meaning to all kinds of readers. It is therefore best to use direct questions rather than ambiguous ones.
Questions must not contain sensitive items or statements	- Anonymous questionnaires are more likely to produce honest responses than those where the respondent can be identified. - If your questionnaire does contain sensitive items, be sure to clearly state the policy on confidentiality. - The questions should be formulated in a positive way.
Ask for an answer using only one dimension	- A question that asks for a response based on more than one dimension may not provide the information you are seeking. For example: *Do you know the VAT and import tax exemptions for renewable energy technology?* If the answer is *no*, you will not be able to tell whether the respondent does not know VAT, import tax exemptions, or both.
Accommodate all possible answers	- Multiple choice is the most popular type of survey question. Multiple choice questions are generally the easiest to answer and analyse. Asking a question that does not accommodate all possible responses can confuse and frustrate the respondent. One way to correct this problem is to add an open-ended option like *other* and include a comment option for that particular answer.
Mutually exclusive options	- A good question leaves no ambiguity in the respondent's mind. There should be only one correct or appropriate choice for the respondent to make.
Group similar questions	- Grouping questions that are similar will make the questionnaire easier to complete. Questionnaires that jump from one unrelated topic to another feel disjointed and are not likely to produce high response rates.
Do not make assumptions	- Questions that make an unwarranted assumption are among the most subtle errors in questionnaire design. Write the questions so they apply to everyone in the target group.
Do not imply a desired answer	- The wording of a question is extremely important. We are striving for objectivity in our surveys and must therefore be careful not to lead the respondent into giving the answer we would like to receive. Leading questions are usually easily spotted because they use negative phraseology.
Do not use emotionally loaded or vaguely defined words	- Quantifying adjectives (most, least, majority) are frequently used in questions. It is important to understand that these adjectives mean different things to different people.
Do not use unfamiliar words or abbreviations	- Do not use uncommon words or compound sentences. Write short sentences. Abbreviations should only be used if you are absolutely certain that every single respondent will understand their meanings. If there is any doubt at all, do not use the abbreviation.
Do not ask the respondent to rank a series of more than five items	- Questions asking respondents to rank items by importance should be avoided. This becomes increasingly difficult as the number of items increases, so that the answers become less reliable. This is especially problematic when asking respondents to assign a percentage to a series of items. In order to successfully complete this task, respondents must mentally continue to readjust their answers until they amount to 100%. Limiting the number of items to five will make it easier for the respondent to answer.

Source: customised selection from *David S. Walonick,* 1997 – 2010

Tool 15 – Performance analysis

Function

This is a method for analysing the performance of target groups* in relation to tasks** they are responsible for. Experts will be asked to provide scores on the targeted and actual performance.

The results of the analysis show the ability of selected target groups to carry out tasks, as well as their level of performance.

The difference between actual performance and required performance (the capacity gap) is depicted in two graphs and charts (see examples):

- The first graph and chart show how well or badly tasks are being completed (compliance). In other words, the tasks for which there is a capacity gap and its size.
- The second graph and chart show how well or badly a target group is carrying out its tasks (target group performance). In other words, the target groups which have a capacity gap.

* Target groups can be individuals, organisational units, working groups, institutions and task forces.

** Tasks, functions and/or responsibilities can include all work assignments, such as planning, management, goal setting, coordination, supervision, development, production, installation, writing and training.

When to use it?

Step II - Task 16 - Performance analysis

Task 19 - Extracting existing and lacking capacities

Who should use it?

Technical team and technical or management experts.

How to use it?

- Choose the target groups that have functions in the core area. For example: All stakeholders involved in national and provincial energy supply planning, like the ministry of energy, national budget commission, department of renewable energy, finance ministry, climate change department at the environment ministry, provincial planning board, local authority, provincial energy working group, consultancy firm for baseline studies, international cooperation partners, utilities and engineering college.
- Describe the applications and processes in the core area they are responsible for. For example, providing national guidelines for renewable energy, following plan approval procedures, coordinating the planning process, advisory service planning, preparing plan documents and training energy planners.
- Identify experts that have an overview of the core area and target groups e.g. a national renewable energy planner for the planning system and related institutions. Alternatively, the head of an institution for the performance of the department.
- Send a performance analysis matrix to the experts.
- When the completed matrices have been returned, transfer the data to the spreadsheet table provided. The graphs and bar charts containing the results will be automatically generated.
- Use the results for further steps *(Modules 2.3 and 2.4).*

The spreadsheet for the analysis can be downloaded at *www.hrdp-esra.org/analysis_tools_for_cadre.*

What information is needed and/or what are the possible information sources?

The core areas and applications/processes come from the Target Model.

Good to know

- Some experts may need help to fill-in the matrix.
- The results are an estimate. The more experts are involved, the more robust the results.
- This is a simple and straightforward method for analysing performance and does not have any statistical significance. It is purely descriptive and not suited to mathematically-minded experts.

Description of method and result

A performance analysis is based on an assessment of the performance of different target groups as far as their functions/tasks/responsibilities are concerned. These relate to the applications and processes of a core area. The analysis compares the actual performance with the targeted performance.

1. Data collection:

a) Experts assess the current and desired/necessary performance using scores between 0 (bottom score) and 3 (top score) and write the scores in a prepared matrix *(see Matrix 1 – Generic matrix for scoring)*.

b) The analysis uses a scoring table, showing required tasks/responsibilities in the rows and target groups (such as institutions, working units, individuals etc.) in the columns. If matrices are available from several experts, their estimates are added up and normalised to produce an overall picture.

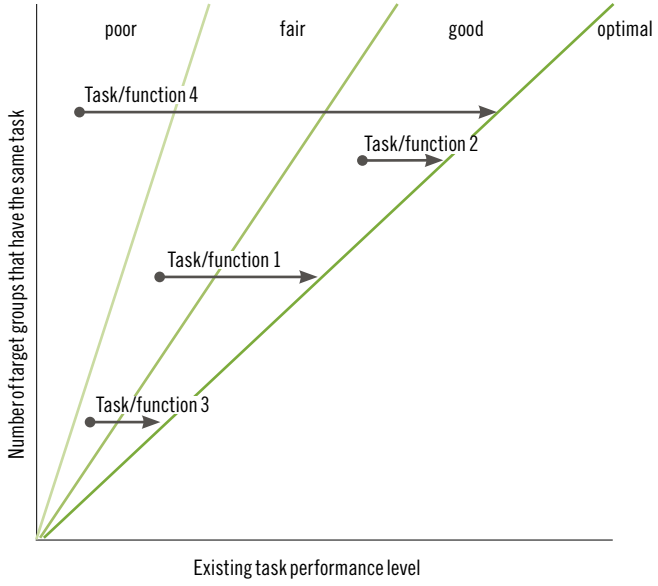
Matrix 1 Generic matrix for scoring

Tasks and/or functions for *name of area of concern*	Matrix for scoring						
	actual score	target score	actual score	target score	actual score	target score	Row total institutional competence
Task or function 1	x	y	x	y			∑
Task or function 2	x	y	x	y			∑
Task or function 3	x	Y	x	y			∑
etc.	x	y	x	y			∑
Column total (tasks and performance)	∑	∑	∑	∑	∑	∑	
Units (individuals, institutions, organisation units, etc.)	Unit 1		Unit 2		etc.		

2. Data processing and results:
The data is processed automatically, producing two graphs and two bar charts.

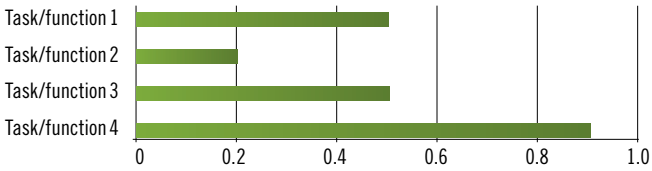
a) The first graph shows **the tasks** and answers the question **how well are the tasks accomplished by the target groups**: it plots the row sum *actual* against row sum *target (see Figure 2)*. In this graph the *x-axis is the performance level of the target groups with respect to tasks.*
The capacity gap can be measured by the distance from the point to the diagonal line: if the task is located close to the y axis, this task is poorly done (the capacity gap in fulfilling the task is big), if the task is done well it is placed near the diagonal line. Points located on the diagonal line mean that all the scores for the actual performance are the same as the scores for the target. The *y-axis represents the number of target groups that have the same task.* Tasks with a high value have to be done by many of the selected target groups.
Figure 2 shows an example with four labelled tasks/functions and the capacity gap with arrows.

Figure 2 Task and performance



In the first chart, the distance from each point to the diagonal line (the gap) is normalised and plotted for each task *(see Figure 3)*. The closer the bar reaches 1 the larger is the capacity gap. This means the task needs special attention when planning capacity development measures.

Figure 3 The capacity gap for tasks (the larger the value, the higher the need for capacity development)



b) The second graph shows which target group is fulfilling their tasks and how well. In other words, which target group has a capacity gap. It answers the question *how good are the target groups in accomplishing the tasks*: It plots the column sum *actual* against column sum *target (see Figure 4)*.

