

Morocco: Wind Park Tanger

Ex-post evaluation

OECD sector	23068 / Wind energy	
BMZ project ID	1993 65 685	
Project-executing agency	Office National de l'Electricité (ONE)	
Consultant	Deutsche Energie Consult Ingenieurgesellschaft mbH (DECON)	
Year of ex-post evaluation	2008	
	Project appraisal (planned)	Ex-post evaluation (actual)
Start of implementation	1 st quarter 1995	1 st quarter 1995
Period of implementation	36 months	74 months
Investment costs	EUR 5.8 million	EUR 6.1 million
Counterpart contribution	EUR 1.5 million	EUR 1.8 million
Financing, of which FC (Financial Cooperation) funds	EUR 4.3 million	EUR 4.3 million
Other institutions/donors involved	./.	./.
Performance (overall rating)	3	
• Relevance	2	
• Effectiveness	4	
• Efficiency	2	
• Overarching developmental impact	1	
• Sustainability	3	

Brief description, overall objective and project objectives with indicators

The wind park Tanger project consists of the construction of a small wind park (capacity 3.5 MW) on coastal mountain ranges in the north of Morocco. The project, which was mainly of a demonstrative nature, was intended to show how electrical power can be produced in an environmentally friendly way with a technology that was hitherto unknown in Morocco. By feeding electricity into the national grid, the wind park supports base load supply (project objective). If the plant's performance is seen in relation to Morocco's overall electricity production capacity, this support is of only minor importance. The project was intended to contribute to providing environmentally

friendly electrical power in the context of a macro-economically efficient electricity supply, and thereby promote the country's economic development (overall objective).

The indicator for achieving the project objective was an average production of at least 15,000 KWh annually as of the wind park's second operational year. So far, this production capacity could only be achieved in the period of 2002/2005. In subsequent years, production plummeted to values way below 10,000 KWh. This is due to irregular wind-force, reduced production capacity because of technical defects and long waiting times in the repair process because major replacement parts were not available, to mention but a few reasons. Moreover, the metering systems also proved faulty.

Project design / major deviations from the original project planning and their main causes

In view of the country's high dependence on imports in the energy sector, using domestic renewable energy sources will continue to be of crucial importance. At the time of project appraisal, the energy sector was a priority area of German development cooperation with Morocco, and it still is, given the sector's importance for the country's economic development. Also the choice of project type, i.e. the promotion of renewable energy, must be considered as future-oriented, particularly from a current perspective.

The main intention, however, was to promote a project of a demonstrative nature and thereby to prove that this technology, which was new for Morocco at the time, represents an economically viable and basically environmentally friendly way of electricity production. It was meant to encourage the establishment of further, greater wind parks. The project did certainly give an incentive to do so, and has accelerated the introduction of this technology. The project's positive effect as a pilot scheme is obvious from today's considerable use of wind power in the expansion of national energy supply in Morocco.

Project-executing company is the public company Office National de l'Electricité (ONE), which is one of the country's ten largest companies. ONE is subject to the political decisions of the Moroccan government and therefore only has limited financial autonomy. This is why the necessary adjustments in tariffs are not always well-timed or based on actual requirements. For this reason, ONE cannot react flexibly enough to cost pressures like an increase in commodity prices, or years with little rainfall in the case of hydroelectric power. ONE's economic situation is tight.

Key results of the impact analysis and performance rating

The project has the positive effect of avoiding gas emissions. CO₂ is the only globally active gas emission, and CO₂ output is reduced by about 8,400 t/a. The project thus contributes to achieving the MDG 7 targets.

Three aspects need to be mentioned with regard to the potentially negative effects of wind power projects. At the respective location of individual wind turbines, the construction works and the access traffic damage the topsoil, which is rather sensitive in this altitude, and may cause local erosion. However, given the low number of wind turbines, this effect is negligible here. Most of the time, the noise of the individual wind turbines' blade movements could be drowned by the generally strong sound of the wind, so that noise pollution is not a major problem. In view of the low number of individual wind turbines and their maximum height of only 62 m, the wind park presents only a minor danger for migratory birds and local bird species.

The project had a general developmental orientation. It had no potential to promote gender equality and it was not intended to promote participatory development / good governance. Instead, it aimed at protecting the environment and natural resources.

The project's developmental effectiveness may be summarised as follows:

Relevance: The project's chain of impact, i.e. reducing environmental pollution resulting from power generation by means of using renewable energy sources, is valid up until today. The project tackled one of Morocco's core problems, i.e. the country's dependence on fossil fuel imports. However, a project of a demonstrative nature like this one may not be expected to significantly contribute to solving this problem. Donor alignment was of rather minor importance in the context of this pilot scheme. The project corresponded to the developmental goals of the German government. We assess the project's relevance as good (sub-rating 2).

