

# **BIM and GIS - Bidirectional Data Exchange for Renewable Energy Planning**

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## **SUMMARY**

According to the German Federal Ministry of Economics and Climate Protection (BMWi), renewable energies represent an important source of electricity in Germany. In 2022, more than 40% of gross electricity generation was already covered by renewable energies. Generation by wind power has a special significance, as about 50% of the electricity generated by renewable energies comes from wind power. This energy source is to be expanded in the coming years, in order to make Germany less dependent on the import of fossil fuels in the future. In order to achieve this goal, a number of laws already came into force, setting binding targets for onshore wind energy areas. Furthermore, the approval process for wind turbines got simplified.

In addition to the necessary approval procedures and determination of the usable areas for onshore wind energy, the complex, multi-layered and lengthy design, planning, application and construction phases of the wind farms play an essential role in the implementation of the desired goal. The research project "BIM and GIS - bidirectional data exchange for renewable energy planning" aims to considerably shorten the phases from design to realization of wind farms by creating a link (link model) between the Building Information Modeling (BIM) and Geographical Information System (GIS). The project focuses on the development of a procedure for an integrated, media-interruption-free design, planning and construction execution process for wind turbines and its implementation in the form of a software product. A loss-free exchange of information between BIM and GIS in real time and the provision of data in an open interface in IFC format (Industry Foundation Classes), are the most essential requirements for the product.

The objective is to connect the BIM and GIS domains without the transfer of data. Information is retained within the domain model and only shown in the other domain. This minimizes data loss and the creation of classes or attributes in either system, which are not naturally present. As an

industrial partner of the University of Applied Sciences Erfurt, M.O.S.S. Computer Grafik System GmbH offers moGI, a GIS program. Planners can utilise moGI to develop and design wind farms. On the BIM side, we integrate the open BIMserver, which is connected to Autodesk Revit via a plug-in. The link model between the BIMserver and moGI acknowledges all alterations in the planning process and implements them to the appropriate system. This presents planners with necessary real-time information, without switching to another planning software.

To achieve the objective of the project "BIM and GIS - bidirectional data exchange for renewable energy planning", an analysis was carried out to identify the data required for design, planning, approval and construction, as well as the development of the necessary technologies and interfaces to connect the systems BIM and GIS with a link model.