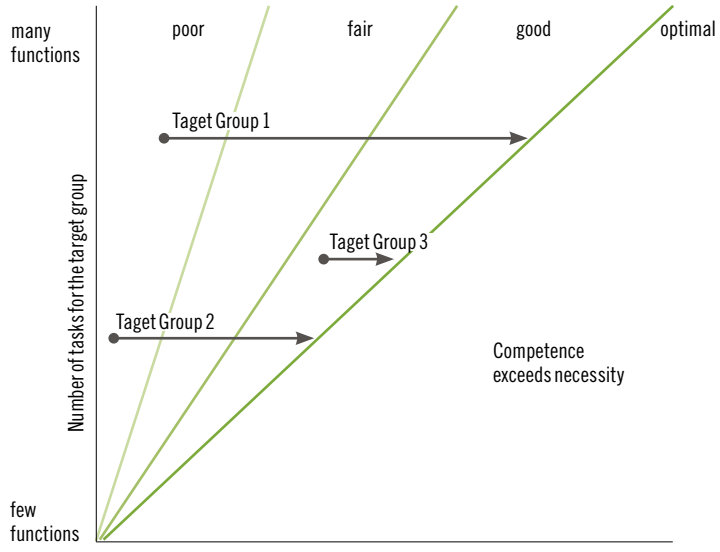
The *x-axis is the performance level of target groups.* The capacity gap (expressed as competence level) can be measured by the distance of the point to the diagonal line. If the target group is close to the y-axis, the competence level is low and the capacity gap is large, if the task is done well it is located near the diagonal line.

When points are right on the diagonal line it means that all the scores for actual performance are the same as the scores for the target.

The *y-axis shows how many tasks are to be done by the target group.* Target groups with a high value have many of the selected tasks.

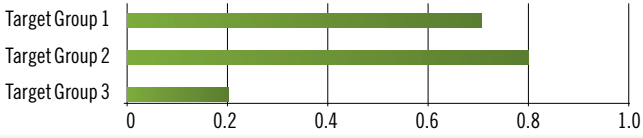
Figure 4 shows an example with three labelled target groups and the capacity gap indicated using arrows.

Figure 4 Target groups and performance



In the second chart, the distance of each point to the diagonal line (the gap) is normalised and plotted for each target group (*see Figure 5*). The closer the bar reaches 1 the larger the capacity gap. This means that the target group needs special attention when capacity development measures are planned.

Figure 5 The capacity gap of target groups (the higher the value, the higher the need



Source: own design

Reference and further reading: *Bemmerlein-Lux et al.,* 2011

Tool 16 – Modelling future employment

Function

This tool underpins the quantitative analysis of employment impacts of renewable energy expansion in a particular country using input-output (I/O) modelling. It is especially suitable for countries which have some industrial structure, but might be not applicable to some developing countries, mainly due to the lack of appropriate data. Models of future employment provide estimates of green job generation in the short to medium term and can thus significantly support the decision-making processes of policy makers, experts and consultants.

The approach can be incorporated into wider economic modelling exercises e.g. to match the employment analysis of renewable energy expansion with other labour market policies. But it also provides useful information as a stand alone tool.

The resulting models should answer the following questions:

- How much employment will be generated down the economic value chain?
- How do imported and domestic capacities influence employment?
- How can domestic integration down the value chain influence employment?

The accuracy of tools to calculate employment impacts largely depends on the precise inclusion of the right data.

When to use it?

Step II – Task 17 – Collection and completion of special research studies

Who should use it?

Technical team, policy consultant, economist, expert, advisor, researcher.

How to use the employment factor modelling?

See more detailed description in the Method – Modelling future employment using employment factors.

- Check data availability for the respective country
- discuss opportunities for industrial production with domestic experts
- set assumptions for domestic production and imports
- set assumptions for export
- construct employment factors
- do the calculation
  - determine the activity values and the appropriate employment factor
  - calculate employment.

What information is needed and/or what are the possible information sources?

Data collection is labour-intensive; input structure and data on renewable energy investments are necessary.

Good to know

- The work requires specialist knowledge of economics. Some modelling expertise is required. It could be an advance element in a capacity building measure.
- Data mining is substantial; cooperation with local statistical bureaus is advisable.
- The results can be used by the following:
  - Organisations and companies: projections of future demand for certain competencies play an important role for planning, restructuring, expanding, contracting etc. one's own work processes (*see Tool 18 – Selection of work processes relevant for the performance of an organisation*, *Tool 19 – Individual competence profile* **and** *Tool 20 – Individual competence matrix*).
  - Start-ups: Investors looking for new opportunities might decide to start a business to offer solar and wind energy related products and services, based on employment projections. Likewise, other types of new organisations emerge.
  - Academia: Universities and training institutions can use the projections to expand and tailor their curriculum to solar and wind energy.

Method: Modelling future employment using employment factors (Slightly customised text from *Breitschopf et al.*, 2012).

The employment factor approach provides a way to estimate the level of direct employment related to the construction and use of renewable energy in a particular country. From a methodological perspective, it is a fairly straightforward approach. Its simplicity enables a quick assessment of employment relating to renewable energy or quick extrapolation for a new reference year. It does not allow the inclusion of indirect impacts.

Since physical capacity and output data is usually available, the accuracy of results depends on the accuracy of employment factors. If good data is comprehensively available, this approach requires fairly low resources. If good data is not available, resource requirements can be high. Taking exports into consideration can be difficult using the employment factor approach.

Methodology

An employment factor approach estimates the job impacts of renewable energy use by multiplying physical activity data with employment factors. The employment factor relates employment to activity data.

Construction of employment factors

The denominator of the employment factor is a physical activity parameter that depends on the activity:

- For activities in the *construction or demolition* phase of renewable energy facilities, the employment factor is usually related to the capacity additionally installed or demolished in the reference year.
- For activities in the *operational phase* of renewable energy facilities, the total installed capacity in the reference year is often used. Total electricity generation is another alternative.

The *numerator* of the employment factor is, the number of full-time equivalents, which is preferable to the number of people employed, since the former can be adequately represents individuals with varying workloads. Also possible, but less common, is the use of working hours. The unit of the numerator also depends on the kind of activity:

- Since activities in the *construction or demolition* phase are temporary, employment is measured using the unit full time equivalent (FTE) years (e.g. 0.5 full time equivalent – years per MW installed capacity).
- By contrast, activities in the *operational phase* are permanent during the operating lifetime. Therefore, they are expressed as permanent full time equivalents (e.g. five full time equivalents per MW installed capacity or per GWh power generation).

When aggregating the total employment for the reference year of the study, FTE years is the appropriate unit.

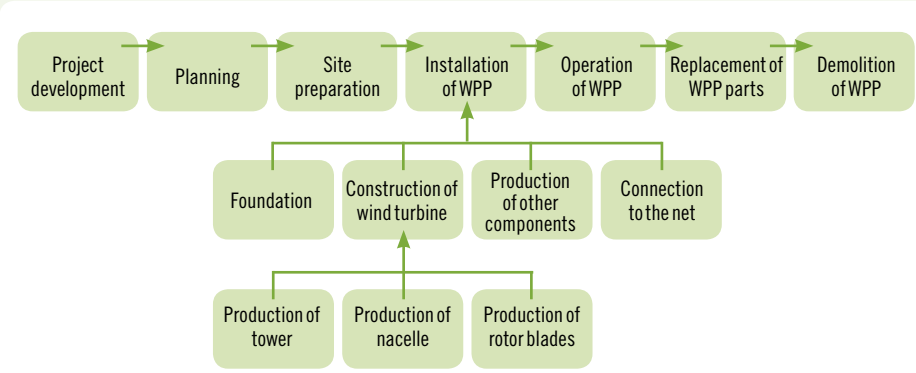
Calculation

The employment factor approach consists of the following three steps:

1. Determine the system boundaries

a) Determine the system boundaries of the wind and/or solar industry in the respective country. Specify the technologies to be analysed: all relevant technologies for generating electricity should be included. Specify, for each technology, the life cycle phases and activities to be considered in the employment analysis. All relevant activities should be included. Activities for manufacturing goods where relevant shares are imported or exported should be considered separately. The level of disaggregation depends upon the relevance of activities and data availability. Examples: the life cycle phases of construction, operation and demolition may be relevant for wind power plants. These life cycle phases can be further broken down into activities that are relevant for employment in the respective country *(see Figure 6* for an example of a wind power plant and the main activities involved).

Figure 6 Example of life cycle and supply chains of a wind power plant (WPP)



Source: *Breitschopf et al.*, 2012.

2. Determine the activity values and the appropriate employment factor

a) Determine the activity values and the appropriate employment factor for each technology and each activity.

b) Determine, for each activity, the **level of imports** into the country and **exports** out of the country.
Imports: Determine the domestic and the imported share for each activity.

c) **Exports:** Determine either the level of products intended for export or the number of jobs directly linked to the export activity. In many cases it may be easier to directly collect data about the number of jobs linked to manufacturing the exported wind turbine towers than data on the installed capacity related to the towers. Export data can be extracted from national trade statistics for selected renewable energy products, though not using the physical units (MW, GWh) in the employment factor approach.

d) Determine, for each technology and each activity, the **domestic activity** level by subtracting imports and adding exports where possible. Export-related employment can also be added directly in a later step.

