

# WIND ENERGY PROJECTS GRID- CONNECTED CASE STUDY IN THE GAMBIA

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# Overview of the Gambia

- Total surface area of 11,570 sq. km
- Population of approximately 1.8 million as at 2012
- Pop. growth rate of 2.7% per annum (2003 census).
- Real GDP growth averaged at 5.5% a year (2007- 2011)

# Electricity Sub-Sector

## Players in the Grid Connection

### Conventional

NAWEC-----National Utility

GEG -----IPP

### Renewable

Batokunku ----IPP

Gamwind ----IPP

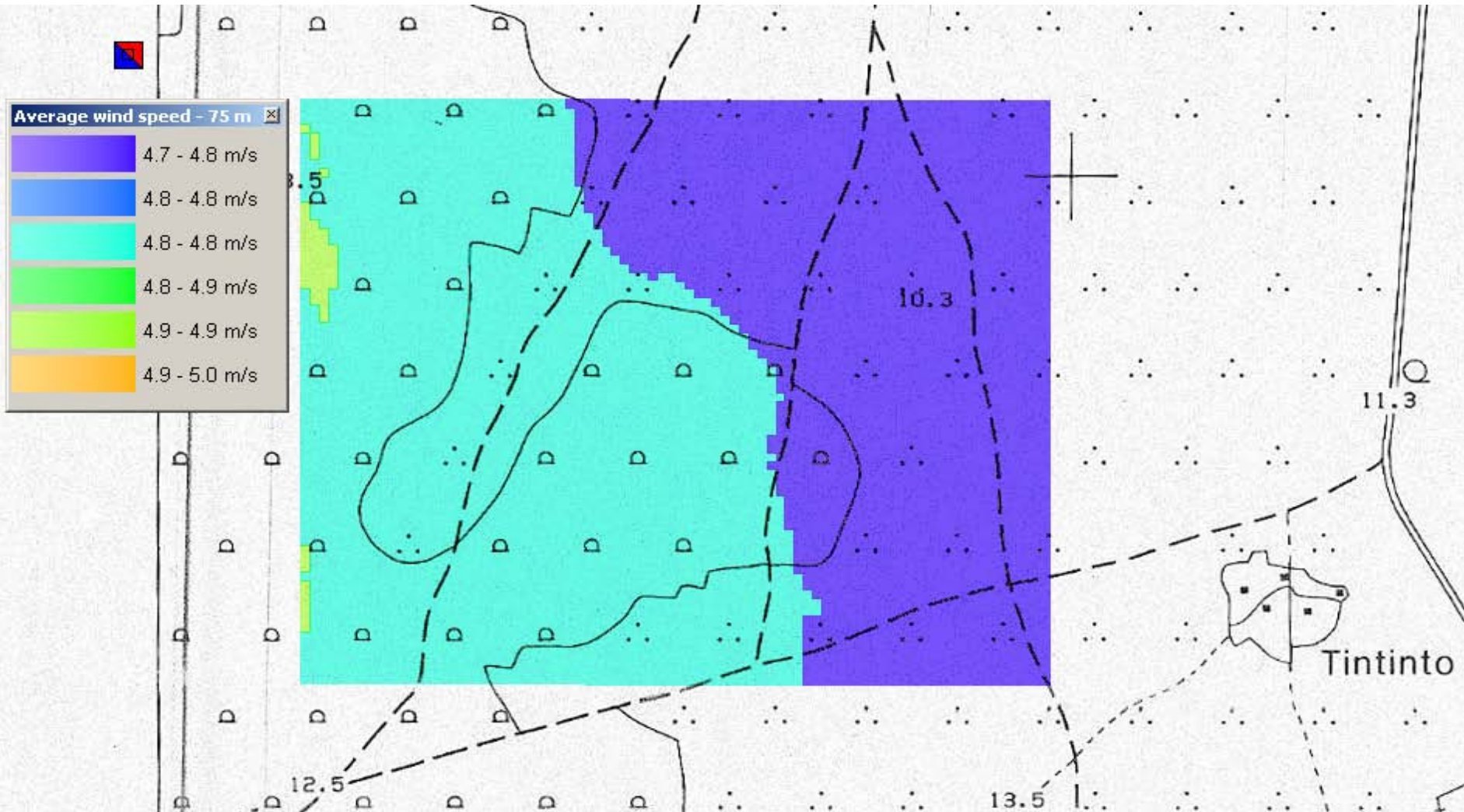
# Legal and Regulatory Framework

- Energy Policy (2005)
- Electricity Act 2005
- Regulatory Act (PURA)- 2001
- PPA and FIT model for RE
- RE Bill –awaiting enactment

