



## Energy yield assessments considering climate change

**GEO-NET Umweltconsulting GmbH from Hanover (GEO-NET) can now perform wind energy yield assessments considering various climate scenarios.**

Not least due to climate change, an increased expansion of renewable energies must be driven forward. GEO-NET makes an important contribution to the financing of wind energy projects by providing bankable reports and measurement campaigns.

In the last year, the question of how climate change will affect the energy yield of wind farms during their operating period was increasingly raised at various conferences and industry meetings. Additionally, the November 2022 BWE standard for a well-managed wind farm with direct financial citizen participation from the German Wind Energy Association also calls for future developments such as climate change to be appropriately described and adequately considered when preparing wind and yield assessments.

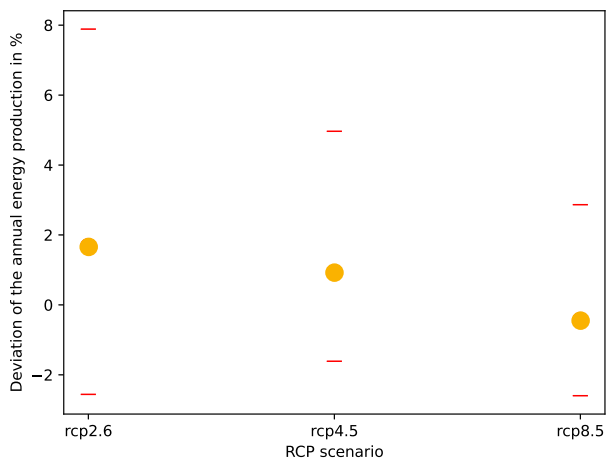
In order to forecast how the influence of climate change will affect meteorological variables and thus the yield of wind farms, GEO-NET Umweltconsulting GmbH has added a new service to its product portfolio.

This is based on a coupling of coarse climate models with the CFD model FITNAH-3D, which has been tested for many years and is constantly being further developed. As climate models, regional climate projections from the CORDEX initiative for various RCP (Representative Concentration Pathways) scenarios are used.

**Do you want to assess the risk of climate change on the yield of your wind farm? We look forward to receiving your request at: [wind@geo-net.de](mailto:wind@geo-net.de)**

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Within the CORDEX initiative, regional climate models are driven by global climate models, which provide forecasts for future climate changes.



Different RCP scenarios are used for the forecasts. They are based on the pathway of the concentration of climate-relevant greenhouse gases in the atmosphere by 2100 and the resulting, additional radiative forcing by the end of the 21st century relative to pre-industrial levels in 1850. For example, in the case of the RCP8.5 scenario, the additional radiative forcing in 2100 relative to the pre-industrial level is 8.5 W/m<sup>2</sup>.

Model uncertainties in the CORDEX simulations are taken into account by considering the 15% and 85% percentiles in addition to the means.

## Exemplary results for one location are presented.

The tables contain the projected annual energy production [MWh/a] for current scenarios as well as for scenarios adjusted using CORDEX data based on the mean, and the 15% and 85% percentiles for the different RCP scenarios.

The figure visualizes the results for the annual energy production. For each RCP scenario, it shows the 15% percentile, the 85% percentile (dashes), and the mean (dot) of the change in the energy yield for a site.

	current	rcp2.6	rcp4.5	rcp8.5
W1	13.402,0	13.636,0 (+1,75%)	13.538,5 (+1,02%)	13.338,1 (-0,48%)
W4	14.409,6	14.622,8 (+1,48%)	14.520,0 (+0,77%)	14.326,4 (-0,56%)
W5	22.953,3	23.356,4 (+1,76%)	23.178,4 (+0,98%)	22.878,5 (-0,33%)
Park result	50.764,9	51.615,2 (+1,67%)	51.236,9 (+0,93%)	50.543,0 (-0,44%)

**Table** Development of the annual energy production [MWh/a] based on different RCP-scenarios

	current	rcp2.6		rcp4.5		rcp8.5	
		15% p.	85% p.	15% p.	85% p.	15% p.	85% p.
W1	13.402,0	13.017,6	14.538,1	13.227,4	14.036,6	12.818,3	13.811,5
W4	14.409,6	14.076,7	15.461,1	14.170,2	15.120,7	13.811,1	14.864,8
W5	22.953,3	22.372,3	24.769,6	22.550,0	24.128,4	21.817,4	23.543,2
Park result	50.764,9	49.466,6	54.768,8	49.947,6	53.285,6	50.446,8	52.219,5

**Table** 15% and 85% percentiles of the energy yields [MWh/a] for each scenario

## Services provided by GEO-NET

- + Coupling of climate models with the proven CFD model FITNAH-3D
- + Evaluation of different RCP scenarios and their effects on yield-relevant parameters
- + Site-specific evaluation of the influence of the scenarios on the energy yield
- + Possibility of worldwide investigations
- + Evaluation following a wind & energy yield assessment or as a special report without prior assessment



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