Supplement for

Tempo-spatial distribution of nitrogen dioxide within and around a large-scale wind farm-a numerical case study

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Table S1. Statistics between modeled and measured hourly NO₂ air concentrations

| | R (correlation coefficient) | AE (absolute error) | FE (fractional error) | FB (fractional bias) |
|-------|--------------------------------|---------------------------|-----------------------------|----------------------------|
| value | 0.723418 (p=4.31E-9) | 0.00483 | 0.613158 | 0.001075 |

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Figure S1. Modeled and measured hourly concentrations of NO₂ from 0000 UTC November 19 to 0000 UTC November 21 2016.



Figure S2. Wind field predicted by the control run (a) and the differences (ΔV) between the wind fields by three wind farm parameterizations and the wind field from the control run at 2000 UTC November 19 at the 4th model level (~100 m). (b) $\Delta V = V_{S2} - V_{S1}$, (c) $\Delta V = V_{S3} - V_{S1}$, (d) $\Delta V = V_{S4} - V_{S1}$, where V_{S1} , V_{S2} , V_{S3} , and V_{S4} are winds predicted by model scenarios 1–4.



Figure S3. Modeled TKE contour and vector winds by four model scenario run at 2000 UTC on November 19th, 2016 (m^2/s^2) , within the YWF (marked by white dashed line) and its surrounding that indicated by the white box in Figure 2 at the eta level 4 about 100m the reference vector is 10m/s. (a) TKE by the control scenario run (S1), (b) TKE by model scenario 2 (roughness length parameterization), (c) TKE by model scenario 3 (drag force parameterization with high density wind turbines setup), (d) TKE by model scenario 4 (wind turbine drag force parameterization with low density wind turbines setup).