3. Calculate employment

a) Calculate employment for each technology and each activity by multiplying the domestic activity level with the respective employment factor. Directly add export-related employment where necessary.

b) Aggregate the calculated employment numbers to display results e.g. by technology and life cycle phase. Make a record of the system boundaries chosen and calculation steps.

Data requirements and data sources

1. Physical activity data

The necessary activity data depends on the renewable energy technology. It may include the following for each reference year and renewable energy technology:

- Total installed capacity (by activity considered in MW).
- Net capacity addition (calculated as installed capacity in the reference year minus installed capacity in the previous year in MW).
- Capacity replacement (in MW); this may not always be identifiable from the existing statistics, but may require separate calculations and assumptions on the replacement patterns.
- Electricity generation (in MWh).

Electricity generation data is usually available in the national official renewable energy statistics. If this is not detailed enough other sources such as industry associations should be consulted. Where capacity data is not available, it may be calculated from electricity generation by assuming generic full load hours per year. Since the focus of this guideline is electricity generation, CHP plants should also be recorded including their installed electrical capacity.

2. Data related to imports and exports

Data related to imports and exports is needed for specific products generated by the renewable energy industry. Possible sources are trade statistics, data from industry associations, studies or expert opinion.

In official trade statistics, only a fraction of products related to renewable energy can be identified (e.g. hydro power turbines or wind turbines). Often, renewable energy products are merged with other products even at the most detailed level of the commodity classification (PV cells and modules are amalgamated with certain semiconductor devices). *Steenblik* 2005 and 2006 gives an overview of products covered in foreign trade statistics. In addition, trade statistics usually record the weight and monetary value of traded goods but not capacity- or energy-related units. It may therefore be difficult to merge trade data with the physical data used in the employment factor approach.

It may therefore be more useful to collect export-related job data directly from the exporting companies. The most important exporting companies will probably be known to the various industry associations.

3. Employment factors

Technology-specific employment factors can be determined using a number of sources, such as:

- a detailed analysis of the labour requirements of renewable energy technologies *(Singh et al.,* 2001), though these are rather scarce and vary by region

- cost analysis of technologies, where labour costs have been translated into the number of full-time equivalent jobs *(Peterson/Poore,* 2001)
- enterprise surveys, by relating the employment to output in physical terms (MW, GWh)
- expert opinion.

The employment factors should be specific to the technology and valid for the country and reference period under consideration. They should be assessed separately for the various life cycle phases and activities. Ideally, the employment factors would be available for each activity included in the renewable energy industry system boundaries. Employment factors should be available at a level of detail that enables imports and exports of renewable energy-related products to be taken adequately into account. For the employment impact of PV systems, for instance, it is important to establish which share of the PV modules installed is supplied by domestic companies, and which share is imported. Therefore the level of detail of the employment factors needs to reflect the import and export ratios in the renewable energy industry.

The following table gives an overview of the data requirements needed for each renewable energy technology per activity in the technology life cycle:

Table 4 Data requirements

Data	Unit	Sources	Remarks
Capacity data: - total installed capacity (year t and t-1) - capacity replacement.	MW	- Official statistics offices (IRENA, IEA, national statistical offices) - other renewable energy-related sources.	For each technology.
Energy output data: - total output - full load hours.	MWh	- Official statistics - other renewable energy-related sources.	For each technology.
Export and import data.	Various units that need to be converted into MW/MWh	- Official trade statistics (UN Comtrade) - *Steenblik* 2005 and 2006: overview of products covered in foreign trade statistics - technical literature, market intelligence, enterprise data.	For each technology and renewable energy product. Official statistics cover only fractions of traded renewable energy-related products. Often renewable energy products are merged with other products in one trade group.
Employment factors.	- Full time equivalent. (FTE) (years)/MW - FTE (years)/MWh.	- Labour requirement analysis - technology cost analysis - enterprise surveys - expert judgement.	For each technology and activity It is necessary to take import and export of renewable energy products into account.

Discussion

The employment factor approach has the potential advantage of being very accurate and technology-specific. The employment factors can be based on data from actual renewable energy facilities or feasibility studies or from enterprises in the renewable energy industry. Technical studies to generate the employment factors may consume a great deal of resources. The use of the approach is straightforward once the employment factors have been determined. What is more, the personal and financial resources needed to do such an assessment are not very large if the appropriate employment factors are available. Monitoring the renewable energy industry or extrapolating results is easy to do.

Unfortunately, only a few basic data sources are used to generate job factors, while the job factors for the same technologies vary greatly between the sources (up to a factor of four). In many cases, the generation of employment factors is poorly documented. This means definitions, as well as the system boundaries of technologies, are not always transparent. Improved documentation would also make it easier to apply employment factors to other reference years or countries.

There are other limitations, such as:

- The level of renewable energy technology exports (measured as installed capacity) needs to be covered from other sources market intelligence, company surveys or expert opinion.
- Indirect and induced impacts cannot be covered using this approach.

Tool 17 – Rules of the game

Function

This tool helps better explain the context, rules and practices that influences organisations. The results are used to complete the picture of stakeholders *(see Tool 7.3 – Detailed description of selected stakeholders)* and structures in the framework of capacity development. The tool contributes to:

- Gaining a deeper understanding of the context or fundamental issues in a society or country. These can influence the design, acceptance and enforcement of the existing as well as potential rules and practices. These factors can provide or limit the amount of room for manoeuvre for capacity development. They can also legitimise strategies and changes by embedding them into national and/or local traditions and a national historical context.
- Completing the picture of stakeholders and structural factors as basis for analysis of the causal links between them. This helps explain why capacity development is taking place or not.

When to use it?

Step II – Task 19 – Extracting existing and lacking capacities

Who should use It?

Technical team
(could be the subject of a special research study).

How to use it?

The contextual factors that influence the institutional arrangement can be analysed along the following lines:

- Legacy: history of how the state was formed, trajectory, defining moments in national history etc.
- Policy and politics: political system, legal norms, legitimacy, political landscape, political culture, armed conflict, democratisation, improvements to freedom of speech etc.
- Economic structure, including job markets, degree of regulation, growth dynamics.
- Society and demographics: social structure, demographic changes, degree of urbanisation (rise of a white collar middle class, rise of radical ideologies, caste systems and ghettos).
- Cultural traditions and values, position of religion in society.
- Geography and resource endowment: geopolitical location, landlocked, resource-rich, increased water scarcity due to climate change, regional spillover due to fragility in neighbouring countries etc.
- The prevailing type of governance mechanism (e.g. traditional, hierarchical, market oriented or network based).

- Other aspects like education, research and development, state of technology, media, finance, donor relationships etc.

What information is needed and/or what are the possible information sources?

Literature review and interviews with stakeholders.

Good to know

- This step of the diagnostics can appear overwhelming and it is important to stay practical and focus exclusively on information relevant to the solar and/or wind energy sector, as well as on brief descriptions in background information necessary to understand the context *(see Guiding questions)*.
- The analysis should focus on those factors that play a particularly important and significant role for the organisations that shape the development of the wind and/or solar energy sector.

Analysis of the structures that influence the rules of the game

The individual stakeholders and existing as well as potential rules and practices are influenced by a country's social, economic and political system. Structural factors such as history of state formation, natural and human resources, economic and social structures often influence the design, acceptance and enforcement of certain rules and practices and the individuals acting within them. Other than the rules of the game, structural features tend to change slowly, as they are deeply rooted. Changing these features is often beyond the control of stakeholders. The influences between stakeholders, institutions and structures work in both directions.

Guiding questions

In order to analyse the structures, the following key questions should guide the process:

- What are the structural features of the country and society that have the most significant influence on the shape of institutions?
- What defining moments in the history of energy production, power supply and the use of renewable energy influence present day energy policy decisions?
- How has the state's history shaped the energy supply sector, energy market and the development of renewable energy technologies?
- What is the predominant governance mechanism e.g. for decision-making in the energy and market sector, planning and approval system, control and accountability processes and import export regulations for technology?
- What role has the informal economy (including corruption) on energy markets (planning, construction, operation, research and development) and supply chains?

Source: customised version GTZ, 2010
For the conceptual basis of the relationship between structural features, institutions and agents *see Duncan et al.,* 2003

Tool 18 – Selection of work processes relevant for the performance of an organisation

Function

Any organisation has work processes which deliver according to their mandate and responsibilities. This tool underpins the assessment of existing capacities and the identification of capacities needed at organisational level in relation to the work processes and their importance. The result of the calculation helps identify those work processes for which an in depth individual capacity needs diagnostics is advisable. The tool should be used in conjunction with *Tool 19 - Individual competence profile* ***and*** *Tool 20 - Individual competence matrix*.

When to use it?

Step II - Task 19 - Extracting existing and lacking capacities

Who should use it?

Technical team, together with a manager from the organisation/enterprise.

How to use it?

