PRESS RELEASE I PARIS I 11 FEBRUARY 2014

NB : embargoed until 17:00 pm 11 February 2014

Are wind farms changing Europe's climate?

The development of wind farms in Europe only has an extremely limited impact on the climate at the continental scale, and this will remain true until at least 2020. These are the main conclusions of a study carried out by researchers from CNRS, CEA and UVSQ[1], in collaboration with INERIS and ENEA, the Italian agency for new technologies, energy and sustainable development. These results were established using climate simulations that included the effect on the atmosphere of wind farms located in Europe, on the basis of a realistic scenario forecasting a two-fold increase in wind energy production by 2020, in accordance with European countries' commitments. Published on the website of the journal *Nature Communications* on 11 February 2014, the work highlights the importance of carrying out fresh studies to assess the impact of wind energy development by 2050.

The effects of a massive deployment of wind energy production facilities (often called wind farms) had never been quantified precisely to this day. However, on the basis of idealized scenarios of gigantic wind farm deployment, several recent studies have shown that atmospheric circulation can be modified, as well as temperatures and precipitation. A significant increase in temperatures was observed, especially at night, near these farms. It turns out that at night, wind turbines mix the atmosphere more than they do during the day, which reduces cooling near the ground. However, no study had yet attempted to quantify the climatic effect of a realistic wind energy development scenario on a continental scale. In Europe, this is a particularly important issue, since energy production is set to double between 2012 and 2020, in accordance with European countries' commitments.

In this study, the scientists compared climate simulations performed both with and without the effect of wind turbines, based on a realistic hypothesis for the deployment of this type of production across the whole of Europe in 2020 (assuming a wind power installed capacity of 200 gigawatts in 2020). The main conclusion is that differences caused by wind turbines remain very small compared to natural climate variability: in some regions, the difference in temperature reaches 0.3°C at the most, and a decrease in accumulated seasonal precipitation of a few percent is observed (with values only being significant in winter).

These small differences could partly be due to a combination of local effects in areas densely covered with wind farms, and by a slight northward deflection of westerly winds in Western Europe. However, they remain considerably smaller than typical differences in temperature and precipitation from one winter to the

[1] This study was led by two French laboratories: the Laboratoire des Sciences du Climat et de l'Environnement (CNRS / CEA / UVSQ), which belongs to the Institut Pierre-Simon Laplace, and the CEA's Institut de Technico-Économie des Systèmes Énergétiques.

next, and their implications for the Earth's overall energy budget are considerably less than that of greenhouse gas-induced climate change.

In this context, there is a need to carry out fresh studies using other models and different scenarios for wind energy development in order to determine the exact consequences of an even more massive deployment of wind energy by 2050. One key issue will be to assess the effects of a two-fold or even three-fold increase in the power levels studied here, which is the estimated increase over the next forty years.

This study was made possible thanks to the support of CEA's DSM-Energie project and the European FP7 project IMPACT2C.


© Robert Vautard


© Augustin Colette

Reference

Regional climate model simulations indicate limited climatic impacts by operational and planned European wind farms. R. Vautard, F. Thais, I. Tobin, F.-M. Bréon, J.-G. Devezeaux de Lavergne, A. Colette, P. Yiou, and P. M. Ruti, *Nature Communications*, Published on line 11 February 2014.
DOI: 10.1038/ncomms4196.

Contact information

CNRS researcher I Robert Vautard I T +33 1 69 08 26 40 I robert.vautard@cea.fr
CNRS Press Office I Priscilla Dacher I T +33 1 44 96 46 06 I priscilla.dacher@cnrs-dir.fr