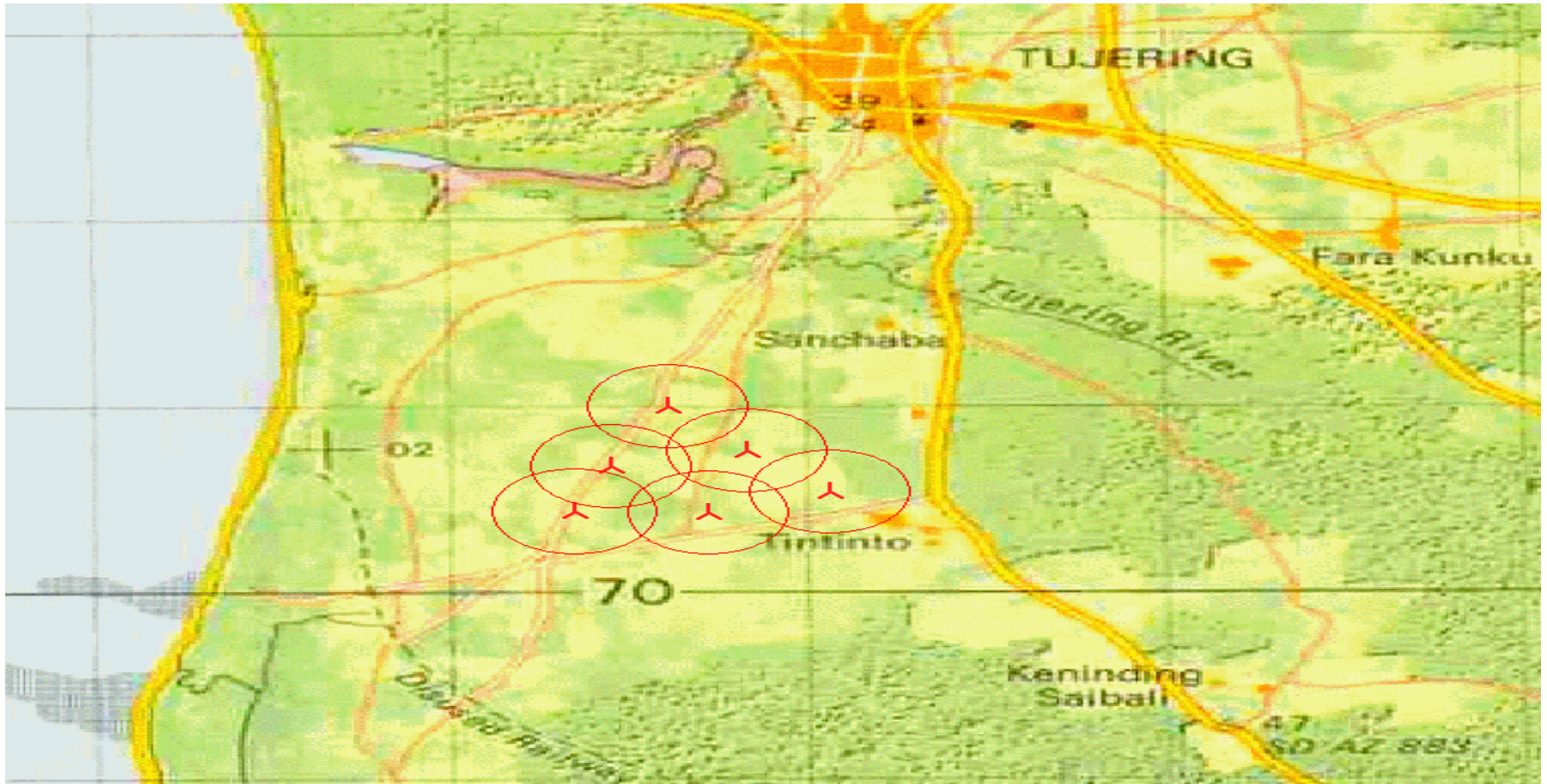
# Wind information in The Gambia

- A. Wind speed is moderate
- B. According to RE Feasibility study Report 2007 Average wind speed is around **4.0m/s at 30m** height
- C. Higher along the coast
- D. Lower in the inner land
- E. Wind speeds higher between **January – May**
- F. Lower in **June -December**
- G. **GAMWIND** registered **14m/s at 35m**