- Identify the managers of the target organisation e.g. those responsible for human resources, day-to-day operations, strategic planning and budgets. They have a good overview of work processes and can identify their relevance and weaknesses.
- Specify and list the work processes of the organisation/institution or enterprise for each question in *Template 21 - Selection of key work processes for wind and solar energy sector of an enterprise or an organisation* one in a row for each question.
- Score the work processes according to the evaluation criteria (0= does not apply, 1= partially applies, 2= largely applies, 3= fully applies). Use a negative formulation for statements related to performance and positive formulations related to relevance.
- Calculate the frequency of each score for each of the work processes *(Template 22)*.
- Calculate the weighted sum of scores *(Template 23)*.
- We suggest the further consideration of those work processes that have a weighted sum of scores greater than one third of the maximum weighted sum (if you have seven questions, the highest weighted sum is 3 x 7 = 21). These work processes are highly important to the performance of the organisations and should be highlighted when working out individual competence profiles *(Tool 19)*.

What information is needed and/or what are the possible information sources?

Detailed knowledge of the organisation, work processes and the human resources that work in the organisation/enterprise.

Good to know

Focus on key organisations.

Template 21 Selection of key work processes for wind and solar energy sector of an enterprise or an organisation (example)

Name of organisation: Example: *for a department of solar energy or the ministry of energy*	
List the main work processes relating to output at the organisation/institution or enterprise; one per row in all the question fields.	
(0 = does not apply, 1 = partially applies, 2 = largely applies, 3 = fully applies)	**Score**
1. The work processes are of high importance in relation to wind and solar energy production.	
Prepare a national strategy for solar energy supply.	2
Compile an atlas of national solar radiation potential.	2
Design regulations for a feed-in tariff for solar power.	3
Prepare the annual budget proposal .	1
Supervise provincial departments.	2
Office management.	3
2. The work processes are unproductive.	
Prepare a national strategy for solar energy supply.	2
Compile an atlas of national solar radiation potential.	1
Design regulations for a feed-in tariff for solar power.	3
Prepare the annual budget proposal.	1
Supervise provincial departments.	2
Office management.	3
3. The work processes will be important for future output and/or services if the wind and/or solar sector market becomes more relevant.	
Prepare a national strategy for solar energy supply.	3
Compile an atlas of national solar radiation potential.	3
Design regulations for a feed-in tariff for solar power.	1
Prepare the annual budget proposal.	1
Supervise provincial departments.	1
Office management.	3
4. There is a lack of qualified staff/employees in the work processes.	
Prepare a national strategy for solar energy supply.	1
Compile an atlas of national solar radiation potential.	3
Design regulations for a feed-in tariff for the solar power.	1
Prepare the annual budget proposal.	1
Supervise provincial departments.	1
Office management.	3

Name of organisation: Example: *for a department of solar energy or the ministry of energy*	
List the main work processes relating to output at the organisation/institution or enterprise; one per row in all the question fields.	
(0 = does not apply, 1 = partially applies, 2 = largely applies, 3 = fully applies)	**Score**
5. Employees do not carry out these work processes competently.	
Prepare a national strategy for solar energy supply.	2
Compile an atlas of national solar radiation potential.	1
Design regulations for a feed-in tariff for solar power.	1
Prepare the annual budget proposal.	2
Supervise provincial departments.	3
Office management.	3
6. The work processes experience recruitment difficulties.	
Prepare a national strategy for solar energy supply.	3
Compile an atlas of national solar radiation potential.	3
Design regulations for a feed-in tariff for solar power.	2
Prepare the annual budget proposal.	2
Supervise provincial departments.	0
Office management.	3
7. Employee retirements in the next five to ten years will affect the work processes.	
Prepare a national strategy for solar energy supply.	3
Compile an atlas of national solar radiation potential.	1
Design regulations for a feed-in tariff for solar power.	2
Prepare the annual budget proposal.	1
Supervise provincial departments.	1
Office management.	3

Template 22 Frequency matrix (example)

Work processes	Frequency of scores for the questions from *Template 21 Selection of key work processes for wind and solar energy sector of an enterprise or an organisation (example)*			
	0	1	2	3
Prepare a national strategy for solar energy supply.	0	1	3	3
Compile an atlas of national solar radiation potential.	0	3	1	3
Design regulations for a feed-in tariff for solar power.	0	3	2	2
Prepare the annual budget proposal.	0	5	2	0
Supervise provincial departments.	1	3	1	2
Office management.	0	0	0	7

Template 23 Weighted frequencies of scores (example)

Work processes	Weighted frequencies of scores (use the frequencies from *Template 22)*			Weighted sum of scores*
	Total 1	Total 2	Total 3	
Prepare a national strategy for solar energy supply.	1	6	9	16
Compile an atlas of national solar radiation potential.	3	2	9	14
Design regulations for a feed-in tariff for solar power.	3	4	6	13
Prepare the annual budget proposal.	5	4	0	9
Supervise provincial departments.	3	2	6	11
Office management.	0	0	21	21

* Maximum weighted sum of scores is three times the number of questions (in the example 7 x 3 = 21).

Source: own design

Tool 19 – Individual competence profile

Function

The individual competence profile helps to define the competencies required within an organisation to be able to be successful in selected work fields *(see Tool 18 – Selection of work processes relevant for the performance of an organisation)*. Detailed staff profile descriptions are created for each work area and its corresponding tasks, including required knowledge and skills.
The tool should be used in conjunction with *Tool 20 – Individual competence matrix*.

When to use it?

Step II – Task 19 – Extracting existing and lacking capacities

Who should use it?

Technical team, together with a manager from the organisation/enterprise.

How to use it?

- Identify the competence (knowledge, skills, behaviour) requirements for each work process *(Tool 18)*, together with the responsible manager of the organisation/enterprise.
- For each selected work field, fill in one table *(Template 24 – Individual competence profile)*.
- Fill in the required competencies by asking the following questions:
  - What **knowledge** must staff have to fulfil the core task of the respective work fields?
  - What **skills** must staff have to fulfil the core task of the respective work fields?
  - What traits must staff have to fulfil the task of the respective work fields?
  - What overarching knowledge, skills and/or traits must staff have of the respective work fields have?

For examples, *see Checklist 9 – Examples of general competencies*.

What information is needed and/or what are the possible information sources?

Detailed knowledge of the work fields and the tasks required to supply the required output.

Good to know

Tool 25 – Compilation of key questions for CaDRE, *Checklist 10 – Professions for solar and wind power* lists professions required for the wind and the solar energy sector.

Template 24 Individual competence profile

Basic data				
Name of organisation: ……..		**Selected work field:** Example: *GIS section to compile the information for the atlas and produce the maps*		
Competence profile				
	Competence requirements for specific tasks in the work fields under consideration.			
	Required competence for task A: *example:* *map production.*	**Required competence for task B:** *example:* *compilation and control of data for the atlas.*	***Include more required tasks if necessary.***	**Overarching competencies.**
Knowledge	- Principles of database handling - spatial requirements for siting solar systems.	- Quality criteria for required data on solar radiation - etc.		
Skills	- Technical competence in handling the GIS system.	- Database management.		
Awareness/ behaviour	- Teamwork.	- Teamwork.		

Source: own design

Checklist 9 Examples of general competencies

General knowledge and skills

- **Change management** – understands the impact of change; knowledge of change management principles, strategies and techniques required for effectively planning, implementing, and evaluating change in the organisation.
- **Customer service** – works with clients and customers to assess their needs, provide information or assistance, resolve their problems, or satisfy their expectations; knows about available products and services; is committed to providing quality products and services.
- **Decision making** – makes sound, well-informed and objective decisions; perceives the impact and implications of decisions; commits to action, even in uncertain situations, in order to accomplish organisational goals; causes change.
- **Influencing/negotiating** – persuades others to accept recommendations, cooperate or change their behaviour; works with others towards an agreement; negotiates to find mutually acceptable solutions.
- **Information management** – identifies a need for and knows where or how to gather information; organises and maintains information or information management systems.
- **Legal, government and jurisprudence** – knows laws, legal codes, court procedures, precedents, legal practices and documents, government regulations, executive orders, agency rules, government organisation and functions and the democratic political process.
- **Oral communication** – expresses information to individuals or groups effectively, taking into account the audience and nature of the information; makes clear and convincing oral presentations; listens to others, attends to nonverbal cues and responds appropriately.
- **Organisational awareness** – knows the organisation's mission and functions and how its social, political, and technological systems work, and operates effectively within them; this includes the programmes, policies, procedures, rules and regulations of the organisation.
- **Planning and evaluating** – organises work, sets priorities and assesses resource requirements; works out the short- or long-term goals and strategies needed to fulfil them; coordinates with other organisations or parts of the organisation to accomplish goals; monitors progress and evaluates outcomes.
- **Problem solving** – identifies problems; determines accuracy and relevance of information; uses sound judgment to generate and evaluate alternatives and to make recommendations.
- **Project management** – knows the principles, methods, or tools for developing, scheduling, coordinating and managing projects and resources, including monitoring and inspecting costs, work, and contractor performance.
- **Reading** – understands and interprets written material, including technical material, rules, regulations, instructions, reports, charts, graphs or tables; applies what is learned from written material to specific situations.
- **Reasoning** – identifies rules, principles or relationships that explain facts, data or other information; analyses information and makes correct inferences or draws accurate conclusions.
- **Technical competence** – uses knowledge acquired through formal training or extensive on-the-job experience to perform job; works with, understands and evaluates technical information related to the job; advises others on technical issues.
- **Writing** – recognises or uses correct grammar, punctuation and spelling; communicates information (for example, facts, ideas, or messages) in a succinct and organised manner; produces written information, which may include technical material that is appropriate for the intended audience.