Effectiveness: The project objective indicator (electricity generation) was achieved in the first two years of operation only. Subsequently performance values considerably decreased due to a lack of maintenance on the one hand and because of irregular wind forces on the other hand. It is very doubtful whether the plant will be able to achieve again and sustain the original production level. After all, it is primarily a pilot scheme. Even so, we rate effectiveness as no longer satisfactory (sub-rating 4).

Efficiency: The project's prime costs (from a microeconomic as well as macroeconomic perspective) amount to ca. 6.3 EUR ct/KWh (on the basis of prices in 2008) or 6.5 EUR ct/KWh (on the basis of prices at the time of project appraisal in 1994). For the purposes of the calculation it was assumed that electricity production will remain at the current low level even after 2009. At the time of project appraisal, prime costs approx. 5.2 EUR ct/KWh were projected. This means that prime costs have risen by 25 % as a result of reduced production. However, the wind park's prime costs are lower than those of the alternative, namely thermal electricity production (prime costs ca. 7.8 EUR ct/KWh). This is mainly due to the taxes and charges paid for ONE's oil imports (an average of 30 % was assumed). Given the current average tariff of ca. 6.8 EUR ct/KWh (converted figure), the prime costs are covered. CO₂ avoidance costs are at a comparatively low with 2.8 EUR/t CO₂. The main reason for this is the drastic increase of oil prices over the past years, as compared to the time of project appraisal. We assess the project's efficiency as good (sub-rating 2).

Overarching developmental impact: Given Morocco's hesitant attitude towards new technologies, the project was well timed to spark off a new development, i.e. the utilization of wind energy in Morocco. At the outset of the project, the project-executing agency focused on conventional electricity production in power stations burning fossil fuels. Owing to the project, ONE acknowledged wind power as an alternative energy source, and the general acceptance of wind power has risen a lot faster than it would have done otherwise. This development will contribute to reducing Morocco's dependence on imports. Moreover, Morocco will be able to combat future environmental problems, in particular by reducing air pollution and diminishing the increase in greenhouse gas emissions. It is especially important that the FC financed pilot scheme has triggered a lasting interest in the industrial exploitation of wind energy and had a structural impact in this respect. Since the time of project appraisal, wind energy capacity of wind parks in Morocco has multiplied and will expand increasingly rapidly because the government is convinced of its advantages. We assess this structural impact as considerably more important than the contribution to the country's

economic development, which was also one of the project's objectives. Overall, we rate the overriding developmental impact as very good (sub-rating: 1).

Sustainability: Due to the tight economic and financial situation of the project-executing agency and the ensuing limited availability of replacement parts and insufficient maintenance works, the wind park is not properly operated and maintained, so that its operation is not guaranteed in the long term. Moreover, it is highly unlikely that the current performance level will increase in the future. However, since the project is of a demonstrative nature and therefore must fulfil other requirements than ordinary power stations, and because the above-mentioned structural effects had a sustainable impact, we rate the project's sustainability as satisfactory (sub-rating 3).

Considering the individual sub-ratings, the project's success as a pilot scheme must be assessed as overall satisfactory, in particular because of its clearly positive structural impact. It falls short of expectations, but the positive results dominate. (Rating 3).

General conclusions and recommendations

- When measuring wind data, the possible range of wind forces should be given more attention when forecasting the station's capacity.
- When new technologies are introduced, it is advisable to include a complementary measure in support of the operating company, in order to allow for a more effective learning phase.
- In regions where the construction of several wind parks is likely, there should be a regional study of the ornithological situation before individual projects are planned.
- Pilot schemes require different objectives than projects which have been carried out several times in the respective country, and it should be able to verify their demonstrative effect by means of adequate indicators.

Notes on the methods used to evaluate project success (project rating)

Projects are evaluated on a six-point scale, the criteria being relevance, effectiveness (outcome), "overarching developmental impact" and efficiency. The ratings are also used to arrive at a final assessment of a project's overall developmental efficacy. The scale is as follows:

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| 1 | Very good rating that clearly exceeds expectations |
| 2 | Good rating fully in line with expectations and without any significant shortcomings |
| 3 | Satisfactory rating – project falls short of expectations but the positive results dominate |
| 4 | Unsatisfactory rating – significantly below expectations, with negative results dominating despite discernible positive results |
| 5 | Clearly inadequate rating – despite some positive partial results the negative results clearly dominate |
| 6 | The project has no positive results or the situation has actually deteriorated |

A rating of 1 to 3 is a positive assessment and indicates a successful project while a rating of 4 to 6 is a negative assessment and indicates a project which has no sufficiently positive results.

Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability)

The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability)

The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected.)

Sustainability level 3 (satisfactory sustainability)

The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability)

The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and an improvement is very unlikely. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The overall rating on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. A rating of 1 to 3 indicates a “successful” project while a rating of 4 to 6 indicates an “unsuccessful” project. In using (with a project-specific weighting) the five key factors to form an overall rating, it should be noted that a project can generally only be considered developmentally “successful” if the achievement of the project objective (“effectiveness”), the impact on the overall objective (“overarching developmental impact”) and the sustainability are considered at least “satisfactory” (rating 3).