# NATURE CONSERVATION AS CRITERIA IN WIND ENERGY SCENARIOS

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# NATURE CONSERVATION AS CRITERIA IN WIND ENERGY SCENARIOS

## Overview

- Project outlines
- Scenario development and site selection for wind turbines
- Conclusion

# Project outlines

- Project title: “Szenarien für den Ausbau der erneuerbaren Energien aus Naturschutzsicht“ (eng.: Scenarios for the roll-out of Renewable Energys from Nature Conservation View)
- Project start/end: 06/2016 – 09/2018
- Funded by the Federal Agency for Nature Conservation
  - Contact Kathrin Ammermann, Department II, 4.3
- Project partners:

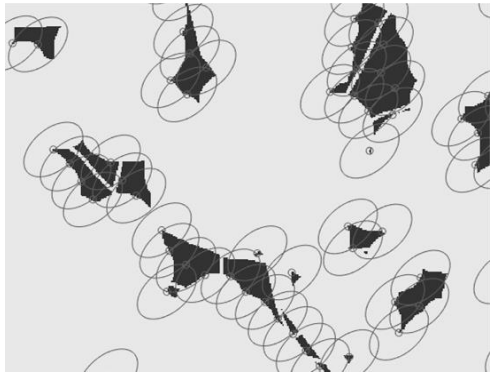
Hochschule Ostwestfalen-Lippe University of Applied Sciences | Fraunhofer IEE | bosch & partner

leading partners

Christian Westarp | Lenné3D® | PSY:PLAN Institut für Architektur- und Umweltpsychologie

# Scenarios in general

- General idea of the scenarios:
  - Generic scenarios to investigate the influence of natural conservation as a key factor
  - General boundaries

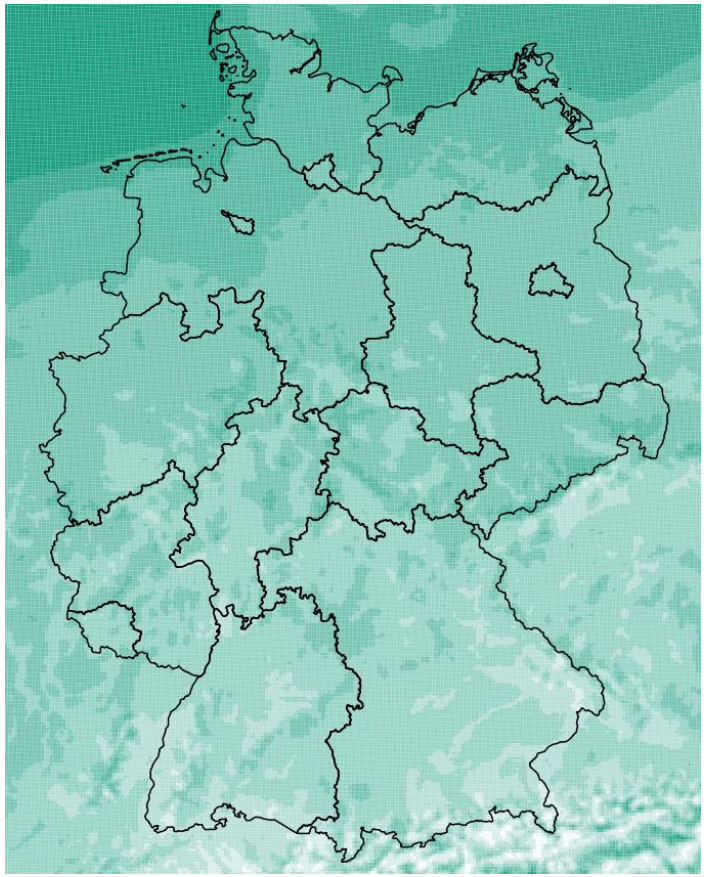


Usable area

Ratio

- 2 steps to locate wind turbines:
  - Disaggregation energy on federal states
  - Within each state, choosing the “best” positions