# Wind Resources Map

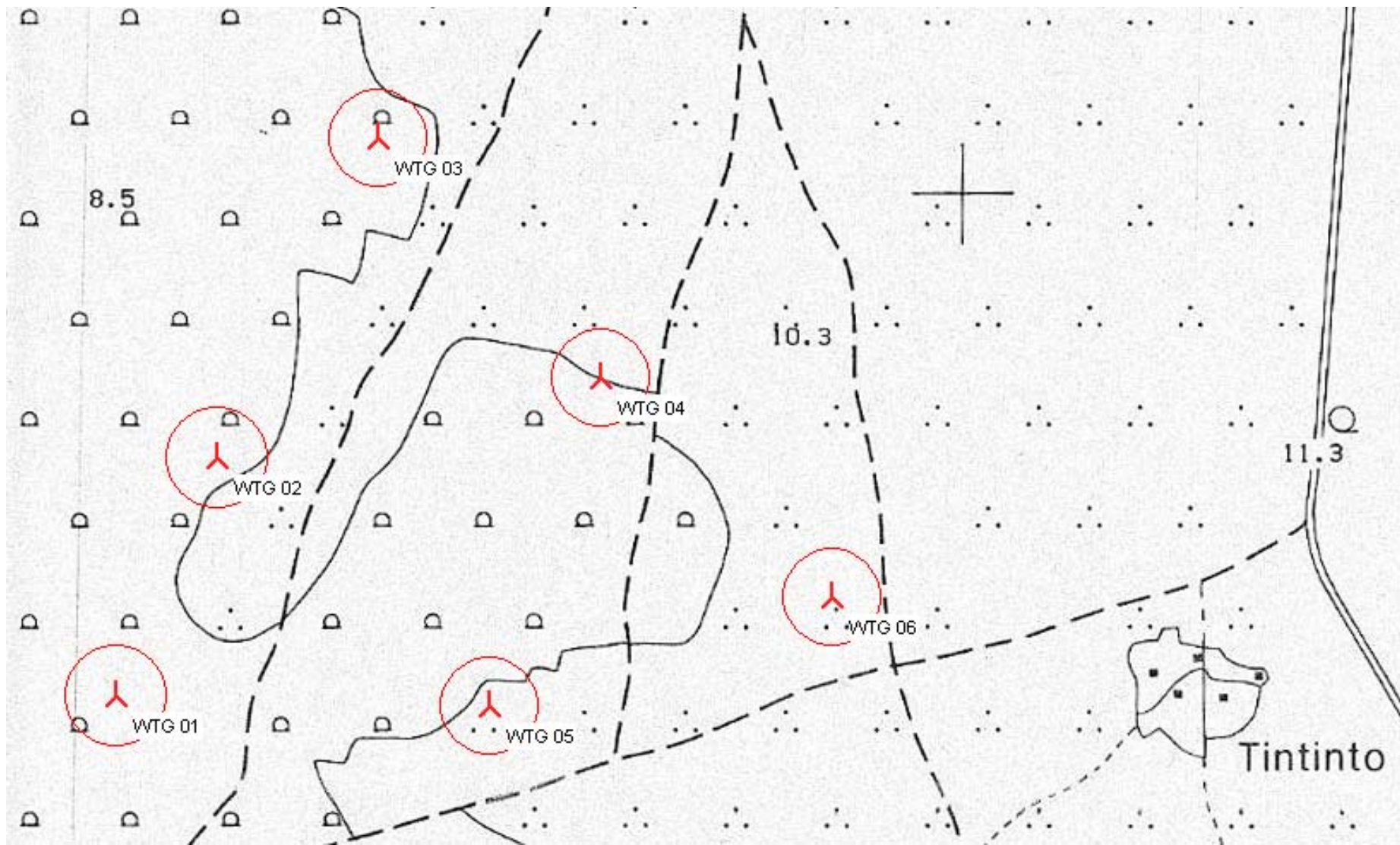


# *Park Layout within Tujereng Area*





# Park Detailed Layout



# Batokunku Wind Turbine- grid connected

- 1<sup>st</sup> grid-connected wind project in The Gambia
- Installed in March 2008
- Capacity-150 kVA
- Community owned