General behaviour

- **Attention to detail** – is thorough when performing work and conscientious about attention to detail.
- **Creative thinking** – uses imagination to develop new insights into situations and applies innovative solutions to problems; designs new methods where established methods and procedures are inapplicable or are unavailable.
- **Flexibility** – is open to change and new information; adapts behaviour or work methods in response to new information, changing conditions, or unexpected obstacles; effectively deals with ambiguity.
- **Integrity/honesty** – contributes to maintaining the integrity of the organisation; displays high standards of ethical conduct and understands the impact of violating these standards on an organisation, oneself and others; is trustworthy.
- **Interpersonal skills** – shows understanding, friendliness, courtesy, tact, empathy, concern and politeness to others; develops and maintains effective relationships with others; may include effectively dealing with individuals who are difficult, hostile or distressed; relates well to people from varied backgrounds and different situations; is sensitive to cultural diversity, race, gender, disabilities and other individual differences.
- **Self-management** – sets well defined and realistic personal goals; displays a high level of initiative, effort and commitment towards completing assignments on time; works with minimal supervision; is motivated to achieve; demonstrates responsible behaviour.
- **Stress tolerance** – deals calmly and effectively with high stress situations (for example tight deadlines, hostile individuals, emergency situations, dangerous situations).
- **Teamwork** – encourages and facilitates cooperation, pride, trust and group identity; fosters commitment and team spirit; works with others to achieve goals.

Source: customised version GTZ, 2010

Tool 20 – Individual competence matrix

Function

The individual competence matrix can be used to make an overview of the **existing** competencies required to execute one or more specific tasks within an organisation. The results can then be evaluated by comparing the existing competencies with the **required** competencies, which have been previously identified and defined *(see results of Tool 19 – Individual competence profile)*. The comparison will reveal the capacity gaps of the organisation (missing competence profiles) and of individuals (training needs, recruiting needs etc. to improve their own competence areas).

When to use it?

Step II – Task 19 – Extracting existing and lacking capacities

Who should use it?

Technical team together with a manager from the organisation/enterprise.

How to use it?

- Prepare a list of all competency profiles specific to work fields *(use information from Tool 19 – Individual target competence profile)*.
- Identify the line manager of the staff members in the specific work field and arrange meetings.
- Decide with the line manager which staff members of the specific work field are to be assessed.
- List the names of the identified staff members in *Template 25 – Individual competence matrix*.
- Jointly assess each selected staff member against each competence profile by using a rating scale from 3 (very good competencies, able to teach others) to 1 (still learning).
- Calculate the overall competence score of each staff member by adding the vertical scores.
- Calculate the overall staff scores for each competence field by adding the horizontal scores.

The result will reflect:

1) The capacity gaps for individuals, showing which staff members require capacity building measures.
2) The capacity gaps for a specific task, showing which tasks lack competent staff members.

What information is needed and/or what are the possible information sources?

Detailed knowledge of staff, their tasks and their competencies.

Good to know

Share the assessment with the line manager of the staff member in question.

Template 25 Individual competence matrix

Basic data						
Name of organisation:				**Selected work field:**		
Competence matrix						
List of competencies for the specific task	**List of staff members**					**Overall score**
	Staff V	**Staff W**	**Staff X**	**Staff Y**	**Staff Z**	
A	*include score*					∑
B						∑
C						∑
D						∑
.....						∑
Overall score	∑	∑	∑	∑	∑	

Assessment scale:
3 = Very good competencies, able to teach others.
2 = Able to handle the task independently.
1 = Still learning.

Source: customised from GTZ, 2009

Tool 21 – Interrelationship analysis

Function

Ignoring the interactions between systems, organisations, networks and individuals leads to imbalances and weakens the capacity development process. Human resource development measures that pay too little attention to peoples' situation in the workplace are pointless. Organisational development that fails to take into account potential cooperation with other organisations may miss out on real opportunities. In other words, interactions play a key role in successful capacity development.

Interrelationship analysis helps understand the interdependencies between the four capacity levels and supports the process of developing and prioritising recommendations for the design of a capacity development strategy.

When to use it?

Step II - Task 20 - Make a synthesis and recommendations and draft final report

Who should use it?

Technical team.

How to use it?

- Name the recommendation that needs to be checked. Use one relationship table for checking each recommendation *(Template 26)*.
- In the same row, describe the recommendations in detail. Use the respective fields for the systems, organisational, network and individual level.
- Make a statement about how the recommendations complement the other levels and what synergies can be assumed. Use the *complement* row for this purpose.
- List the risks that can be detected. Use the *deficit* row for this purpose. Ask the question: *Where may recommendations lead to transfer deficits?* The deficit *Matrix 2* shows some examples of risks that can emerge.
- Identify corrective actions to close or minimise the transfer deficits and include them in your recommendations *(Matrix 2 - Deficits resulting from lack of interaction and Table 5 - Purpose and focus of the levels)*. Corrective action could include:
  - Additional requirements for a specific sequence of activities: a capacity development initiative can for instance begin with human resource development measures and on that basis promote organisation and cooperation development at a later point in time.
  - Complementary measures by other stakeholders: A capacity development activity may confine itself to one level; however it may use the complementary results of activities from other stakeholders.

What information is needed and/or what are the possible information sources?

It is essential to know whether the processes are affected by the recommendations. The results of *Tool 22 – Force field analysis* might provide relevant inputs for the interrelationship analysis.

Good to know

Go through a transfer check with key stakeholders during the communication process.

Template 26 Interrelationship check

Interrelationship check		Individual level	Organisational level	Networks	System level
Prioritised recommendations *Name recommendation*					
Interrelationship with other levels	Complement one another, have synergies				
	deficits/risks				
Corrective action on deficits/risks					

Matrix 2 Deficits resulting from lack of interaction

Deficit matrix Focusing on a single level is appropriate only when the other levels are not ignored or when they are addressed in some other way. Ignoring a level leads to imbalances and risks. The following deficit matrix shows examples of the deficits that can arise.				
Interactions between the four levels of capacity development				
Ignored area:	**Human resource development**	**Organisational development**	**Cooperation and network development**	**System/institutional development**
Human resource development		**Competency deficit:** The individual skills required to implement organisational change are lacking.	**Negotiation deficit:** The skills required for horizontal cooperation are lacking.	**Articulation deficit:** Stakeholders do not articulate their interests in negotiations.
Organisational development	**Transfer deficit:** Lessons learned individually are not applied within the organisation.		**Deficit of rules:** There is a lack of internal structures and processes.	**Continuity deficit:** There is a lack of agreement on rules and process management.
Cooperation and network development	**Knowledge deficit:** Horizontal exchange of knowledge is neglected.	**Alliance deficit:** Cooperation potential remains unfulfilled; one-off solutions and insularity is commonplace.		**Cooperation deficits:** Lack of clarity concerning roles and cooperation between various stakeholders.
System/institutional development	**Deficit of broad-based impact:** The skills acquired are not sufficient for policy dialogue.	**Inappropriate frameworks:** Development potential goes untapped.	**Reliability deficit:** Cooperation arrangements and networks remain unstable.	

Table 5 Purpose and focus of the levels

Levels of capacity development	Stakeholders	Focus
Human resource development *Purpose*: promote individual learning capability, self-reflection, discussion of values, abilities and skills (skills development).	Individuals and small groups.	Coaching and training: values and attitudes, motivation, action strategies, abilities and skills in key competencies, social skills such as team work, leadership and communication.
Organisation development *Purpose:* organisational learning and improved performance and flexibility of an organisation.	Organisations and sub organisations of the state, civil society and the private sector.	Change management: agreement on vision and system boundaries, strengthening of self-reflection, delivery processes and clients; division of labour, planning and steering, optimal resource management, internal rules and structures, knowledge management.
Cooperation and network development *Purpose:* develop and strengthen cooperation between organisations and networks for knowledge exchange, coordination and co-production.	Groups of stakeholders, production chains, clusters, networks along geographical or thematic lines.	Network management: establishment, development and steering of cooperation arrangements and networks (community-based, public/private, sectoral product-based) on the basis of comparative advantages to make use of favourable locations and economies of scale.
System/institutional development *Purpose:* build legal, political and socio-economic frameworks that are conducive to capacity development so that people, organisations and their networks can develop and raise their performance capability.	Stakeholders and stakeholder groups who participate in the negotiation of rules at all levels.	Policy advisory services: negotiation culture, articulacy of stakeholders, incentive to agree, round tables and other forms of participation for the negotiation of rules, interests, basic rights, policies and their implementation, rule of law, checks and balances in the exercise of power, transparency, mediation and facilitation of negotiations.

