# Determining Potential Wind Energy Caps

## Introduction and Purpose

When creating future wind energy projections for our target countries it’s critical that we consider what the maximum amount of wind energy each country can produce. Without understanding the maximum capabilities of each country our projections could pass beyond what’s realistically possible and thus rendering their estimates, and any resulting analysis from them, as useless.

Like any existing energy source there is a limit to how much can be built out and deployed based on available resources. With wind energy this can largely be simplified down to available land. For the purposes of this analysis, we will limit our scope to onshore wind and ignore offshore wind capacity limits.

## German Wind Energy Limits

Just as it has been the primary basis for our other analyses in this project, we will use Germany as the baseline for our projections into the emerging Poland market. Based on a study “Potenzial der Windenergienutzung an Land” (2011) by the German Wind Energy Association (BWE) and further analyzed by Beckius and Magnusson (2013) it’s been estimated that a realistic target for the total wind energy output of Germany would utilize a footprint equivalent to about 2% of German land area.

The 2% target equates to an estimated 189 GW capacity potential. While this capacity target may end up smaller than reality due to advancements in turbine technology or other factors, for the purposes of this project we will set the 189 GW capacity estimate as our cap for future energy potential.

## Poland Wind Energy Limits

Next, we need to estimate the realistic wind capacity for Poland. To do this, further research was done to determine if previous studies had been done to estimate a Polish wind energy cap. In a study by Ember Coal to Clean (Czyzak 2022) they determined that Poland currently can use only 0.3% of their total land for wind turbines due to current policies around turbine distancing. They estimated this capped their max capacity at 10 GW.

Since the 0.3% cap is largely due to legal frameworks and not technical or landscape constraints for the purposes of our analysis we’ll assume that in the near future Poland will adopt a similar policy to other European countries and can reach a similar 2% target we set for Germany. If we extrapolate from the 10GW estimate for .3% land use for Poland a 2% land use would place Poland total capacity target at ~67 GW

## Citations

Beckius, D., & Magnusson, D. (2013). The German wind energy market and its developers – a study of sourcing models, success factors and challenges. <http://www.diva-portal.org/smash/get/diva2:644677/FULLTEXT01.pdf>

Umwelt Bundes Amt (UBA) (2013), Potenzial der Windenergie an Land. <https://www.wind-energie.de/fileadmin/redaktion/dokumente/publikationen-oeffentlich/themen/01-mensch-und-umwelt/03-naturschutz/bwe_potenzialstudie_kurzfassung_2012-03.pdf>

Czyzak, P. (2022). Change is in the Wind. <https://ember-climate.org/app/uploads/2022/03/Briefing_-Unlocking-onshore-wind-in-Poland.pdf>