# Scenario „Efficiency“



Average wind speed

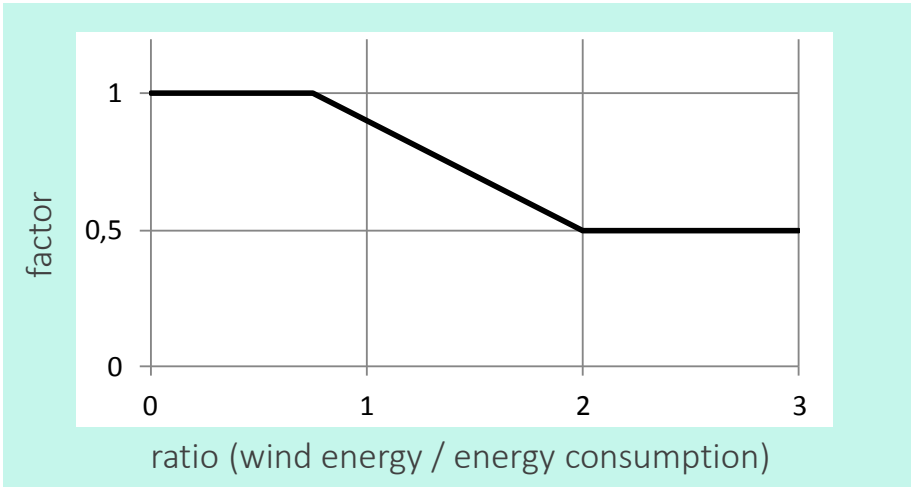
Wind turbines in scenario „efficiency“
in total: 18.040

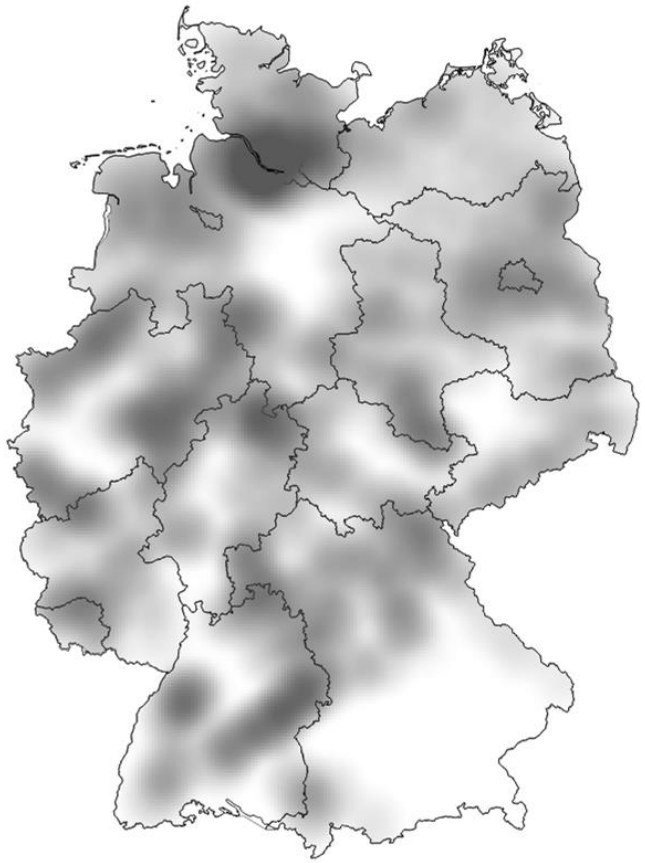
# Scenario „Consumption“

Potential position

Actual position

Electrical energy consumption



Wind turbines in scenario „consumption“
in total: 21.254

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# Nature conservation – how to address on a national level?