Source: customised from GTZ, 2010

Tool 22 – Force field analysis

Function

Once recommendations for capacity development measures have been formulated, they need to be prioritised. Force field analysis supports the process of prioritisation. This kind of analysis compares the impact a certain measure is expected to have against the effort required to implement it.

When to use it?

Step II – Task 21 – Characterise the areas concerned in a balanced intervention

Who should use it?

Technical team.

How to use it?

- List and, if necessary, cluster recommendations (in the form of gap complexes) made during the capacity needs synthesis *(see Task 20 – Make a synthesis and recommendations and draft final report)*.
- Assess each recommendation with regards to its impact (high/low) and to the effort required to bring about the expected impact (easy/complex) by using the force field graph (*Template 27*).
- Prioritise recommendations as follows: use the *Checklist 19 – Check the draft recommendations,* to evaluate the recommendations with the criteria listed there and one's own evaluation of the impact of the recommendations.
  - High impact/change easy: essential. High impact/change complex: essential.
  - Low impact/change easy: useful if time and resources allow.
  - Low impact/change complex: ignore.

What information is needed and/or what are the possible information sources?

It is essential to be fully familiar with the processes affected by the recommendations *(see Task 21 – Characterise the areas concerned in a balanced interventions (Module 3.1))* for further criteria for prioritising recommendations.

Good to know

- Carry out the analysis to prepare the report and presentation.
- Carry out the analysis with key stakeholders in meetings or the final CaDRE workshop.

Template 27 Strategic Alternatives

		Impact	
		–	+
Ease of change	+	Useful	Essential
	–	Ignore	Essential

Source: GTZ, 2010

Tool 23 – Interest and power to implement analysis

Function

The successful implementation of capacity development strategies depends highly on the support of all stakeholders involved.

The support of stakeholders who have the power to implement change in a particular context is crucial. In addition, there has to be a genuine interest in driving change. Often, stakeholders' level of interest in and power to bring about change do not match.

Measures that are of no interest to anyone and are not backed by stakeholders with the power to implement them will fail and should be dropped.

Measures that are of interest to most stakeholders and are supported by those who have the power to make them happen have a good chance of being successful. They should be included in the strategy.

With the help of *Tool 22 – Force field analysis* the CaDRE team can estimate how high or low the impact of the recommendations could turn out to be i.e. how easily they can contribute to closing capacity gaps. This tool helps to visualise the relationship between the interests and the executive powers of particular stakeholders. The results of this analysis allows one to assess the feasibility of recommended capacity development measures and to set priorities for planning the capacity development strategy, by increasing the focus on what is actually achievable.

When to use it?

Step II – Task 21 – Characterise the areas of balanced interventions

Who should use it?

Technical team supporting the lead.

How to use it?

- List the recommendations in the two matrices provided below.
- List the stakeholders relevant to the recommendation in both matrices.
- Fill scores into *1) Matrix 3 – Power to implement recommendations* by answering the question: **To what extent does each stakeholder have the decision-making powers to help implement the recommendations?**
- Fill scores into *2) Matrix 4 – Interest in implementing recommendations* by answering the question: **How interested is each stakeholder in seeing the recommendations implemented?**
- Look at the graphs plotted automatically and showing the results *(see Figure 7 and Figure 8)*:
  - The power – interest analysis will show the stakeholders as plotted points. It spreads the stakeholders according to their degree of interest in and power to implement recommendations.
  - The practicality of recommendations will show the recommendations as plotted points. It spreads the recommendations according to the interest and power of the stakeholders
- Interpret the plots according to the suggestions in the results graph and use the interpretation to prioritise and/or adapt the recommendations.

The spreadsheet for the analysis can be downloaded here: *www.hrdp-esra.org/analysis_tools_for_cadre*.

What information is needed and/or what are the possible information sources?

The previous use of *Tool 7.3 – Detailed description of selected stakeholders* and *Tool 7.4 – Governance map and relationships* as well as *Tool 7.2 – Stakeholder selection according to their role and interest in CaDRE* can provide valuable information to complete this task.

Good to know

The scoring can also be done in a workshop including the stakeholders. If so, a draft containing the recommendations should be prepared. Be aware that the analysis does not have any statistical significance. It is purely descriptive.

1) Matrix 3 – Power to implement recommendations

To what extent does each stakeholder have the decision-making powers to help implement the recommendations?

For each stakeholder selected, give a score expressing the decision-making powers in relation to each of the recommendations.

Recommendation												Scores to use	
(fill in)											Σ	0	No power
											Σ		
											Σ	1	Little power
											Σ		
											Σ	2	Moderate power
											Σ		
											Σ	3	Medium power
											Σ		
											Σ	4	High power
											Σ		
											Σ	5	Very high power
											Σ		
											Σ		
												Row average	
Power of stakeholders to help implement recommendations	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ		Column average	
	Organisation 1	Organisation 2	Organisation 3	Organisation 4	Organisation 5	Organisation 6	Organisation 7	Organisation 8	Organisation 9	Organisation 10			

include scores

2) Matrix 4 – Interest in implementing recommendations

How interested is each stakeholder in seeing the recommendations implemented?

For each stakeholder selected, give a score expressing the degree of interest in each of the recommendations.

Recommendation												Scores to use	
(fill in)											Σ	0	No interest
											Σ		
											Σ	1	Very little interest
											Σ		
											Σ	2	Little interest
											Σ		
											Σ	3	Medium interest
											Σ		
											Σ	4	High interest
											Σ		
											Σ	5	Very high-interest
											Σ		
											Σ		
												Row average	
Interest of stakeholders in implementing recommendations	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ		Column average	
	Organisation 1	Organisation 2	Organisation 3	Organisation 4	Organisation 5	Organisation 6	Organisation 7	Organisation 8	Organisation 9	Organisation 10			

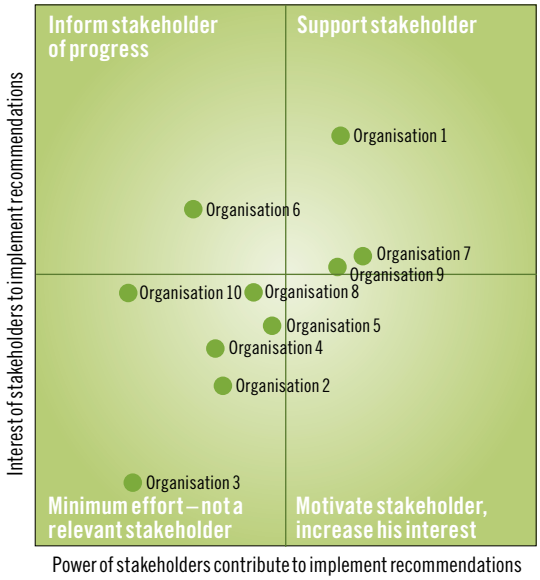
include scores

3) The results

The first graph shows the stakeholders/organisations. It plots the extent to which stakeholders have the **power** to contribute to the implementation of certain capacity development measures against the **interest** they have in implementing the recommendations.

The stakeholder (labelled *Organisation 1)* in the upper right hand corner has both the power to and interest in implementing the measures; the stakeholder (labelled *Organisation 3)* in the lower left hand corner has neither the interest in nor power to implement the recommendations.

Figure 7 Example – stakeholder power – interest

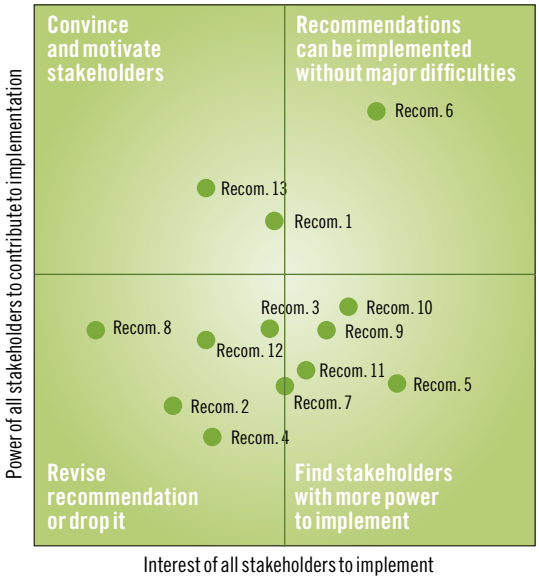


Source: own design

The second graph shows the recommendations and how feasible or practical they will be. It plots the **interest of stakeholders** in implementing recommendations against the **power of stakeholders** to help implement them.

The recommendation on the upper right hand side (labelled *Recom.6)* is of great interest to most of the stakeholders and they have the power to help realise it. The recommendation (labelled *Recom.4)* on the lower left hand side is not interesting and the stakeholders do not have the power to help realising the recommendations.

Figure 8 Example – practicality of recommendations



Source: own design

Tool 24 – Communication plan

Function

Sharing plans and results and informing stakeholders is an activity that has to be carried out repeatedly by the CaDRE team. It helps to initiate and keep the stakeholder dialogue alive. Important and useful inputs can be obtained through these feedback rounds. In addition, effective communication adds to the transparency of the work process and drives participation and commitment.

