Wind power projects in the CDM: Methodologies and tools for baselines, carbon financing and sustainability analysis

The report is intended to be a guidance document for project developers, investors, lenders, and CDM host countries involved in wind power projects in the CDM. The report explores in particular those issues that are important in CDM project assessment and development—that is, baseline development, carbon financing, and environmental sustainability. It does not deal in detail with those issues that are routinely covered in a standard wind power project assessment. The report tests, compares, and recommends methodologies for and approaches to baseline development. To present the application and implications of the various methodologies and approaches in a concrete context, Africa’s largest wind farm—namely the 60 MW wind farm located in Zafarana, Egypt—is examined as a hypothetical CDM wind power project. The report shows that for the present case example there is a difference of about 25% between the lowest (0.5496 tCO$_2$/MWh) and the highest emission rate (0.6868 tCO$_2$/MWh) estimated in accordance with these three standardized approaches to baseline development according to the Marrakesh Accord. This difference in emission factors comes about partly as a result of including hydroelectric power in the baseline scenario. Hydroelectric resources constitute around 21% of the generation capacity in Egypt, and, if excluding hydropower, the difference between the lowest and the highest baseline is reduced to 18%. Furthermore, since the two variations of the “historical” baseline option examined result in the highest and the lowest baselines, by disregarding this baseline option altogether the difference between the lowest and the highest is reduced to 16%. The ES$^3$-model, which the Systems Analysis Department at Risø National Laboratory has developed, makes it possible for this report to explore the project-specific approach to baseline development in some detail. Based on quite disaggregated data on the Egyptian electricity system, including the wind power production profile of Zafarana, the emission rates estimated by runs with 1 hour time-steps of the simulation tool ES$^3$ range from 0.590 tCO$_2$/MWh to 0.610 tCO$_2$/MWh. These results come very close to estimates based on two different interpretations of standardized baseline options above.