Legal Framework for Dismantling and Recycling of Wind Turbines in Germany

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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.
• § 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
• **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
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

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*
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
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**
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)
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.
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 ...