

Evaluation of ongoing programmes 2007

TERNA (Technical Expertise for Renewable Energy Application), Ethiopia

Brief Report

**Produced by: AGEG Consultants eG, Kirchheim/Teck,
Germany**

**This report was produced by independent external experts.
It reflects only their opinion and assessment.**

Published by:
Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Evaluation Unit

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Eschborn, June 2008

Tabular overview

The evaluation mission

Evaluation period	November/2007 to December/2007
Evaluating institute/ consulting firm	AGEG Consultants eG, Kirchheim u. Teck, Germany
Evaluation team	Mr. Gerhard H. Zieroth, International Consultant Mr. Endale Gorfu, National Consultant, Ethiopia

The project/programme

Title of the project/programme according to the order	TERNA (Technical Expertise for Renewable Energy Application); Country Project Ethiopia
Project/programme number	1997.2019.4
Overall term broken down by phases	12/2004 - 12/2008
Total costs	334.000 EUR
Objective of the project/programme	To improve the technical and economic capacities of experts and managers of public electric utility company EEPCo in order to promote grid connected wind energy utilization
Lead executing agency	Sector Programme
Implementing organisations	EEPCo, Ethiopian Electric Power Corporation
Other participating development organisations	Austrian Development Agency (ADA)
Target groups	The population whose electricity supply is provided by a grid. The target group shall be supplied with affordable, environmentally friendly electricity and not be burdened with the costs resulting from damage to the environment. Men and women and all income groups benefit equally.

The rating

Overall rating <i>On a scale of 1 (very good, significantly better than expected) to 6 (the project/program is</i>	2
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<i>useless, or the situation has deteriorated on balance)</i>	
Individual rating	Relevance: 2; Effectiveness: 2; Impact: 3; Efficiency: 2; Sustainability: 3

The object of the evaluation of ongoing development measures is the Programme “TERNA (Technical Expertise for Renewable Energy Application), Ethiopia”. The evaluation was conducted by Mr Gerhard Zieroth (international consultant) and Mr Endale Gorfu (national consultant) from November 2007 to December 2007.

Concern over electricity supply security together with a sharp increase in the supply cost of imported diesel has triggered the Government of Ethiopia’s (GoE) interest in an expansion of the country’s hydro capacity and in the development of alternative energy sources such as wind and geothermal energy. GoE’s aim to expand electrification to a larger portion of the population requires the Ethiopian Electric Power Corporation (EEPCo) to substantially increase its generation capacity. EEPCo perceives hydro, wind energy and diesel as realistic options to secure long term electricity supply in the country. Against this background and in recognition of the fact that there was little or no capacity in Ethiopia to assess and develop wind energy, EEPCo applied for technical assistance under the Technical Expertise for Renewable Energy Application program (TERNA) in 2003.

The stated overall objective of the current TERNA programme is “to improve the technical and economic capacities of experts and managers of public and private organisations to promote grid connected wind energy utilization”. TERNA’s concept rests on a straightforward results chain: The existence of the TERNA program, its Public Relation work, country studies and the considerable success of wind energy in Germany and other European countries triggers interest of partners in wind energy. This leads to „joint country programmes“ that consist of resource assessments and capacity and awareness building and/or energy policy consulting. Next, feasibility studies are conducted that enable local partners to attract finance, which then leads to the implementation of wind projects. These projects in turn contribute to a cleaner energy mix and help the countries to increase energy security through the diversification of their energy portfolios. At the same time the program aims to establish partnerships that help German suppliers to expand their markets.

TERNA’s capacity building in Ethiopia focused on enabling the project partner, the national power utility EEPCo to prepare and implement wind energy investments. TERNA activities in Ethiopia have been implemented against an electricity sector background that is characterized by an ambitious programme of access expansion, hydropower development and cross border connections driven by GoE’s development programme. This programme also lists a 50 MW wind park project as a means to diversify EEPCo’s generation mix. Electricity is seen as a major input in GoE’s poverty alleviation strategy and supported by a variety of Multilateral Lending Agencies (MLA). Access to electricity is targeted to reach 50% by 2010 (PASDEP).

