

## Windscaapes: Kite aerial photography for assessing environmental conditions of large wind farms

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Kite aerial photography (KAP) is a low-cost means to acquire high-resolution imagery from a bird's-eye view (Aber and Aber 2009). KAP is one means of small-format aerial photography, which has proven quite useful for documenting all types of natural and human resources (Aber et al. 2010). We fly various kites 50-150 m above the ground to acquire airphotos using light-weight radio-controlled camera rigs. KAP allows vertical as well as oblique imagery in all directions relative to the ground target, sun position, and shadows. This unique vantage, in close proximity to large turbines, is especially suitable for oblique views of wind farms and their surroundings.

We have followed the global growth wind energy since the Danish model emerged in the late 1970s. During the past decade, we have applied KAP to document the physiographic settings and environmental conditions of large wind farms in many locations, particularly in the Great Plains of the United States. KAP is an effective means to portray wind turbines within the landscape and their relationships to human activities, land use, and structures. Where properly situated, designed and operated, modern wind farms cause minimal environmental impacts. However, some older wind farms have notable environmental and aesthetic consequences. We will present KAP of wind energy developments in the central and western United States as well as Denmark.



Wind turbines situated in an agricultural landscape close to Ramme Dige, a well-known archaeological complex near the North Sea coast in western Denmark. Ramme Dige includes several Neolithic and Bronze Age burial mounds (right) and the remains of an Iron Age wall and ditch (left). Kite airphoto by SWA and JSA (September 2005).



Flat Ridge Wind Farm on the High Plains of south-central Kansas. The wind farm occupies a mesa-like ridge that supports a mixture of crops and cattle grazing. Operation of the wind farm has minimal impact on the agricultural land use. Kite airphoto by SWA and JSA (March 2011).



Wind farm at Earl Park, Indiana is situated on the divide between the Great Lakes and Ohio drainage basins. Gently rolling ground moraine forms the substrate for agricultural fields with ripe soybeans. Kite airphoto by JSA (September 2012).

## References

- Aber, J.S. and Aber, S.W. 2009. Kansas physiographic regions: Bird's-eye views. Kansas Geological Survey, Educational Series 17, 76 p.
- Aber, J.S., Marzloff, I. and Ries, J.B. 2010. Small-format aerial photography: Principles, techniques and geoscience applications. Elsevier, Amsterdam, 266 p.