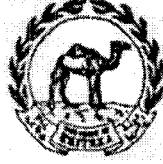


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دولة ارتريا
وزارة الطاقة والتعدين
قسم الطاقة

THE STATE OF ERITREA
Ministry of Energy and Mines
Department of Energy

ቀን
Date

21/09/05

ቁ.መ.
Ref.

06.12.19/78/05

Subject: Invitation for Expression of Interest

Country: Eritrea
Project Title: Wind Energy Applications in Eritrea
Sector: Energy
Project Code: 00031458

The Department of Energy (DoE), under the Ministry of Energy and Mines of the State of Eritrea, has commenced a Wind Energy Application Project funded by the Government of Eritrea (GoE) and the UNDP/GEF. Part of this project entails the following components:

- 1) supply, installation and commissioning of a 750 kW wind park, with three turbines of 250kW each, near the city of Assab in the southern part of our country;
- 2) reinforcement of the existing grid at Assab to be integrated with the wind farm based on the design and specification to be provided by the DoE.

The DoE is therefore issuing this letter to invite bidders to express their interests in carrying out the above-mentioned turnkey project. The project may also be done through a consortium or else independent firms doing the whole or a portion of the two project components mentioned above. Interested bidders are therefore kindly requested to provide us with the following additional information:

- 1 The rated capacity of the bidder's available wind turbines, that match or closely approximate the given requirement.
2. The time needed to manufacture/assemble the desired wind turbine components (once the contract is awarded).
- 3 The installation equipment (specifically cranes, if any) required installing the company's turbines.
- 4 A description of the civil works that might be contracted to a local general civil contractor.
5. The company's experience in carrying out similar projects worldwide and especially in developing countries.

6. Brief description of the operations and maintenance support including the warranty type and period to be provided.
7. The level of certification for the wind turbines.
8. The company's capability, if any, to supply grid reinforcement materials and thus reinforce the existing grid based on the design and specifications to be provided.

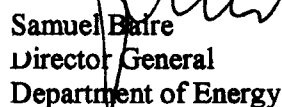
The DoE has included various attachments to this letter that should provide potential bidders with enough information to begin this process.

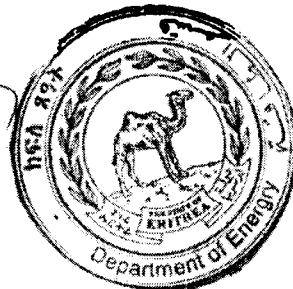
The DoE will issue the formal tender by mid-October and proposals will be due by November 30, 2005 with the goal of completing the installation and commissioning on or before June 01, 2006.

Therefore, please respond, by E-mail, to these informational requests, to Mr. Abiy Ghebremedhin, National Project Manager for "Wind Energy Applications in Eritrea", at the following address prior to October 05, 2005:

Ministry of Energy and Mines
Department of Energy
Wind Energy Applications Project in Eritrea
Abiy Ghebremedhin Desta
P.O.Box 5285, Asmara, Eritrea
Tel.: 00291-1-127944 or 121541
Fax: 00291-1-127652
E-mail: abiywindp@yahoo.com

Very truly yours,


Samuel Baire
Director General
Department of Energy



ATTACHMENT 1

General Country Description

The country of Eritrea is located on the western shore of the Red Sea, immediately north of Ethiopia (For the map of Eritrea, please you may visit the website: http://www.sas.upenn.edu/African_Studies/CIA_Maps/Eritrea_19872.gif).

Eritrea gained its independence from Ethiopia in 1993 and has been working to restore its infrastructure and to encourage economic development. Without any indigenous fossil fuel resources, Eritrea is dependant on imports for its power supply. Due to the high cost of these imports, Eritrea has embarked on a program to develop its own renewable energy resources in an effort to spur economic development through lower energy costs. A countrywide wind assessment has been in progress for several years and has identified certain areas with excellent wind resources. The Assab area in southern Eritrea is one of those regions.

Assab Wind Park

The city of Assab in southern Eritrea has a population of approximately 40,000 and is one of the two ports in the country capable of receiving significant cargo. The region is desert with very salty and corrosive atmosphere and experiences high winds for a significant part of the year. The proposed Assab Wind Park, approximately 750kW in size will be located 6 kilometers north of the city of Assab and several kilometers south of the airport. The Wind Park site is within 350 meters of the main route north of the city along which runs a 15kV transmission line that is currently energized to 5.5 kV. The site is a bluff that is easily accessed by vehicle. Geotechnical surveys are being conducted, the results of which will be provided to the bidders. The site experiences very high average winds during portions of the year (steady 10 m/s near ground wind speed during midday) and has an excellent yearly average (7.8 m/s at 30 meters) as indicated in measurements at the Assab Airport. Wind data is attached as Attachments 3 & 4. Local power generation consists of diesel generators with a total capacity of 5MW and local electric load is 3-4 MW.