TERNA can be considered as a contribution to bridge the technological divide that has left many developing countries far behind the industry leaders. Building capacity in the handling of wind technology that has the potential to make significant contributions to greenhouse gas mitigation, energy security and sustainable energy supply is considered as highly relevant for any country that has a usable wind energy potential. Wind has environmental characteristics that differ significantly from those of large-scale hydropower, the main generation source in Ethiopia. While wind energy in Ethiopia is not a least cost supply option in a narrow sense it could have an important role in securing a sustainable and reliable power supply. With respect to Ethiopia's National Energy Policy, TERNA is fully aligned with stated objectives such as capacity building, energy security, use of renewable energies and environmentally sound energy sector development. Against this background TERNA has made significant contributions and its **relevance is rated good (rating 2)**.

TERNA has been an effective intervention with respect to the assessment of Ethiopia's wind resource. It was less effective in the execution of feasibility studies and related capacity building. The financing parts of feasibility studies undertaken with TERNA funding are extremely weak and fall short of international standards. In the authors' view, a minimum requirement would have been an analysis of current lending strategies of major development banks, focal areas of the relevant institutions as well as a description of typical loan conditions in case the projects were considered suitable by the lenders.

One of the weakest points of TERNA Ethiopia is the lack of a comprehensive training needs assessment and a capacity building plan that responds effectively to the practical needs of the partner institution. In Ethiopia this weakness has manifested itself through a considerable drop in training effectiveness during the country programme. While practical training in the fundamentals of resource assessments, wind energy utilization and wind park technology was effective, the subsequent training was in areas that are not necessarily essential for power utility staff if the objective is to develop and operate a wind park. It is for instance not necessary for utility staff to master the intricacies of highly specialized wind park design software that is typically used by specialised engineering firms. Another training exercise supported by TERNA is the execution of wind park feasibility studies by the EEPCo wind energy team. The EEPCo wind team is clearly not comfortable with the task and there were obviously tensions between the consultants hired to support EEPCo. Utility companies need the capacity to manage independent consultants much more than the ability to do a study. A study produced by a prospective owner of a park would hardly be bankable. Although EEPCo's attempts to procure a wind park were supported by TERNA consultants, the project was not able to provide sufficient training in essential areas such as project procurement

strategies, ownership and financing models (IPP, BoT etc) and in project management. Nevertheless, in their latest call for tenders EEPCo managed to attract interest of wind investors amidst a strong competition for international investment. The overall **rating for effectiveness is therefore 2 (good)**.

In assessing overarching development impacts of TERNA two different levels have to be distinguished. Firstly, there is the impact of resource assessments and capacity building with respect to a country's capability to perform high quality, integrated resource planning for its power sector. If a viable wind potential is found, it can be developed as part of a least cost expansion plan. In this respect TERNA has had and continues to have positive impacts on the quality of power sector expansion planning. With respect to developing wind parks, however, EEPCo faces some serious challenges: The high altitude of Ethiopia's wind sites poses technical constraints for wind energy utilization. At sites above 2000 meters standard wind turbines are not suitable for operation and suppliers have shown little interest in offering modified turbines. The problem has been exacerbated by an extremely tight market situation for wind turbines in 2006 and 2007. This general market condition explains why EEPCo's tenders for a 120 MW wind farm initially met little interest from suppliers.

Assuming that suppliers are willing to deliver turbines, (3 bids were received in January 2008) mobilization of financing for large-scale wind projects will remain difficult. According to Multilateral Lending Agencies (MLA) representatives interviewed, the market for public sector finance is currently very tight in Ethiopia. For European Union (EU) and Kreditanstalt fuer Wiederaufbau (KfW), energy is currently not a focal area of financing in Ethiopia. African Development Bank (AfDB), the Arabic Development Bank (BADEA) and World Bank have strategic priorities in energy and lend to the power sector. However, these banks are heavily committed to finance pro-poor rural electrification, hydro generation and cross border transmission lines. Thus, it is unlikely that public sector financing of wind would be possible in the short and mid term unless a special facility can be mobilized.

At present EEPCo attempts for the third time to procure a wind park with supplier's credit finance. Three bidders have submitted bids and paid the required bid bonds. It remains to be seen if EEPCo will succeed. It appears, however, that for sustainable wind energy investments to materialise in Ethiopia, more innovative ownership models such as IPP/BOT may have to be pursued. Unfortunately, capacity building in this area has not yet been provided. Given the continuing uncertainties with regard to availability of appropriate technology, generation cost and access to financing that surround wind energy investment in Ethiopia the **rating for impact is satisfactory (3)**.