potential conflicts with
nature conservation





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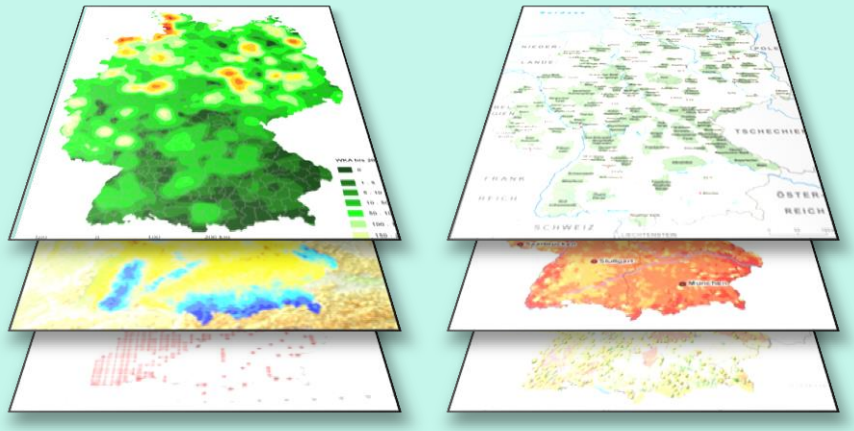
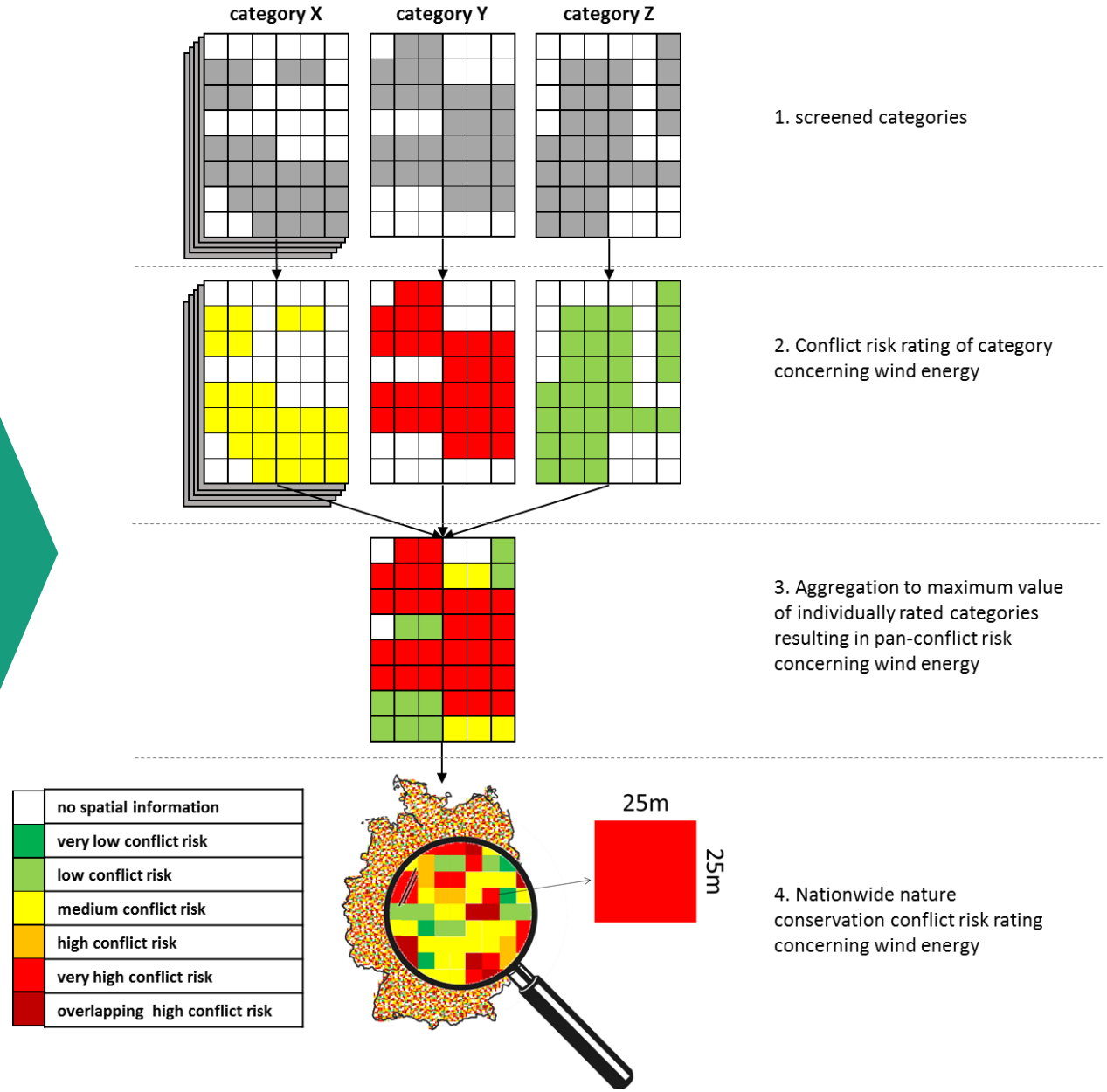
# Nature conservation – approach