Therefore, it is important to properly plan and document these processes in a communication plan. This provides an overview of who has been contacted for what purpose or informed about what activity or fact and when this contact took place.

When to use it?

Step I – Task 7 – Organisation of the scoping workshop
Task 9 – Scoping workshop wrap-up
Step II – Task 22 – Prepare the final CaDRE workshop
Task 24 – Follow-up

Who should use it?

Political lead, technical coordinator and/or technical team.

How to use it?

- Consider what information produced during the CaDRE (e.g. recommendations, facts and figures) needs to be shared, when and why.
- *See Template 28.*
- Think about who needs to have this information, when and why.
- Consider whether certain target groups need individual or specific key messages.
- Decide how the information is best shared (e.g. meeting, workshop, report).
- Think about who should deliver the information. Allocate responsibilities for communication.
- Define when each stakeholder or stakeholder group needs the information – is any of the information time critical?

What information is needed and/or what are the possible information sources?

Case specific.

Good to know

- Be aware that people can react differently to the same information, depending on who delivered it and the timing.
- Keep reviewing how appropriate your communication plan is while it is in progress, reinforce key messages through regular, timely communication that is both inspirational and can be followed up.
- Check by email or telephone whether the messages are understood or whether any questions have been left unanswered.
- Prepare a separate list of contacts containing names, titles, organisations, postal addresses, e-mail addresses, telephone numbers and websites.

Template 28 Communication plan

Title: .....
Date: .....

To whom?	Key message	Why?	Comments	Who is responsible?	When?	Status:
Write name, organisation and contact information.	Write the most important message for the recipient, List the material to be sent.	Give reasons why the message and information has to be sent.	Make any comments e.g. special references, reminders.	Indicate the person who is responsible for communication.	Set a deadline.	Indicate whether questions are closed or still unanswered, how to correct this (telephone, mail, letter). If unanswered: specify issues to clarify.
…	…	…	…	…	…	…

Source: own design

Tool 25 – Compilation of key questions for CaDRE

The following is a compilation of key questions relevant to the solar and wind sector that will drive the collection of data and the creation of interviews and questionnaires. This list is by no means exhaustive, as the direction and purpose of key questions may vary depending on the context. The questions are classified into thematic areas and can be combined as required.

1. National strategy for renewable energy deployment

- Does the country have a national programme/strategy for renewable energy?
- How old is the programme?
- Who is responsible for implementing the programme/strategy?
- Does it have clear vision, objectives and targets?
- Are the targets realistic?
- Is renewable energy deployment a high priority in that country?
- What political and legal framework conditions are needed to ensure that the ministry is able to develop and update the strategy efficiently and that the sector coordination for wind and/or solar energy supply can operate efficiently?
- What are main activities are foreseen; what are the areas of intervention and timelines?
- What has been achieved so far?
- What obstacles have needed to be overcome to achieve goals?
- What is the position of renewable energy deployment targets in relationship to the wider energy and economic strategy in that country?
- Does it have a national climate change strategy and if so does it include mitigation through renewable energy?
- Are there any other relevant goals i.e. development or employment?

2. Institutional framework and processes

- What are the public and private institutions (names and mandate/mission) interested in studying, evaluating, promoting, and implementing renewable energy?
- Has the country established a dedicated authority for promoting renewable energy?
- How successful is it in fulfilling its mandate/mission?
- Is the organisation likely to expand its mission in relation to renewable energy development and deployment? Please explain.
- Is the budget sufficient to fulfil its mandate/mission?
- Is there a sufficient number of suitably skilled staff to fulfil its mandate/mission?
- Do public institutions involved in the energy sector coordinate their activities? Are responsibilities clearly laid out?

- Are any roles missing or ignored at institutional level? Is there a (perceived) need for further institutions?
- Does institutional staff have good (enough) knowledge of issues related to solar and wind energy?

3. Policy, regulatory and legal framework for renewable energy

- Has the country passed specific legislation on renewable energy? (List and describe each law).
- How does the legislative process for renewable energy function in the country?
- How well are renewable energy policies enforced?
- What processes and policies are in place at the provincial and national level?
- Are laws interpreted and applied consistently?
- How does the budgetary process for public support mechanisms work?
- What are the regulatory processes for approving the development and operation of renewable energy projects? Which institutions are involved?
- Are any permits and licences required?
- How long does each process take on average?
- What is the planning process e.g. for rural electrification, grid extension or enforcement, spatial planning?
- Is there a national or provincial energy supply plan? Does it include renewable energy?

4. Incentive mechanisms for renewable energy

- Does the government offer incentives to invest in and/or use renewable energy?
- Does the government offer incentives to research and innovate in renewable energy?
- What kind of incentives are in place? (e.g. feed-in tariffs, tax exemptions/reductions, grants, interest-free/low interest loans, reduced duties on renewable energy technology imports etc.).
- How adequate, predictable and reliable are each of these incentives?
- How successful have the incentives been in promoting renewable energy investments/use?
- Are any barriers created by existing policy e.g. fossil fuel subsidies?
- Are any CDM projects up and running or in the pipeline?

a) Feed-in tariffs

- How are the feed in tariffs structured? (fixed price, non-variable premium price, premium price).
- What is the price/kWh by (renewable) energy technology, quality of the resource at the particular site and specific location of the project?
- If applicable, how will the feed-in tariff interact with the RPS?

b) Renewable portfolio standards (RPS)

- What is the target? In what year does this target needs to be reached?
- Is it a national standard, state RPS or both?
- Is there a solar set-aside, credit multiplier or combination of the two?
- Which technologies are eligible for the RPS?

c) Green certificates (also known as renewable energy certificates)

- Is renewable energy certificate trading allowed?
- Who owns the renewable energy certificates?

d) Tax/ duties exemptions/reductions?

- Which tax/ duties exemptions/reductions are in place?
- Are production-based incentives being distributed to renewable energy project owners?
- Who grants the exemptions?
- How can project owners apply for tax exemptions/reductions (outline the process)?

e) Direct subsidies on technology investment

- Are grants awarded for solar installation projects?
- Are any rebate programmes in place?
- Are low interest loans being offered for renewable energy projects? What are the conditions?
- Who grants the subsidies? How are they financed?
- How can project owners apply for subsidies (outline the process)?

f) Other incentive mechanisms

- Joint procurement.
- Third party financing models/leasing (for PV).

5. Solar and wind resource and technology potential

Solar and wind resource potential

- Have any studies been done to evaluate the solar and wind energy resource in that particular country or regionally?
- Which do the studies cover?
- What is the geographic scope and level of detail for these datasets?
- What are the spatial and temporal resolutions of the data?
- Are these studies based on satellite data, ground measurements or combination?
- Is this data reliable or does it need further verification?

- Is this data easily accessible? Where is it kept and how can it be accessed?
- Where are there gaps in these renewable or conventional energy resource assessments?
- Are there any ground measurement campaigns and if so are they still in progress? Are they or were they regularly maintained and calibrated?
- Has an atlas of potential renewable energy resources been published?
- Is it a free and publicly available document or tool?
- Does the level of complexity of the data and tools allow it to be used by all kind of users (experts, non-experts etc.)?
- Has there been any effort to communicate the availability of this data?
- Is a solar/wind mapping tool being used for outreach purposes? What does this tool allow one to do? Does it show the types of technologies, their uses and benefits? Does it show the financing options available for a specific technology?

Grid integration of solar and wind power

- Has the local utility or others conducted assessments of grid requirements or potential constraints to new capacity or transmission?
- Is the energy demand growing or stable (e.g. is renewable energy replacing fuels at conventional installations (stable demand) or is additional capacity needed)?
- Are there enough reserves to accommodate the introduction of a variety of renewable energy into the grid?
- How will the introduction of different renewable energies affect the power quality requirements of grid stability?
- Can the available grid infrastructure cope with the existing national goals of renewable energy deployment?
- Are there standards to facilitate the process of installing and interconnecting renewable energy systems?
- Is net metering allowed?
- Is there implicit net metering (currently installed meters are not prevented from turning backwards)? Can distributed feed-in from microgeneration be monitored/controlled?
- Are there any plans to expand the grid?
- Which agency is responsible for overseeing this process?
- Who will finance grid extension?

6. Solar and wind technology and project development (value chain)

What organisational structures, processes, rules etc. are needed to plan, construct, manage and operate wind and/or solar power stations?

Research and development

- What are the research institutions promoting the deployment of renewable energy technologies?
- What technologies/types of renewable energy do they conduct research on?
- What role do these institutions play in renewable energy promotion?
- What role do they play with regards to project development (demonstration/pilot projects)?
- How do they finance research and development?

Technology production

- Are renewable energy technologies (or components) produced in that particular country?
- How big is local production (number of systems/parts, value in EUR etc.)?
- How much is aimed at the local market, how much for export?
- How reliable are the supply chains?

Project development

- Are any companies/project developers capable of designing renewable energy plants?
- Have preliminary market studies on renewable energy (e.g. solar and wind) been carried out?
- If yes, when and by which organisation?
- How good are the studies?