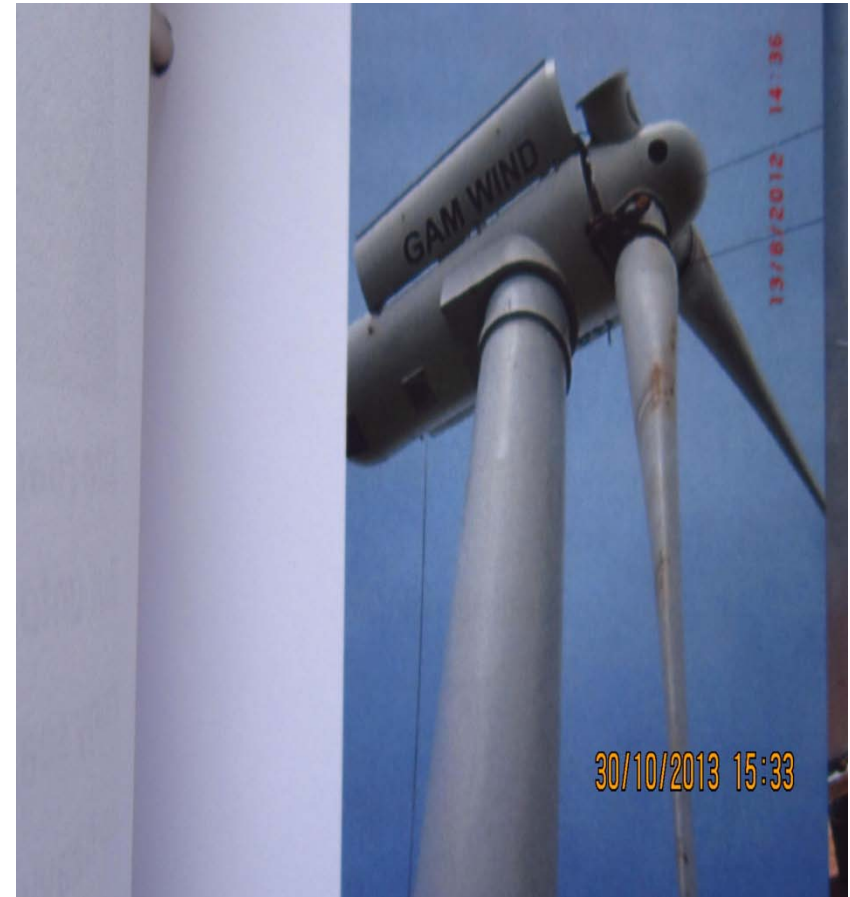
# Batokunku Wind Turbine Cont.

- **Supply**
  - 80 households
  - 4 GSM base stations
- **Tariff**
  - **D1 / kWh ( 3 US cent/kWh )**
  - **D9.20 / kWh (26 US cent/kWh) – NAWEC's**
- **Surplus sent to the grid**
- **Draws from the grid**

# GAMWIND PROJECT – 2 x450kVA

## Wind turbines

- One of the 6 demonstration projects of the GEF-UNIDO-GOTG Project
- Total Capacity - 900kVA (2 x 450kVA)
- Received project grant of 30% of total investment (GEF-UNIDO)
- Project total cost: US\$ 839,000