Construction and Construction Limitations

Eritrea has several very capable construction companies and the Eritrean Electric Corporation (EEC) operates and maintains all generation, transmission and distribution in the country. The key construction limitation is crane availability. Currently, the DoE anticipates using a mobile 40 ton crane located in the Assab port. Should the bidder require a larger crane it will have to be brought in from outside the country for the Project.

ATTACHMENT 2

In the official Tender Document, bidders will be asked to supply the following basic technical information about wind turbines, commissioning protocol, certification, etc.

1. Documentation of wind turbine certification.
2. Design life including explanation of any factors which would serve to reduce the design life.
3. Listing of all relevant IEC standards for which the turbine is in compliance.
4. Demonstration of turbine's ability to operate in a diesel grid with 20% penetration.
5. Description of tests performed before the turbine is shipped from the factory.
6. Description of tests performed on-site after installation.
7. Compliance with grid compatibility standards which will be supplied in the Tender Document.
8. Certified availability.
9. Operations & Maintenance manual and, if separate, the Warranty Services manual.
10. Statement of items and services covered by warranty.
11. Statement of manufacturer's personnel availability during the warranty period as a resource for the on-site O&M personnel.
12. Description of O&M training to be provided to O&M personnel. (The O&M personnel hired by the project will be experienced and familiar with generator maintenance.)
13. Description of operational data collected from other wind turbines installed for other projects.
14. Drawings of the wind turbine and electrical diagrams approved by a licensed engineer.
15. Description of major construction equipment required to install the turbine with specific discussion/specifications of cranes required, if applicable.

ATTACHMENT 3

MEAN HOURLY WIND SPEEDS

ASSAB AIRPORT, ERITREA
10-M WIND SPEED (m/s)

11/01/99 - 07/31/01

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1	6.9	6.6	7.7	5.9	4.8	5.2	4.9	4.3	4.1	4.0	7.2	7.2	5.9
2	6.7	6.5	7.8	5.6	4.8	5.2	4.8	4.5	4.0	3.7	6.9	6.9	5.8
3	6.4	6.4	7.6	5.5	4.6	4.8	4.6	4.0	3.9	3.5	6.7	6.8	5.6
4	6.5	6.5	7.2	5.5	4.1	4.4	4.4	4.1	3.8	3.4	6.8	6.8	5.5
5	6.3	6.4	6.8	5.3	4.0	4.1	3.6	4.0	3.4	3.3	6.6	6.8	5.2
6	6.2	6.4	6.8	5.3	3.8	3.8	3.5	3.7	3.7	3.2	6.7	6.8	5.1
7	6.0	6.1	6.8	5.5	4.0	3.4	3.6	3.4	3.7	3.7	6.7	6.9	5.1
8	6.7	7.0	8.6	6.8	5.0	4.3	4.5	3.9	4.7	4.8	8.3	7.9	6.2
9	8.9	9.1	10.3	8.4	6.0	4.8	5.5	4.4	5.3	5.6	10.0	9.8	7.5
10	9.9	9.5	10.8	9.0	6.6	5.6	6.1	4.9	6.1	6.1	10.6	10.9	8.2
11	10.1	9.6	11.1	9.4	7.1	6.2	6.5	5.8	6.7	6.6	10.5	11.1	8.6
12	10.2	9.7	11.4	9.6	7.3	6.4	6.7	6.3	7.3	7.0	10.8	10.9	8.8
13	10.5	10.0	11.5	9.6	7.6	6.6	6.8	6.5	7.6	7.3	11.0	10.9	9.0
14	10.6	10.2	11.5	9.6	7.2	6.6	6.9	6.8	7.4	7.1	11.0	11.1	8.9
15	10.4	10.1	11.2	9.4	7.1	6.4	6.7	6.5	7.0	6.8	10.8	11.0	8.8
16	10.2	9.6	10.9	8.8	6.8	6.7	6.3	6.4	6.6	6.5	10.8	10.6	8.5
17	9.6	9.3	10.3	8.5	6.4	6.4	5.8	5.7	6.3	6.4	10.1	10.1	8.0
18	8.8	8.4	9.6	7.8	6.0	6.0	5.5	5.4	6.2	5.8	9.2	9.5	7.5
19	8.3	7.8	8.7	7.0	5.6	5.6	5.1	5.7	5.1	5.4	8.8	8.8	6.9
20	8.0	7.8	8.0	6.6	5.5	5.2	5.3	5.8	4.7	5.2	8.4	8.5	6.7
21	8.2	7.6	7.8	6.6	5.2	5.3	5.2	5.6	4.0	4.7	8.2	8.1	6.5
22	8.2	7.2	7.9	6.4	5.0	5.4	5.4	5.6	4.3	4.5	8.0	7.6	6.4
23	7.8	6.9	8.1	6.2	5.2	5.6	5.3	5.2	4.7	4.4	7.6	7.4	6.4
24	7.1	6.7	8.0	6.1	5.2	5.5	5.0	4.5	4.6	4.1	7.3	7.2	6.1
Mean	8.3	8.0	9.0	7.2	5.6	5.4	5.3	5.1	5.2	5.1	8.7	8.8	7.0

