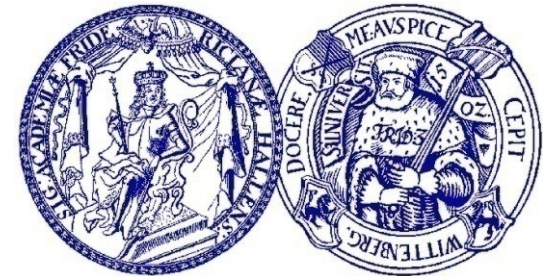


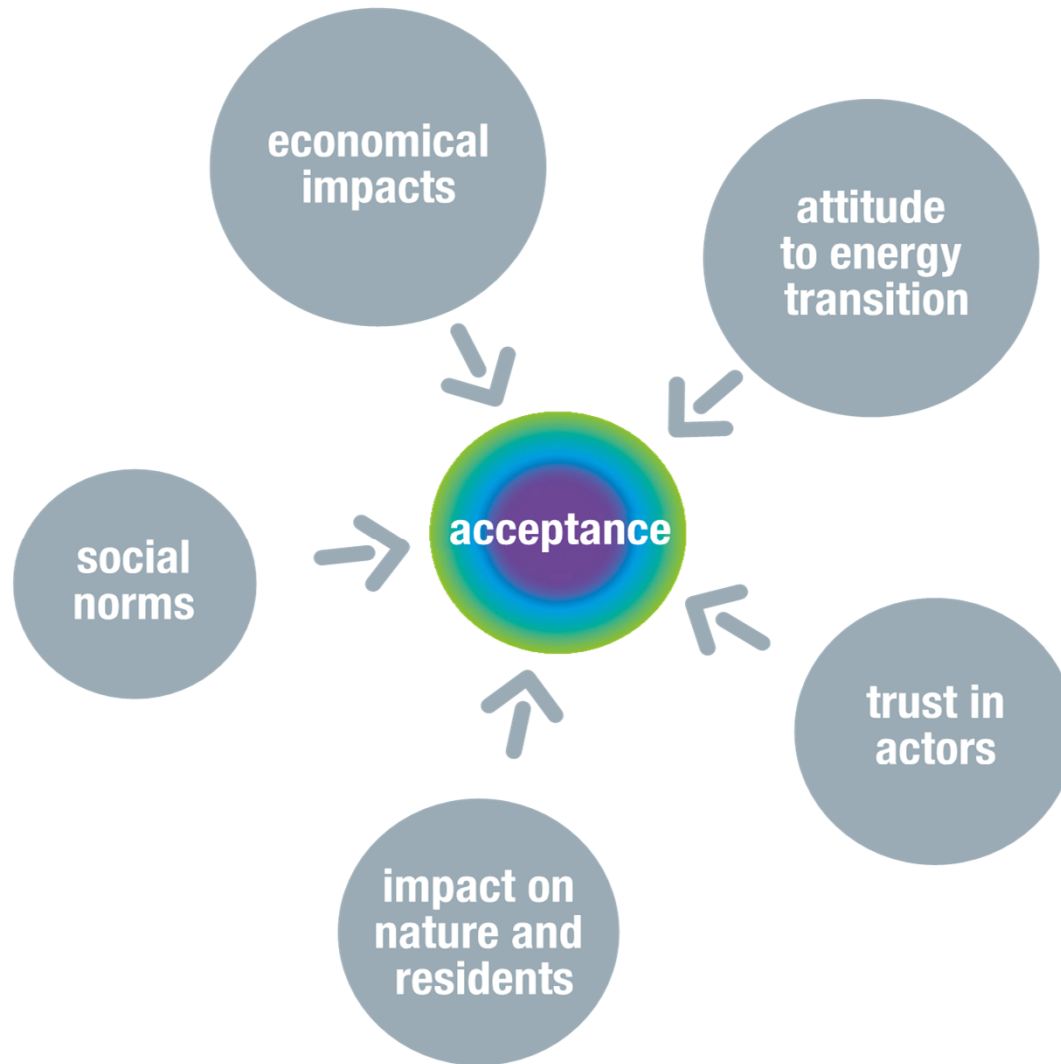
Increasing Acceptance of Demand-based Night Marking

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Interdisciplinary acceptance model



158 residents, multiple regression, $R^2_{adj.} = 0.76$

Acceptance factors

- economic impacts (beta = .27): real estate prices, agriculture, tourism, other local economic sectors
- implementation of the energy transition (beta = .27): fair distribution, energy policy coordination, conflicts
- trust in actors (beta = .19): credibility

- impact on nature and people (Beta = -.19): conflicts over the protection of nature, landscape, residential environment; annoyance due to immissions

- social norms (beta = .14): on site opinion

Recommendations for increasing acceptance

- participation in the planning process
- financial participation
- embedding in local renewable energy projects
- communicate nature conservation concerns, minimize negative impacts on people, nature, and landscape
- create trust

Annoyance due to wind turbine (WT) immissions

mean, scale 0–4	Germany, Switzerland	U.S.
aircraft obstruction markings	1.16	0.47
shadow flicker perceived on property	1.98	1.25
landscape change	1.35	0.70
WT noise perceived on property	1.46	1.44

Strongly annoyed residents due to wind turbine (WT) immissions

definition: strongly annoyed = annoyance ≥ 2 + symptoms	Germany, Switzerland	U.S.
aircraft obstruction markings	1.2 %	1.2 %
shadow flicker	0.2 %	0.2 %
landscape change	0.0 %	1.5 %
WT noise	4.3 %	1.1 %

Correlations with annoyance stress due to obstruction lights

Germany, Switzerland: 20 wind farms, N = 360

- stressed by landscape change ($r = .43$)
- stressed during planning and construction process ($r = .51$)
- attitude toward the local wind farm and WTs in general ($r = -.65, -.51$)
- stressed by shadow casting or WT noise, number of visible WTs ($r = .61, .63, .44$)
- considering of personal and community interests ($r = -.34, -.39$)

Preference for demand-based obstruction lights

- Germany, 13 wind farms, 2009: 58.6 %
- Denmark, National Test Center Østerild, 2016: 56.3 %

Conclusions

demand-based night marking can...

- decrease annoyance
- increase acceptance of the wind farm
- increase trust with operators and authorities

Recommendations

obstruction lights in general

- LED, colour markings
- synchronisation
- light intensity adjustment

demand-based night marking in particular

- announce and well explain demand-based night marking in the planning process
- inform residents correctly and transparently in the case of malfunction
- but, there will continue to be residents who feel annoyed by obstruction lights

Recommendations

consider other factors influencing acceptance

- transparent, fair planning process
- involvement of locals as experts
- take the concerns and worries of local residents seriously
- financial participation
- attitude towards the wind farm

An aerial view from the top of a wind turbine tower. In the foreground, two large, cylindrical navigation lights with clear lenses and metal grilles are visible, mounted on a grey metal structure. The background shows a vast landscape with green fields, a road, a small town with a church, and two wind turbines in the distance under a cloudy sky.

Thank You!

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