Cost **efficiency is rated good (2)** in the Ethiopia programme. The total cost allocated to TERNA Ethiopia is approximately Euro 334.000 of which Austrian Development Corporation co-funded Euro 95.400 specifically to cover training and capacity building. The balance funded by GTZ was used to conduct feasibility studies and to procure measuring equipment. TERNA interfaced well with the UNEP funded Solar and Wind Energy Assessment (SWERA) project. Although there was no direct co-funding, the two projects complemented each other well as TERNA used initial SWERA results for the identification of sites for wind monitoring towers. In turn SWERA used then high quality data produced by TERNA to verify and to calibrate their wind maps.

Most experts interviewed during the evaluation agreed that the flare of interest that TERNA experienced in 2005 and 2006 would eventually die down if no hardware investments will take place in the foreseeable future. This is an inherent risk of a sector project that is bound to find out if conditions for the promoted technology are conducive in a country or not. A broader orientation of TERNA Ethiopia towards energy policy advice would have reduced the risk of not producing a sustainable impact. Investors and financiers engage in wind energy development where they can find credible energy policy targets and governance frameworks. When EEPCo was approached by the US wind developer AYR Logistics in 2006 who tabled an unsolicited IPP proposal this was not taken any further because of the lack of an effective framework for IPP. Historically, no country has ever managed to develop a sustainable, renewable electricity market through capacity building and resource assessments, but long-term success has always been the result of combinations of promotional policies. Due to the lack of acceptance of the Ethiopian partners for an integration of meso and macro level activities (no policy development) the **sustainability rating** for TERNA Ethiopia is only **satisfactory (3)**.

This results in an **overall rating** of TERNA Ethiopia as **good (2)**.

TERNA is rated G0 with respect to gender, i.e. GTZ considers the project as not having potential to improve gender equality. There is no evidence that gender issues have been considered at any stage of TERNA's implementation. The consultants have, however, assessed gender results of TERNA Ethiopia: There were no women amongst the direct beneficiaries of the project (intermediaries). TERNA did not try to influence this bias in response to the findings of the project progress control report of 2006. Thus opportunity to benefit and empower women and include female trainees in the capacity building exercises was unfortunately missed. While it may be difficult in practice for a development partner such as GTZ to convince decision makers at local level to work towards a more equal

participation, it might be worth trying, given the strong emphasis of German, Ethiopian and international development strategies on gender mainstreaming.

With respect to poverty the project is rated as not expected to have direct poverty impacts. Poverty oriented power sector projects that provide access for rural populations are funded by other agencies such as World Bank and AfDB. Although a link between TERNA and poverty can be constructed, the consultants consider this link as weak. Wind would hardly reduce supply cost and allow EEPCo to reduce tariffs. Wind development to the contrary may require an increase in tariffs. This aspect and its potential impact on poor households has not been adequately addressed in the feasibility studies conducted by Lahmeyer International and requires urgent attention. Under conditions prevailing in Ethiopia wind energy has the potential to include social and poverty aspects through the promotion of off-grid and mini-grid solutions. GTZ has already mentioned the possibility to pursue such concepts in the proposal for the project's extension. Unfortunately, an amendment to the work programme Ethiopia to include these aspects has not been made due to lack of response from the Ethiopian side. Against this background the mission suggests the following recommendations with respect to future TERNA activities in Ethiopia¹:

- ❑ Wind should be considered as a possible contribution to optimise generation mix (insurance against hydrological risks and rising fossil fuel prices) **and** a possible source for decentralized power supply in Ethiopia.
- ❑ EEPCo should continue resource assessment and site identification.
- ❑ EEPCo should reduce the size of the first wind park to be implemented to 50 MW in order to reduce risk profile and to make financing less difficult.
- ❑ TERNA should intensify facilitation of dialogue with financing institutions and turbine suppliers.
- ❑ EEPCo and GoE should agree for TERNA to provide capacity building in project management and alternative procurement routes such as IPP/BOT/PPP modalities.
- ❑ The feasibility studies for the Mekelle sites should be up-dated considering recent hydro development (risk management), financing bottlenecks and technical issues related to high altitude applications.

With respect to the orientation of the global TERNA program, the consultants believe, that more emphasis needs to be given to policy dialogue on framework conditions for renewable energy investments. This should not only be seen as a matter of opportunity management

¹ GTZ advised that there is no funding available for additional activities. The consultants nevertheless believe that the suggested follow up would enhance sustainability of the interventions.

but also should be prioritized and sequenced as early as possible in any on-going or new co-operation. Obviously, this requires consent of the partners of German co-operation. The consultants believe, however, that a more proactive policy dialogue, in particular during project preparation would have had a good chance to broaden the approach of a joint project.