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Legal Framework for Dismantling and Recycling of Wind Turbines in Germany

Office franco-allemand pour la transition énergétique

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Approval of Wind Turbines

- **Approval according to construction law**
  - All plants are approved by the **building supervisory authority** of each Federal State

- **Approval according to Federal Immission Control Act**
  - Plants with a **height above 50 metres** also need an approval according to the above act
  - Plants with a **height below 50 metres** are also subject to certain duties according to the Federal Immission Control Act
  - *When installations are decommissioned, the operator has to restore the due state of the land.*

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Provisions of Building Code

Quelle: (Ramboll)

- **§ 35 (5) sentence 2**
  - **Soil sealing** is to be limited to the minimum amount necessary
  - The operator has to issue a declaration of commitment to dismantle the installation and **remove all soil sealing** when permanently abandoning the site

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Waste Management Act

Quelle: (Ramboll)

- **High quality recycling (§ 6)**
  - Waste prevention by using durable materials and continuous maintenance
  - Re-use of components
  - Recycling of as many plant components and materials as possible
- **Non-hazardous re-use (§ 7)**
  - Safe handling of polluting working materials
  - When dismantling dust release has to be minimized
  - Compliance with standards for noise protection

Specific Waste Regulations

- Commercial Waste Ordinance
- Waste Oils Ordinance
- Waste Wood Ordinance
- Regulation of certain fluorinated greenhouse gases (EU) and national ordinance
- Battery Act
- Electrical and Electronic Equipment Act

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Research Project “WEAcycle“

“Development of a concept and policies for preserving resources when dismantling wind turbines”*

- Project commissioned by Environment Agency (UBA)
- Main contractor: Ramboll Environment & Health GmbH
- Project started in 2017 and was published in Oct. 2019

- **Main Goals**
  - Prognosis of amount of different waste materials until 2040
  - Prognosis of disposal costs until 2040
  - Technical requirements for an environmentally safe and resource preserving disposal and ensuing recommendations i. a. for organizational and financial responsibilities

*https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2019_10_09_texte_117-2019_uba_weacycle_mit_summary_and_abstract_170719_final_v4_pdfua_0.pdf

Main Recommendations I

- **General Recommendations**
  - Development of **technical guidelines** for dismantling and disposal of materials
  - Development of **operational standards for dismantling and recycling**
  - Further research to optimize the **management of specific waste streams**

Quelle: (Ramboll)

Main Recommendations II

- **Technical Issues**
  - **Scope of dismantling** of foundation, cable routes, access routes and crane assembly pad
  - **Minimum Standards** regarding the disintegration of rotor blades, dismantling of tower and foundations as well as standards for occupational safety, noise and environment protection

Quelle: (Ramboll)

Main Recommendations III

- **Information requirements**
  - There are a great variety of installations and models adapted to various geological sites. Thus each dismantling project has individual requirements.
  - **Standard requirements** for the information provided by the manufacturer
    - Information could be included in a **standardized catalogue of data** to be transmitted in case of change of ownership
    - Information could be **required for receiving an approval**
    - Information could be included when reporting to the **register for market data on electricity producers**

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Information required for dismantling

Information should comprise the following data:

- Type, rated output, rotor diameter, hub height
- Weight and material composition of each rotor blade
- Local distribution of carbon fibres within the rotor blade
- Weight of hub
- Weight of nacelle, type of generator
- Type and quantity of working materials, lubricant, gear oil with information on drainage
- Where applicable reference to industrial magnets
- Weight of tower, construction mode, proportion of steel and concrete, segmentation
- Drawing of crane installation pad and access routes
- Drawing of cable routes (incl. cable types, diameters)

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Calculation of Provisions for Dismantling

There are several ways in which operators calculate the amount of provisions necessary for dismantling. Some federal states have established specific formulas.

For example:

- **Hessen, Sachsen-Anhalt 2013**
  - Height of hub (metres) x 1000 (Euro) = security
- **Assessment of the Federal Administrative Court, 2012**
  - About 30.000 (Euro/MW) x installed capacity (MW) = security

Generally, WEAcycle recommends to **calculate the costs for dismantling in more detail** as practiced so far. The costs vary e. g. with the **height of the tower** or the **material composition** of the technical parts.