National data – spatial information on nature conservation issues

Rating the indicated conflict risk of spatial categories concerning wind energy







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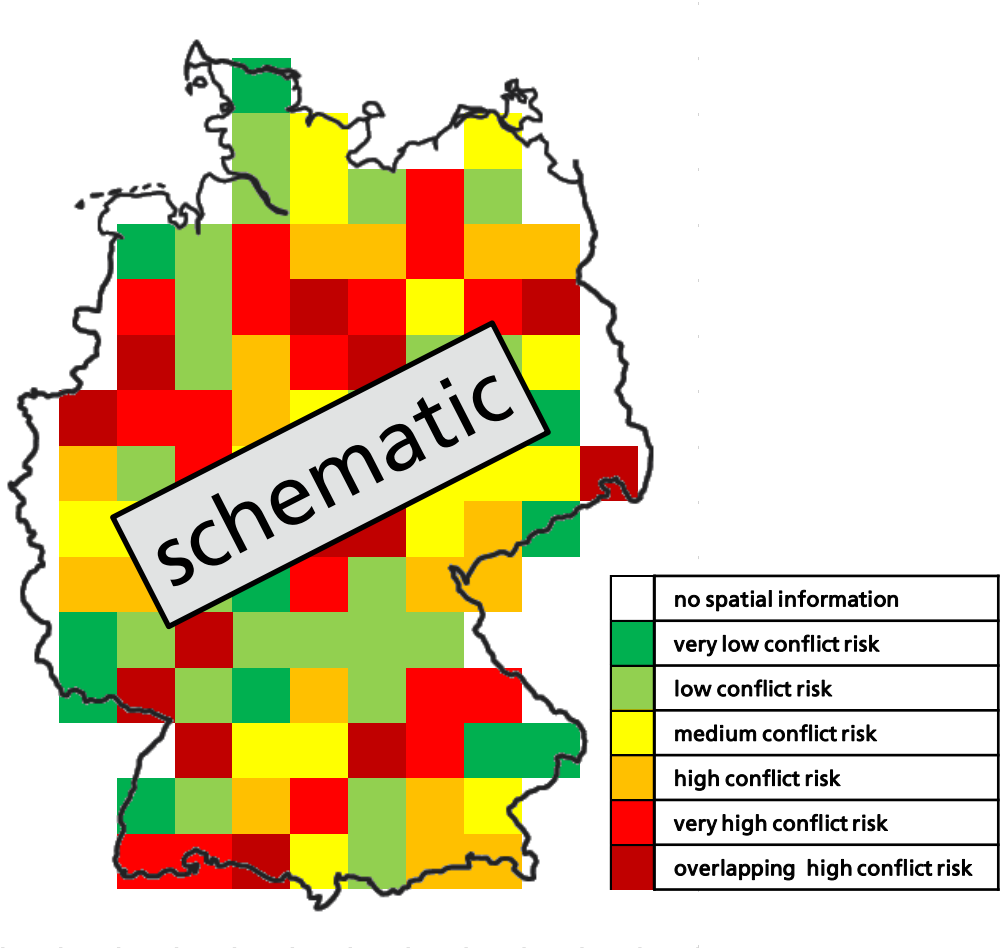
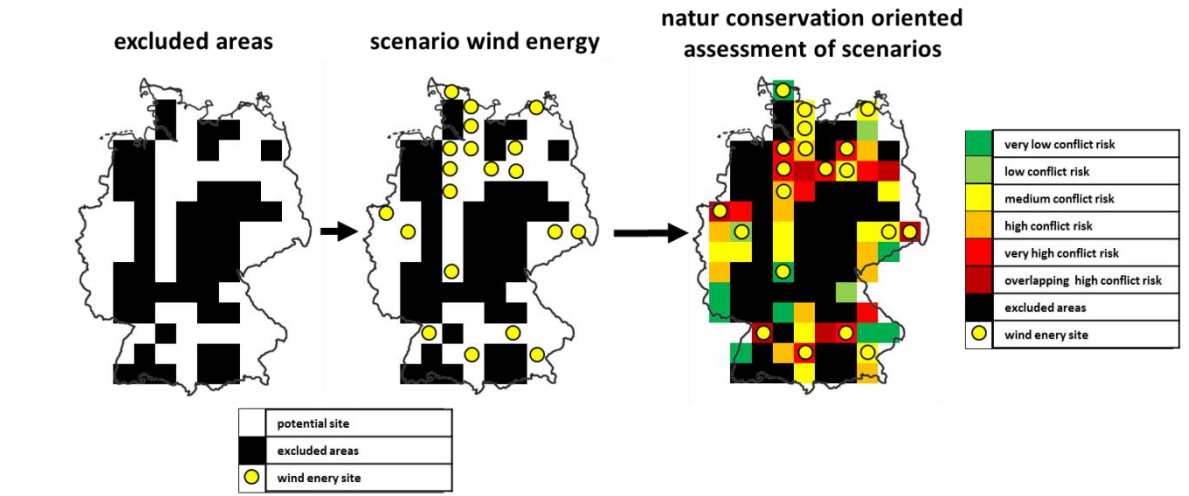
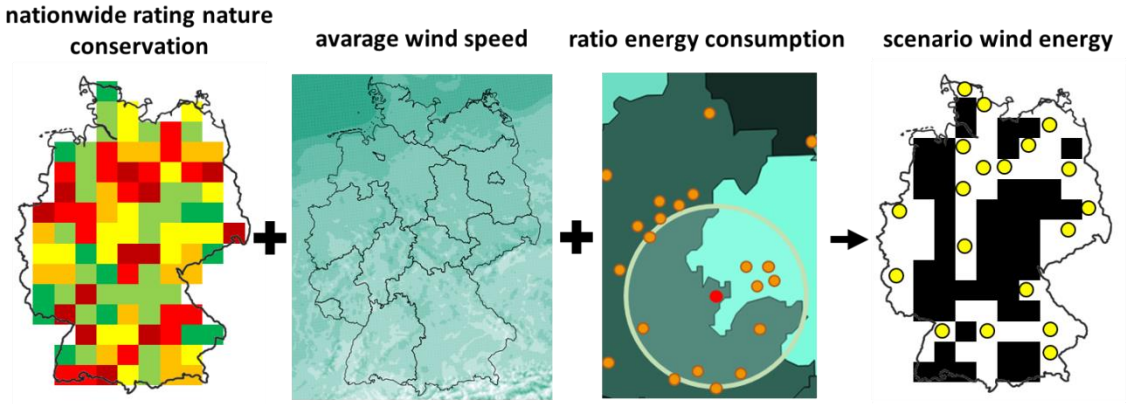
# Nature conservation – results