Good Hours
1184 1368 1488 1440 1488 1440 1488 744 720 744 943 1488

Missing Hours
304 0 0 0 0 0 0 0 0 0 0 497 0

14,535 Hours of Good Data 801 Hours Missing 94.8% Data Recovery

MEAN HOURLY WIND SPEEDS

ASSAB AIRPORT, ERITREA
30-M WIND SPEED (m/s)

11/01/99 - 07/31/01

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1	8.0	7.6	8.8	6.9	6.0	6.4	6.0	5.3	5.0	4.8	8.2	8.4	7.0
2	7.9	7.7	8.8	6.6	6.0	6.6	5.8	5.5	4.8	4.5	8.0	8.1	6.9
3	7.6	7.6	8.7	6.5	5.7	6.2	5.7	5.0	4.6	4.4	7.8	7.9	6.7
4	7.7	7.6	8.3	6.4	5.3	5.9	5.5	5.0	4.6	4.3	7.8	8.0	6.5
5	7.4	7.4	7.9	6.2	5.0	5.6	4.7	5.0	4.2	4.1	7.6	8.0	6.3
6	7.3	7.5	7.8	6.3	4.8	5.0	4.7	4.6	4.6	4.1	7.7	7.9	6.2
7	7.1	7.1	7.7	6.2	4.6	4.4	4.6	4.1	4.3	4.4	7.6	7.9	6.0
8	7.2	7.6	9.2	7.2	5.3	4.7	5.0	4.3	5.0	5.1	8.9	8.5	6.7
9	9.5	9.6	10.9	8.9	6.3	5.1	5.9	4.7	5.6	5.8	10.7	10.5	8.0
10	10.5	10.0	11.5	9.5	7.0	6.0	6.5	5.2	6.3	6.4	11.2	11.6	8.7
11	10.7	10.0	11.8	9.9	7.6	6.6	6.9	6.1	7.0	6.8	11.0	11.7	9.1
12	10.8	10.2	12.0	10.1	7.8	6.8	7.2	6.6	7.5	7.2	11.4	11.5	9.3
13	11.0	10.5	12.1	10.3	8.1	7.1	7.4	6.8	7.9	7.5	11.6	11.5	9.5
14	11.1	10.7	12.2	10.1	7.8	7.2	7.6	7.2	7.7	7.5	11.6	11.7	9.6
15	11.1	10.8	11.9	10.0	7.8	7.2	7.4	7.0	7.4	7.1	11.6	11.7	9.4
16	10.8	10.3	11.6	9.5	7.6	7.6	7.2	6.9	7.0	7.0	11.6	11.3	9.2
17	10.3	10.0	11.2	9.2	7.2	7.3	6.6	6.5	7.0	7.0	10.9	11.0	8.8
18	9.6	9.2	10.4	8.6	6.6	6.9	6.4	6.2	7.0	6.5	10.2	10.4	8.3
19	9.2	8.7	9.6	7.8	6.2	6.2	5.9	6.5	5.8	6.0	9.8	9.8	7.7
20	8.8	8.7	9.0	7.5	6.2	6.0	6.1	6.6	5.2	5.8	9.4	9.6	7.6
21	9.2	8.5	8.8	7.5	6.0	6.3	6.2	6.3	4.7	5.4	9.2	9.2	7.4
22	9.3	8.3	8.9	7.4	6.0	6.5	6.4	6.5	5.0	5.2	9.1	8.8	7.4
23	8.9	8.0	9.2	7.2	6.2	6.8	6.3	6.1	5.4	5.1	8.6	8.7	7.4
24	8.2	7.7	9.0	7.1	6.3	6.8	6.0	5.4	5.4	4.9	8.4	8.4	7.2
Mean	9.1	8.8	9.9	8.0	6.4	6.3	6.2	5.8	5.8	5.7	9.6	9.6	7.8