Financing

- Are loans/credits for renewable energy investment accessible?
- Which institutions offer these loans/credits?
- What is the process for applying for these loans/credits?
- What are the conditions for these loans/credits?
- What is the share of renewable energy projects in portfolios of financial institutions?
- Are investors (including banks) well informed about the risks and benefits of renewable energy investments?

Solar and wind based electricity installations

- Are solar pants and or wind farms available and operational? What is their size (installed capacity)?
- How much electricity do they produce?
- What is the share with regard to total energy production in the country?
- Who do the plants/wind farms belong to?
- What is the business model?
- How were they financed?
- Are new plants/wind farms planned?

Operation and maintenance

- How easy is it to get spare parts for renewable energy technologies (e.g. solar)?
- Are there local companies offering maintenance services?
- Is a customer assistance programme in place to assist residents and business owners in understanding the process and implications of purchasing a renewable energy system?
- Are equipment warranties in place? How long do they last?

7. Renewable energy professionals and skilled labourers

Are there sufficient human resources to develop, plan, implement, construct, operate and maintain solar and wind energy installations? What kind of technical and administrative key competencies (knowledge, experience, type of behaviour) are needed?

- What is the existing stock of people available in the market with the right skills and training?
- What is the current flow of newly trained people available?
- What flow will be needed in future?
- In particular companies/organisations, what are the available human resources and their knowledge and skills?

Ask these questions for skills required in the following fields (refer to the checklist for solar and wind power skill requirements below):

- design
- installation
- operation
- maintenance.

8. Capacity building infrastructure

University level (bachelor and masters)

- Are renewable energy contents mainstreamed, e.g. are there any courses specialising in renewable energy and/or renewable energy modules available in other study courses?
- Are those study courses/modules up-to-date with the latest technology?
- What level are these programmes (bachelor, masters, PhD)?
- Is there any cooperation with other (foreign) universities in relation to renewable energy studies? If so, with which ones and to what extent?
- Is there any cooperation with the private sector (i.e. industry sponsored PhDs, internships etc.)?

Training for professionals/vocational training for technicians

- Are professional/vocational training options available/needed?
- What type of training is offered/needed? (technical, management, policy, general public).

- Where is the training held? (on-site, online)
- What is the duration of the training?
- Who runs the training courses? (university, consultant, power sector, research institute, training institute)
- What are the training costs?
- Is it affordable? Is financial assistance available for individuals interested in participating in the training?
- Are the training courses certified?
- If not, why not and is that being planned?

9. Standards and certification

- Are there any quality standards for renewable energy in that particular country?
- Is there any quality control? How does it work?
- Are any certification systems in place?
- Are there equipment warranties? How long do they last?
- Are permitting processes standardised?

10. Public awareness/dialogue on renewable energy issues

- Is renewable energy the subject of public discussion?
- What is the level of acceptance of renewable energy technologies?
- Do local media regularly report on renewable energy issues and how?
- What is being done to improve public awareness regarding renewable energy and energy efficiency projects? (flyers, workshops, media workshops, press conferences, meetings, web portal, educational display).
- Are there any lobby groups for renewable energy? What do they do?

Checklist 10 Professions in the solar and wind sector

(Adapted from ILO, 2011)

Phase/value chain	Professions in the wind sector	Professions in the solar sector
Potential evaluation, measurement and mapping	Meteorologists	Meteorologists
	Geographers	Geographers
Research and development, equipment manufacture and distribution	R&D engineers	R&D
	Computer	Chemists
	Electrical	Physicists
	Environmental	Electrical engineers
	Mechanical	Mechanical engineers
	Wind power design	Chemical engineers
	Software engineers	Materials engineers
	Modellers (testing)	System designers
	Industrial mechanics	Process engineers
	Manufacturing engineers	Chemical laboratory technicians and assistants
	Manufacturing technicians	Software engineers
	Manufacturing operators	Modellers
	Manufacturing quality assurance experts	Manufacturing engineers
	Certifiers	Manufacturing technicians
	Logistics professionals	Manufacturing operators
	Logistics operators	Building systems specialists
	Equipment transporters	Manufacturing quality assurance experts
	Procurement professionals	Logistics professionals
	Marketing specialists	Logistics operators
	Sales personnel	Equipment transporters
		Procurement professionals
		Marketing specialists
		Sales personnel

Phase/value chain	Professions in the wind sector	Professions in the solar sector
Project development	Project designers (engineers)	Project designers (engineers)
	Environmental Impact Assessment (EIA) specialists	Architects (small projects)
	Economic/financial/risk specialists	Economic/financial/risk specialists
	Atmospheric scientists	Atmospheric scientists
	Social impact specialists	Resource assessment specialists and site evaluators
	Lawyers (feed-in and grid connection contract, financing contract, power-purchase agreements, construction permit)	Lawyers (feed-in and grid connection contract, financing contract, PPAs, construction permit)
	Land development advisors	Land development advisors
	Land use negotiators	Land use negotiators
	Lobbyists	Lobbyists
	Mediators	Mediators
	Environmental and social NGO representatives	Developers, facilitators
	Public relations officers	Public relations officers
		Environmental and energy consultants
		Environmental and social NGO representatives
		Procurement professionals

Phase/value chain	Professions in the wind sector	Professions in the solar sector
Construction and installation	Procurement professionals	**All solar technologies**
	Wind resource assessment specialists	Project and installation evaluators
	Geographers	Construction professionals
	Project managers	Installers
	Electrical civil and marine engineers	Software engineers
	Small wind turbine installers	Quality assurance specialists
	Construction electricians	Business developers
		Commissioning engineers (electrical)
		Transportation workers
		Solar thermal
		System designer
		Plumbers specialising in solar
		Roofers specialising in solar
		Small photovoltaic
		System designers (electrical engineers or technologists)
		Roofers specializing in solar
		Electricians specialising in solar
		Project designers/managers
		Large photovoltaic
		System designers (electrical/mechanical/structural engineers)
		Electricians specialising in solar
		Project designers/managers
		Concentrated solar power (CSP)
		Welders
		Pipe fitters
		Electricians specialising in solar
		Project designers/managers

Phase/value chain	Professions in the wind sector	Professions in the solar sector
Operation and maintenance	Power line technicians	Photovoltaic maintenance specialists (electricians specialising in solar)
	Construction workers	Solar thermal maintenance specialists (plumbers specialising in solar)
	Quality control inspectors	Concentrated solar power maintenance specialists
	Instrumentation and control technicians	Inspectors
		Recycling specialists
Cross-cutting/ enabling activities	Business developers	Educators and trainers
	Transportation workers	Management
	Millwright/mechanical technician or fitter/ wind service mechatronics technician	Administration
	Operation and maintenance specialists	Publishers and science writers
	Power line technicians	Insurance representatives
	Field electricians	IT professionals
	Policy makers and government office workers	Human resources professionals
	Trade association and professional organisation staff	Other financial professionals (accountants, auditors and financers)
	Educators and trainers	Health and safety consultants
	Management	Clients
	Administration	
	Publishers and science writers	
	Insurer representatives	
	IT professionals	
	Human resources professionals	
	Other financial professionals (accountants, auditors and financers)	
	Health and safety consultants	

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Special tools for CaDRE

www.hrdp-esra.org/analysis_tools_for_cadre includes a spreadsheet programme for the *Performance analysis* and the *Power – interest analysis*.

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Dag-Hammarskjöld-Weg 1-5
65760 Eschborn
T +49 6196 79 0
E *www.giz.de*

Division for Water, Energy and Transport

Dr. Mike Enskat
Senior Project Manager
E *mike.enskat@giz.de*

Joscha Rosenbusch
Project Manager
E *joscha.rosenbusch@giz.de*

Authors
Florian Bemmerlein-Lux (ifanos concept&planning)
E *flo@ifanos-concept.eu*

Ilka Neyla Buss (freelance consultant)
E *ilkabuss@gmail.com*

Contributors
- Anita Richter, Joscha Rosenbusch, Mike Enskat (GIZ)
- Sofia Martínez Martínez (IDAE)
- Cornelia Marschel, Hugo Lucas (IRENA)
- Caroline Uriarte, Ron Benioff, Sadie Cox (NREL)

Peer Reviewers
- Alba Gamarra, Executive Director, Centro de Información en Energías Renovables (CINER)
- Benoît Lebot, Climate Change Advisor, United Nations Development Programme (UNDP)
- David Vilar Ferrenbach, Resident Coordinator, ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE)
- Gabriela Elizondo, Senior Energy Specialist, Sustainable Energy Department / SEGEN, the World Bank
- Peter Bank, Partner, ifanos concept&planning

Production Assistant
Jadranka Saravanja (GIZ)

Design and Layout
creative republic // Thomas Maxeiner Kommunikationsdesign
Frankfurt am Main, Germany
E *contact@creativerepublic.net*

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CLEAN ENERGY MINISTERIAL

Accelerating the Transition to Clean Energy Technologies

Multilateral Solar and Wind Working Group

On behalf of

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

DANISH MINISTRY OF CLIMATE, ENERGY AND BUILDING

GOBIERNO DE ESPAÑA

MINISTERIO DE INDUSTRIA, ENERGÍA Y TURISMO