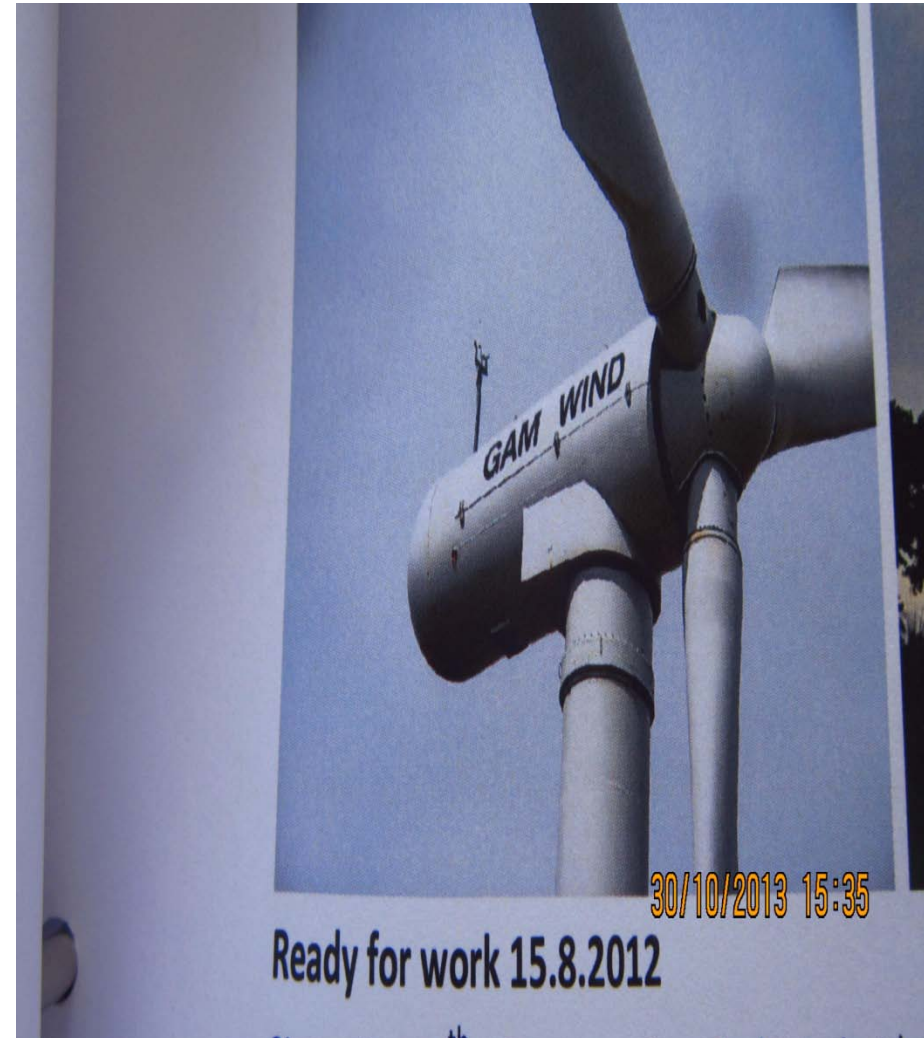
# GEF –UNIDO-GOTG Project in The Gambia

- Promotes RE based mini-grids for productive uses in rural areas ( 2012-2015)
- Estimated total project cost US\$ 5.7million
- Grant funding of about US\$ 2million from GEF
- Co-financing US\$ 3.7million from UNIDO, EUEI and project developers (private sector)
- Implementing agency –UNIDO

# GAMWIND PROJECT – 2 x450kVA

## Wind turbines -Contd

- NAWEC and Gamwind signed PPA – 18<sup>th</sup> November, 2010
- Work started in June, 2012
- 1<sup>st</sup> Wind turbine installed and operational – 15<sup>th</sup> July, 2012
- 2<sup>nd</sup> Wind turbine installed and operational – 15<sup>th</sup> August, 2012



# GAMWIND PROJECT – 2 x450kVA

## Wind turbines: Works Construction

- All equipment supplied to the site by 28<sup>th</sup> May, 2012
- Foundations for the 2 wind turbines completed by 2<sup>nd</sup> July, 2013
- 15 tonne crane used to mount the blades and generator of 1<sup>st</sup> wind turbine