Good Hours

1184 1368 1488 1440 1488 1440 1488 744 720 744 943 1488

Missing Hours

304 0 0 0 0 0 0 0 0 0 0 497 0

14,535 Hours of Good Data

801 Hours Missing

94.8% Data Recovery

MEAN HOURLY VALUES

ASSAB AIRPORT, ERITREA
10-M WIND DIRECTION (DEG)

11/01/99 - 07/31/01

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
01	160	171	172	190	241	288	273	291	242	197	154	157	210
02	161	164	172	189	248	279	266	274	220	198	153	159	206
03	161	165	170	179	233	274	272	277	212	205	154	160	204
04	167	170	171	189	236	275	263	265	210	192	156	161	205
05	162	173	165	186	224	259	254	257	209	191	157	163	200
06	166	174	163	186	210	245	246	241	196	188	158	165	195
07	173	178	170	175	205	225	243	230	204	197	158	165	193
08	166	176	158	165	198	225	236	235	205	197	155	163	188
09	158	172	153	138	139	203	225	192	160	141	145	155	166
10	140	148	145	126	101	133	210	166	137	108	135	141	142
11	129	133	120	115	109	107	187	157	89	71	125	130	125
12	120	106	114	107	92	109	170	135	87	67	117	125	115
13	111	95	107	111	85	112	143	86	85	68	114	112	105
14	110	95	112	111	93	130	143	62	72	80	112	111	107
15	110	103	113	111	134	139	154	68	107	77	113	111	116
16	112	98	115	117	176	198	165	82	127	99	118	112	131
17	116	114	133	123	171	198	180	148	156	112	122	121	143
18	121	131	136	132	208	262	190	234	144	140	129	126	163
19	133	148	143	154	231	298	248	232	161	138	134	146	184
20	138	154	145	179	224	277	255	259	187	165	140	141	189
21	142	160	156	177	236	288	279	251	231	178	140	146	199
22	153	165	156	184	237	289	274	291	237	170	145	150	203
23	154	165	165	189	235	280	288	295	224	175	149	153	205
24	154	166	163	190	246	284	275	270	243	188	152	155	206
Mean	142	147	146	155	188	224	227	208	173	148	139	143	171

Good Hours

1184 1368 1488 1440 1488 1440 1488 744 720 744 943 1488

Missing Hours

304 0 0 0 0 0 0 0 0 0 497 0

14,535 Hours of Good Data 801 Hours Missing 94.8% Data Recovery

MEAN HOURLY VALUES

ASSAB AIRPORT, ERITREA
30-M WIND DIRECTION (DEG)

11/01/99 - 07/31/01

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
01	157	168	171	190	237	281	270	282	252	198	152	155	207
02	159	165	171	189	245	283	262	271	219	198	152	157	206
03	160	166	169	182	232	274	269	263	212	194	154	159	203
04	166	169	170	186	227	272	258	261	209	191	156	160	202
05	162	171	167	185	230	258	257	256	210	185	157	162	200
06	165	173	173	185	216	250	250	249	208	181	158	164	198
07	171	178	165	175	208	228	241	228	211	195	158	164	193
08	165	175	156	163	199	232	231	234	203	194	153	162	187
09	156	170	150	135	147	197	227	187	157	162	143	153	166
10	145	145	143	130	109	141	206	162	133	117	132	138	143
11	134	131	123	119	112	133	188	153	98	69	122	128	129
12	118	110	112	111	95	111	177	143	85	65	114	123	116
13	109	99	111	110	88	120	157	106	83	77	111	110	109
14	107	94	111	109	113	150	174	69	69	79	110	109	113
15	108	101	111	109	148	165	162	89	116	74	112	109	121
16	110	102	113	116	190	217	173	90	136	108	115	110	136
17	114	118	131	121	173	229	199	167	177	121	120	124	150
18	118	134	133	128	210	293	220	242	165	160	126	123	171
19	131	145	141	146	228	295	256	239	182	146	131	138	183
20	136	151	143	174	226	274	266	255	183	162	137	139	188
21	139	159	154	175	226	285	276	247	229	175	138	144	196
22	150	162	154	187	240	287	288	287	235	167	144	148	204
23	152	160	163	193	238	283	284	290	222	169	148	151	204
24	152	164	162	195	244	281	273	267	241	178	150	153	204
Mean	141	146	146	155	191	231	232	210	176	149	137	141	172

