

# FACT sheet

Country: Mali  
Project: TERNA Wind Energy  
Term: 2001-2004  
Total funding: € 161,000



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## Scenario

Mali is one of the poorest countries in Africa. Its electrification rate is just 9 per cent nationwide and less than 1 per cent in rural regions. In 2001 the country's total electricity generation capacity was 140 MW, with half accounted for by hydroelectric power plants.

While the situation in the southern part of Mali has considerably improved in recent years owing to the construction of the new 200 MW hydroelectric power station Manatali and the expansion of the national grid, the north still suffers from extreme underdevelopment.

Here, the Malian energy utility EDM (Energie du Mali SA) operates small (1-4 MW) diesel-powered isolated grids in just a few larger towns. For EDM, supplying electricity to the north is a loss-making business; the cost of providing electricity to the north is more than 21 eurocents per kWh, whereas the national consumption tariff is between 10 and 23 eurocents.

As the substandard electricity supply in the north presents a major obstacle to economic development, an important factor for supporting the peace process in these regions, the Malian government has given high priority to improving the supply system in the north.

To limit polluting emissions and lower the cost of electricity generation, the government is focusing increasingly on renewable energies such as wind and solar power.

It is also striving to attract private capital by creating a statutory framework for liberalising the electricity market and

allowing private-sector generators and electricity utilities to enter the market.

The Malian government selected the city of Gao to play a pioneering role. Gao, the fifth largest town in Mali, has a population of 40,000 and a 4 MW diesel-powered isolated grid. Satellite images suggest the conditions are suitable for wind energy.

## Project

To date there is a lack of wind energy expertise in the country, and the wind data that is so crucial to attracting investors is unavailable. Between March 2001 and February 2004, therefore, GTZ conducted wind measurements and analyses in Gao as part of the TERNA project (Technical Expertise for Renewable Energy Applications).

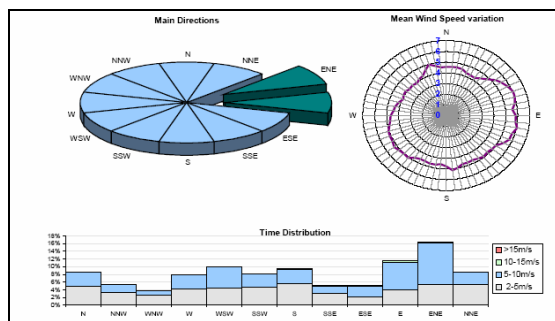


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Results of the wind measurements in Gao

Average wind speeds in Gao were 5.0 m/s at a height of 41 m. Based on these results, EDM, the Direction National de l’Energie (DNE) and GTZ produced an energy yield and a feasibility study for a 3 x 300 kW wind farm.

The investment required for such a wind farm is estimated at € 1.7 million. The price of diesel fuel in Gao is the central parameter of the micro- and macro-economic analyses: the cost of generating electricity in these diesel-fuelled plants lies at around 21 eurocents per kWh in a micronomic analysis and under the assumption of an oil price of 25 USD per barrel. Considering the latest oil-price increases the cost of electricity generation in Gao is likely to now be clearly higher.

Assuming a feed-in tariff of 18 eurocents per kWh or above as well as favourable financing conditions, the economic efficiency of the planned wind farm could be guaranteed.

## Impact

The feasibility study concludes that considering the high costs of diesel-fuelled power plants, wind farms can operate efficiently already from average wind speeds of 5 m/s at hub height.

From a macroeconomic perspective, wind farms offer the following advantages:

- The fed-in wind energy means a lower absolute consumption of diesel fuel, the cost of which is high due to the long distances it must travel;
- The capacity of diesel-fuelled plants that, according to the growth scenarios, would have to be increased after 2008,

can be reduced correspondingly to the average output of the three wind turbines;

- The use of wind farms will lower CO<sub>2</sub> emissions by 880 tons per year.

Further, the construction of the wind farms would lead to slightly lower electricity generation costs in a macronomic analysis. The specific cost of generating electricity in both diesel- and wind-powered plants would amount to around 17.5 eurocents per kWh, slightly below that of a purely diesel-fuelled system.

Other project impacts:

- Local resources can be used, reducing the regions’ dependence on imported diesel fuel;
- The burden on the environment is lifted thanks to lower pollutant emissions;
- The planned wind turbines are a sensible complement to Mali’s already existing micro power plants that use renewable energy sources;
- The project supports the Malian government’s energy policy objectives;
- The project could become a pilot facility for other wind farms in Mali or neighbouring countries.

On balance, the wind farm project in Gao is technically and economically feasible. A requirement is that its financing be arranged with the support of international development organisations.

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