

Wind Park Mekelle – Project File

1. Background

Ethiopia's interconnected grid (ICS) is powered practically exclusively by hydro power plants (2004: 670 MW installed capacity). Currently, several new hydro power plants are in the planning process or are under construction to meet the country's rising electricity demand. Under this situation – and realizing the seasonal complementary of wind and hydro power resources – Ethiopian Electric Power Corporation (EEPCO) is implementing a wind energy development programme, which is estimated to comprise up to 200 MW by 2012. The first two wind parks with an installed capacity of 2 x (40 – 60) MW are expected to come to grid by mid-2007. Generation from these wind parks is expected to make obsolete otherwise necessary emergency diesel power plants, needed to bridge gaps in the generation base in the ICS.

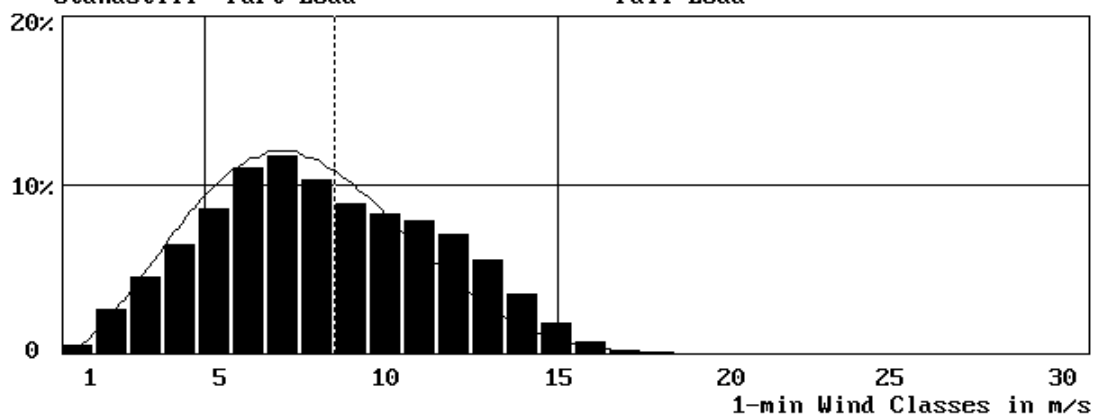
The planning of this project is supported within the framework of the TERNA Wind Energy Programme of Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH.¹

Mekelle Wind Park – Frequency Distribution and Output Estimation

(not corrected for altitude)

U-year: 7.69 m/s
 E-month: 231,405.41 kWh; E-year, est: 2,776.865 MWh; P-gen, mean: 321.40 kW
 Standstill: 14.2 % * Part load: 79.6 % * Full Load: 6.3 % * CF-gen 35.7 %

FREQUENCY DISTRIBUTION $f(v)$ in % (k = 2.45; c = 8.68 m/s)
 Standstill Part Load Full Load



WIND PLOT Ashegoda I 10 m ETH * Anemometer * Typical 800 kW

¹) Further information may be obtained in the GTZ report "Information for Project Appraisal: Ethiopia" which can be downloaded under http://www2.gtz.de/wind/deutsch/windenergie_1.html.

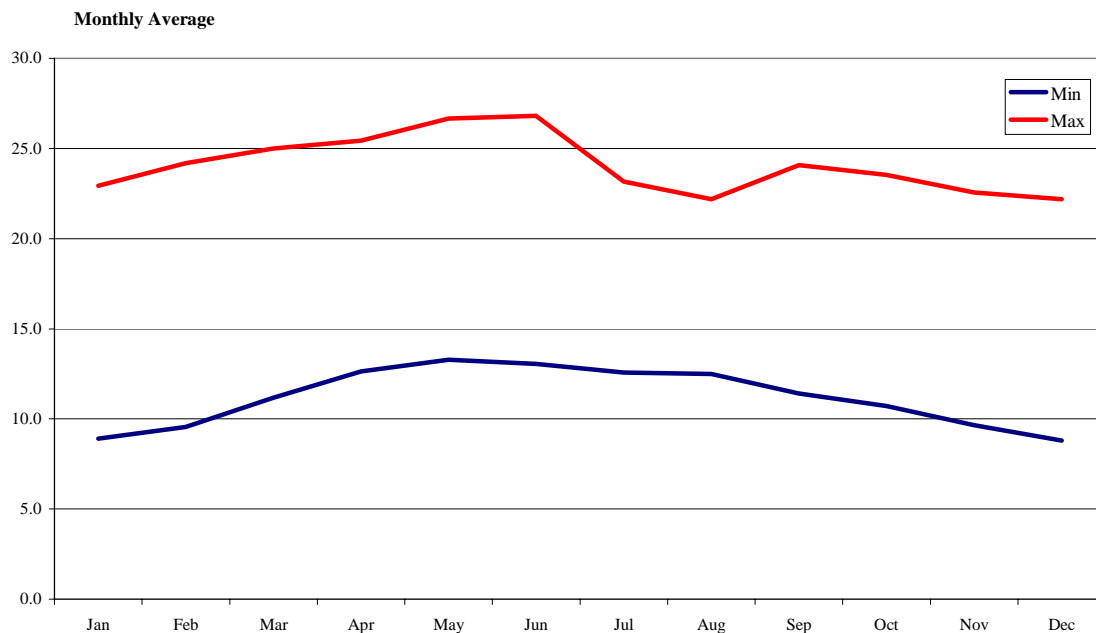
2. Wind Park Location and Wind Resources

Currently, a feasibility study is underway which will determine which of the two sites out of the four pre-selected site alternatives will be developed first. Two of the sites are close to Mekelle town in the province of Tigray, in the North of Ethiopia at an altitude between 2,350 and 2,400 m above sea level. They are in immediate vicinity of a 230 kV transmission line where the power is to be fed in via a new substation.

Wind measurements have been carried out since January 2005 at 10 m height and since September 2005 at 40 m height above ground. They indicate an annual average wind speed of ~ 7.7 m/s at 40 m above ground (see Figure at preceding page).

Air density at the sites is in the range between 0.935 and 0.945 kg/m³, while the ambient temperatures vary from 8 and 27° C.

Mekelle Meteorological Station – Monthly Minimum and Maximum Temperatures



3. Wind Turbine Size

Part of the feasibility study task is to propose an optimum unit size under consideration of transport and installation requirements in the proposed range from 600 to 1,500 kW. A mobile crane for EEPCO's wind energy development plan will be supplied as part of the phase 1 project in Mekelle. EEPCO expects the wind turbine manufacturer to propose modifications to their standard utility turbines to take into account the reduced air density and wind characteristics of the sites.

4. Project Implementation

It is intended to conduct an international tender procedure according to FIDIC among pre-qualified bidders in the second half of 2006. The successful bidder shall establish a service infrastructure for the 2 x (40 – 60) MW wind parks, which is to guarantee high technical availabilities beyond the 2 year warranty period. An internationally experienced consultancy firm/ wind park developer will implement the project on behalf of EEPCO on an EPC contract basis. The wind parks are expected to be in operation by mid-2007.

5. Further Information

For additional information, please contact: Mr. Kebede Walelu, Project Coordinator for Wind Power Study Project, at the following address;

Ethiopian Electric Power Corporation (EEPCO)
www.eepco.gov.et
Corporate Planning
Wind Power Study Project
Kebede Walelu Beyene
P.O.Box 1233 Addis Ababa, Ethiopia
Tel.: ++251 11 5534949, Mobile ++251 91 1218454
Fax: ++251 11 1574071
E-mail: kebwal@ethionet.et