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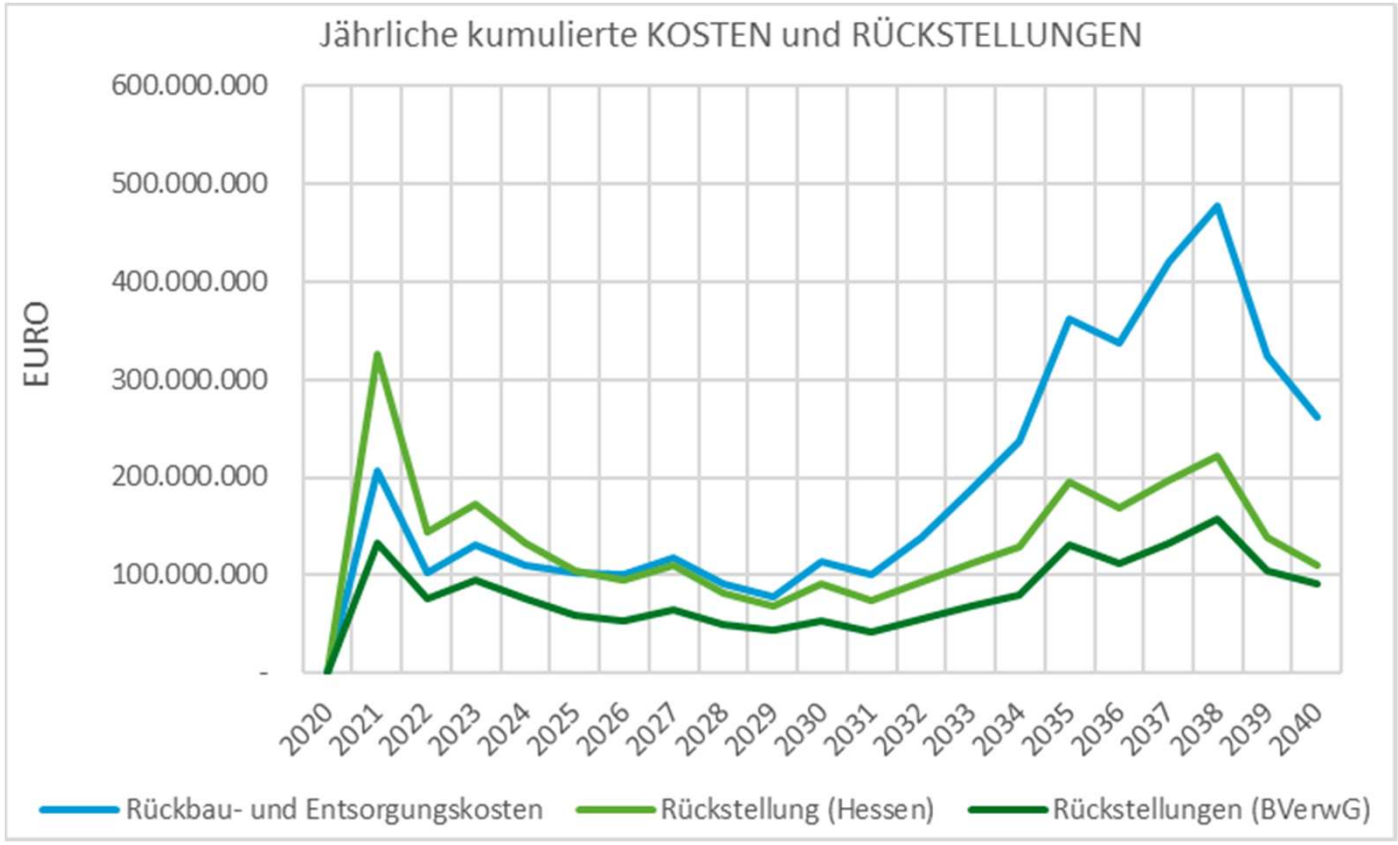
Comparison of Scenarios for Provisions for and Costs of Dismantling



According to the calculations of WEAcycle future costs could differ from current provisions depending on mode of calculation.

Further Steps

- **Development of guidelines and standards**
  - The **Federal States Committee for Soil Protection** has commissioned the formulation of guidelines regarding the issues to be observed when dismantling wind turbines with regard to soil protection
  - Development of **DIN SPEC 4866** “Sustainable dismantling disassembly, recycling and recovery of wind turbines”
- **Further research**
  - **UBA** is planning a **further research project** to clarify so far unresolved issues
  - The recommendations could be used by the Federal States as guidelines for the approval process of their competent authorities
  - Further research will be done on **recycling of rotor blades** made of glass and/or carbon fibre-reinforced plastic

Thank you for your attention!
Any questions …