Project Proposal:

**Impact of a new minimum distance between wind turbines and settlements –** GIS Analysis with free geodata.

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**Background** (Describe your project topic and study area)  
Germany works on the shift from fossil energies to renewable energies. This is even enshrined in German laws. The state of Baden-Württemberg in southern Germany aims to get 10% of the needed energy out of wind energies produced within the state until 2020 (Windenergieerlass Baden-Württemberg 2012). In 2019 suggested the German Government a New Law for Wind turbines. The proposal commands a new minimum distance of wind turbines from settlements. How much area will be affected by these new requirements? Will the new minimum distance have an impact in impeding the goals for 2020 for Baden-Württemberg? Even though the proposal is not yet implemented, it is still an important topic.

The most important criteria to find a suitable location for a wind turbine park are the wind speed and the profitability considering the energy the park can produce and the coast of building and operation services. Criteria are divided in two groups: knock-out criteria and trade-off criteria. Knock-out criteria consider any form of settlement, traffic areas, energy piplines/cables, radio stations, military stations, airports (no matter which size), natur and landscape aspects, waterbodies, some sorts of forest (protected, to use for relaxation or soil protection) and areas where natural resources are exploited. Trade-off criteria consider also nature and landscape aspects, regional important relaxation areas and cultural and soil landmarks (Gesellschaft für Landmanagement und Umwelt mbh 2013). For many of these criteria a certain distance to wind turbine parks is necessary as proposed in Bergmann and Höfle (2013).

[Why is the project being undertaken? Describe an opportunity or problem that the project is to address.]   
**Location:** The research area should be near the City of Heidelberg, in the north of Baden-Württemberg. It is assumed that both the region of Mannheim and the region of Heidelberg are to small and the population density is too high, to be suitable for a wind turbine park. Because of that, the project work to analysis possible locations for wind turbines are performed within the regions of Rhein-Neckar-Kreis and Neckar-Odenwald-Kreis.

**Literature Research:** (Perform a literature research to find suitable methods)

The potential of free geodata in comparison with official geodata was investigated by Bergmann & Höfle (2013). They conclude that the free geodata are not as exact as official data, but the spatial location is nearly identical. can be used to detect areas with potential locations of wind turbines.

With the 1000m minimum distance noise surveys are no longer necessary (Lechleitner & Bohm 2016).

The optical impact of wind turbines was analysed in a GIS-based approch (Taeger & Ulferts 2017).

**Data Research:** (Perform a data reseach to find suitable datasets)

For the project analysis free geodata like OpenStreetMap will be used, because it is free, easier to access and has already been used in analysis of potential wind turbines location (Bergmann & Höfle 2013).

**Tools:** (Find suitable software tools to implement your method (e.g. QGIS, GRASS tools)

Download, Merge, dissolve, Buffer, elevation, etc

**Target/Achievements:**

To achieve the goal of more renewable energies it is necessary to find suitable places for new wind turbine parks. The target of this project is to calculate the total area, which is lost as potential locations for wind turbine parks. Is the new distance creating a big (significant) impact? Are there other more suitable minimum distances then the from 2012? Has the newly proposed distance an impact.

**Sources:**

* Bergmann, M. & Höfle, B. (2013): GIS-gestützte Standortplanung von Windenergieanlagen mit freien und amtlichen Geodaten. In: Strobl, J., Blaschke, T., Griesebner, G. & Zagel, B. (Hrsg.) (2013): Angewandte Geoinformatik 2013. Berlin/Offenbach (Herbert Wichmann Verlag / VDE Verlag GMBH).
* Gesellschaft für Landmanagement und Umwelt mbh (2013): Standortanalyse für Windkraftanlagen zur Ausweisung von Konzentrationszonen für die Stadt Neustadt an der Aisch Westmittelfranken Bayern. Erläuterungsbericht. Weikersheim (Klärle).
* WINDENERGIEERLASS BADEN-WÜRTTEMBERG (2012): Gemeinsame Verwaltungsvorschrift des Ministeriums für Umwelt, Klima und Energiewirtschaft, des Ministerium für Ländlichen Raum und Verbraucherschutz, des Ministeriums für Verkehr und Infrastruktur und das Ministerium für Finanzen und Wirtschaft. http://gewerbeaufsicht.baden-wuerttemberg.de/servlet/is/37557/Windenergieerlass\_-\_Ausser\_Kraft\_seit\_09-Mai-2019.pdf (26.11.2019).
* Lechleitner, M., & Bohm, R. (2016). Kann durch Landesrecht ein Mindestabstand zwischen Windkraftanlagenund Wohngebäuden festgesetzt werden? (Wahlperiode Brandenburg, 6/21). Potsdam: Landtag Brandenburg,Parlamentarischer Beratungsdienst. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-50871-8>
* Taeger, S., & Ulferts, L. (2017). Von Windparks umzingelt - oder nicht?‒ ein GIS-gestützter Ansatz zur Ermittlung der optisch bedrängenden Wirkung von Windenergieanlagen im Zuge der Regionalplanung. AGIT Journal, 3, 130-141.

•Which GIS methods were applied?

•Which criteria where considered?

•Which data sets were used to represent these criteria?

•Which FOSSGIS tools exist to implement these methods? (e.g. GRASS GIS / QGIS tutorials, GitHub)