Geophysical Research Abstracts,
Vol. 11, EGU2009-12484, 2009
EGU General Assembly 2009

Wind farms on peatland: Effect of Management Practices on Carbon Emissions

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The Scottish Government has set ambitious targets for electricity generation by renewables (Scottish Government, 2007). To meet the interim target of 31% electricity generation from renewable sources by 2011 and 50% by 2020, a substantial increase in the number of onshore wind farms is likely to be required. In Scotland a large number of proposed wind farm developments are on peatlands. One concern raised over the development of wind farms on peatlands questions whether the expected saving in carbon emissions due to electricity generation using wind power will be offset by increased carbon losses associated with the development. If carbon payback time exceeds the life time of the wind farm, then the development represents a net carbon cost. However, our calculations show that even on peatlands, good management practices can be used to minimise carbon losses and achieve carbon payback times that are significantly less than the lifetime of the wind farm. Using floating roads instead of excavated roads can minimise the carbon loss. Restoration of the site could potentially halt carbon loss processes, so allowing carbon dioxide emissions to be limited to the time before the habitat and hydrological conditions are restored. If the site is restored after decommissioning, the carbon payback time can be reduced by 50%. Habitat improvement at disturbed sites can significantly reduce carbon emissions, potentially preventing further losses and increasing carbon stored in the improved habitat. We present the calculations of carbon losses at a range of wind farm developments across Scotland, differing in soil type, climate, management practices and site design. We assess the impact of management and design on carbon emissions, and demonstrate the importance of good site management and design to reducing carbon emissions, especially for wind farms sited on peatlands.