Good Hours

1184 1368 1488 1440 1488 1440 1488 744 720 744 943 1488

Missing Hours

304 0 0 0 0 0 0 0 0 0 0 497 0

14,535 Hours of Good Data

801 Hours Missing

94.8% Data Recovery

MEAN HOURLY VALUES

ASSAB AIRPORT, ERITREA
2-M TEMPERATURE (DEG C)

11/01/99 - 07/31/01

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
01	23.4	23.8	26.5	28.5	30.1	31.6	33.0	32.4	31.4	28.8	26.1	24.6	28.2
02	23.1	23.4	26.2	28.1	29.8	31.4	32.8	32.2	31.2	28.6	25.7	24.3	27.9
03	22.9	23.1	26.0	27.8	29.5	31.2	32.6	32.0	31.0	28.3	25.5	24.1	27.7
04	22.7	22.9	25.8	27.4	29.2	31.0	32.5	31.8	30.9	28.0	25.3	23.9	27.4
05	22.6	22.8	25.6	27.2	28.8	30.8	32.4	31.6	30.6	27.9	25.2	23.8	27.3
06	22.5	22.6	25.4	27.0	28.5	30.5	32.2	31.5	30.3	27.6	25.2	23.8	27.1
07	22.4	22.5	25.3	27.2	29.0	30.6	32.3	31.4	30.4	27.8	25.2	23.8	27.1
08	23.4	23.7	26.7	29.7	32.2	33.3	34.2	33.1	32.0	30.3	27.2	25.3	29.1
09	26.0	26.5	29.0	32.6	35.3	36.6	37.1	35.7	34.4	32.9	29.7	27.9	31.9
10	28.3	28.8	31.0	34.4	36.9	38.6	39.5	37.7	36.4	34.9	31.9	29.9	33.9
11	29.9	30.5	32.4	35.3	37.3	39.1	40.7	38.9	37.5	35.8	33.2	31.3	35.0
12	30.7	31.5	33.3	35.7	37.2	39.1	41.2	39.7	38.0	35.9	33.9	32.0	35.5
13	31.1	31.9	33.9	36.2	37.2	39.0	41.1	39.8	38.3	35.9	34.2	32.5	35.8
14	31.3	32.1	34.2	36.6	37.4	39.0	40.7	39.6	38.4	36.0	34.5	32.9	35.9
15	31.5	32.3	34.4	36.8	37.5	38.9	40.2	39.2	38.3	36.2	34.7	33.2	36.0
16	31.7	32.4	34.3	36.8	37.5	38.9	39.8	38.9	38.4	36.5	34.7	33.2	36.0
17	31.5	32.4	34.0	36.4	37.1	38.3	38.9	38.3	37.8	36.1	34.2	32.7	35.5
18	30.0	31.4	32.9	35.1	35.6	36.6	37.4	36.8	36.1	34.1	32.0	30.7	34.0
19	27.5	28.7	30.6	32.6	33.4	34.6	35.6	35.1	34.1	31.8	29.8	28.4	31.7
20	26.0	27.0	29.0	30.9	31.9	33.2	34.4	33.9	33.0	30.7	28.5	27.0	30.3
21	25.1	26.0	28.0	29.9	31.2	32.4	33.8	33.3	32.5	30.1	27.7	26.2	29.5
22	24.6	25.3	27.5	29.3	30.7	32.1	33.5	33.0	32.1	29.7	27.1	25.6	29.0
23	24.2	24.7	27.1	28.9	30.5	31.9	33.3	32.8	31.7	29.3	26.6	25.1	28.7
24	23.3	24.2	26.8	28.7	30.3	31.8	33.2	31.5	31.4	29.0	26.3	24.8	28.3
Mean	26.5	27.1	29.4	31.6	33.1	34.6	35.9	35.0	34.0	31.8	29.3	27.8	31.2

Good Hours

1184 1368 1488 1440 1488 1440 1488 744 720 744 943 1488

Missing Hours

304 0 0 0 0 0 0 0 0 0 0 497 0

14,535 Hours of Good Data

801 Hours Missing

94.8% Data Recovery

ATTACHMENT 4

Assab Airport, Eritrea
Nov 1999 - July 2001

