**Title:** Analysis of Harmonics in wind power plants

**Initial description summary:** The new wind power plants rely on power electronics which do not provide an ideal sinusoidal waves forms. Because of this and the strict requirements of power quality demanded by the Transmission System and wind power plant operator, determine the harmonic content of wind power plants based on Full Rated Converter Wind Turbines is of relevance. The **main objective is to understand and analyze the harmonic content taking place in wind power plants when installing FRC-WTs**. Standards and grid codes review regarding harmonic distortion must be performed. Also, some simplified modeling of wind turbines for harmonic content analysis and simulation for verification is expected.

1. **Theoretical introduction**
   1. Power electronics in WPP
      1. Nonlinearity of power electronics elements
      2. Different WPP converters solutions
         1. brief description of different solutions
      3. Full Scale Converter approach for Wind Turbines
         1. different FRC converters
   2. Harmonics
      1. Introduction
      2. Mathematical description
      3. Harms caused by harmonics in Power System
      4. Sources of harmonics in WPP
         1. full-scale converters
         2. resonance
      5. Description of harmonics in WPP
         1. description of harmonics from converters
         2. description of harmonics from resonance phenomena
            1. frequency scan
            2. harmonic resonance modal analysis
      6. Approaches to mitigate harmonics emission from WPP
         1. during production in converters
         2. filtering
   3. Power quality requirements
      1. review of EU requirements
2. **Control strategies to limit harmonics emission**
   1. full-scale converters control
      1. generator side converter
      2. grid side converter
   2. harmonic filters control
   3. WPP inner topology control
3. **Modeling**
   1. Full-scale converter
   2. electrical
4. **Results of simulations**