150 t crane at work turbin



Works at night Wind Turbine

30/10/2013 15:30

# Gamwind Project –Construction Challenges

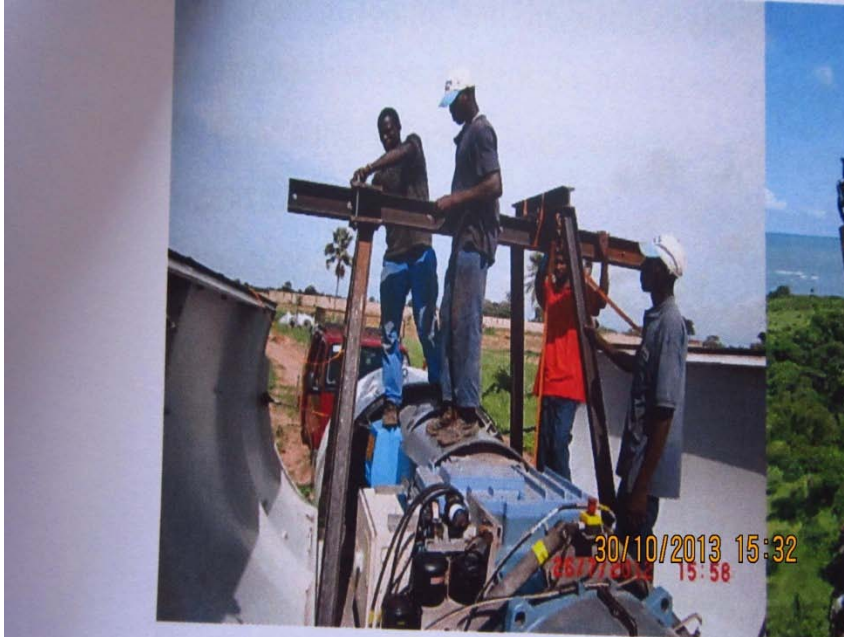


- Availability of suitable cranes
- Difficulty in hiring a crane from Dakar
- Interruption due to the heavy rains – making accessibility to the site difficult for the heavy crane





# Gamwind Project – Construction Works in Action



- Blades and generator of 2<sup>nd</sup> Wind Turbine lifted up using bulldozer/caterpillar with steel ropes – 11<sup>th</sup> & 12<sup>th</sup> August, 2012

# Gamwind Project – Commissioning



- 33kV OH –line -13<sup>th</sup> August , 2012
- 20/33kV Substation -13<sup>th</sup> August, 2012
- 1<sup>st</sup> wind Turbine -15<sup>th</sup> July, 2012
- 2<sup>nd</sup> Wind Turbine -15<sup>th</sup> August, 2012



# Gamwind: KEY DATA

## TURBINE 1

PERIOD	PRODUCTION kWh	OPERATION Hrs	MAINTENANCE Hrs	AVERAGE WIND SPEED
AUG 2012 JAN 2013	116,653	4,003	81	5.18
FEB 2013 AUG 2013	277,137	4,992	31	5.7

## TURBINE 2

AUG 2012 JAN 2013	75,027	3,269	118	5.18
FEB 2013 AUG 2013	262,920	4,973	33	5.7

# Mbolo Women Association Project: Solar PV- Wind Turbine Hybrid System



- Beneficiary of the GEF-UNIDO-GOTG Project
- Total Capacity – 8.3kW
  - **Wind Turbine:** 1.5kW
  - **Solar PV :** 6.8kW
- Received grant of 27.8% of total investment
- Project total cost: US\$ 185,000 + training of 30 Gambians on the system

## **Mbolo Women Association Project: Solar PV- Wind Turbine Hybrid System - Contd**

- It runs a training Center (Fandema) for women
  - sewing,
  - tie & dye,
  - art &craft,
  - basic literacy
  - ICT
- It also runs an international school
- Initially powered by a generator

# Mbolo Women Association Project: Solar PV- Wind Turbine Hybrid System - Contd

ICT



Sewing



Soap and  
cosmetic  
handmade



Video club



Ice and cold  
water




# Challenges for Wind Energy Development in The Gambia

- Acquiring identified sites
- Limited National Capacity
- Updating the wind energy data
- Availability of spare parts locally
- High initial investment cost
- High interest rates

# Opportunities

- Energy Sector is one of the priority investment sectors of The Government of The Gambia.
- Moderate wind speed
- RE Bill awaiting enactment
- Standard PPA and FIT Developed
- Electricity Regulation in place-PURA
- Demonstrated experience in both grid and off-grid wind turbines





**THANK YOU!**  
**Abaraka! Jerejef!**

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