Nationwide rating of nature conservation conflict risk







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# Overview criterias

Scenario „Efficiency“

- Wind speed

Scenario „Consumption“

- Wind power
- Ratio energy consumption

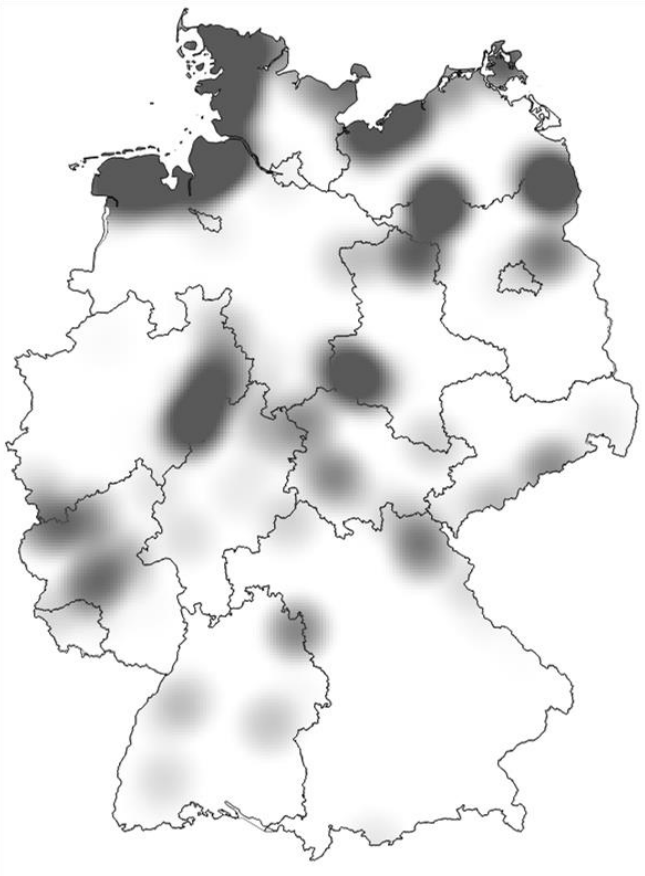
Scenario „Conservation/Efficiency“

- Wind power
- Nature conservation

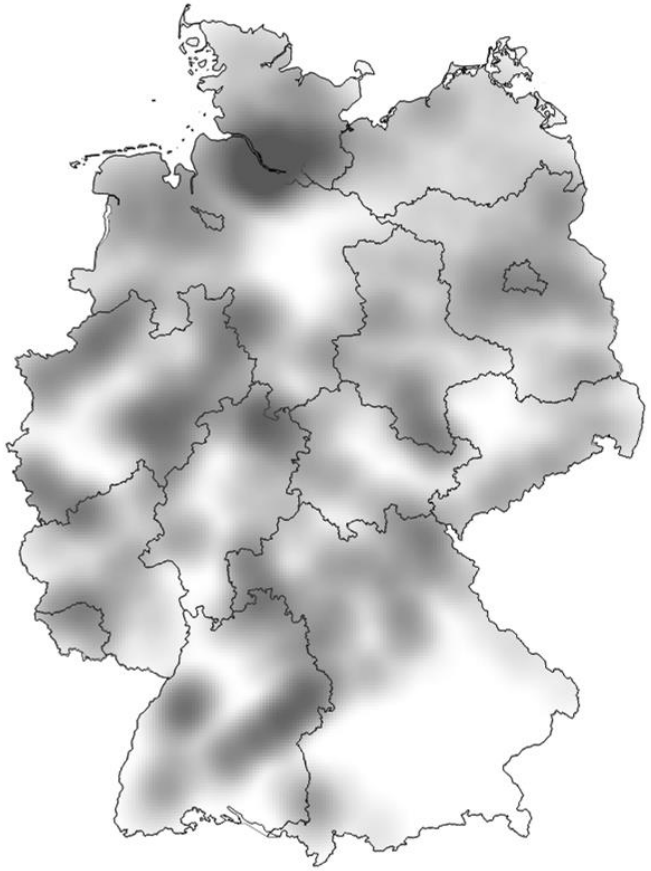
Scenario „Conservation/Consumption“

- Wind power
- Ratio energy consumption
- Nature conservation

# Nature conservation as criteria



Wind turbines in scenario
“Efficiency”
in total: 18,040



Wind turbines in scenario
“Consumption”
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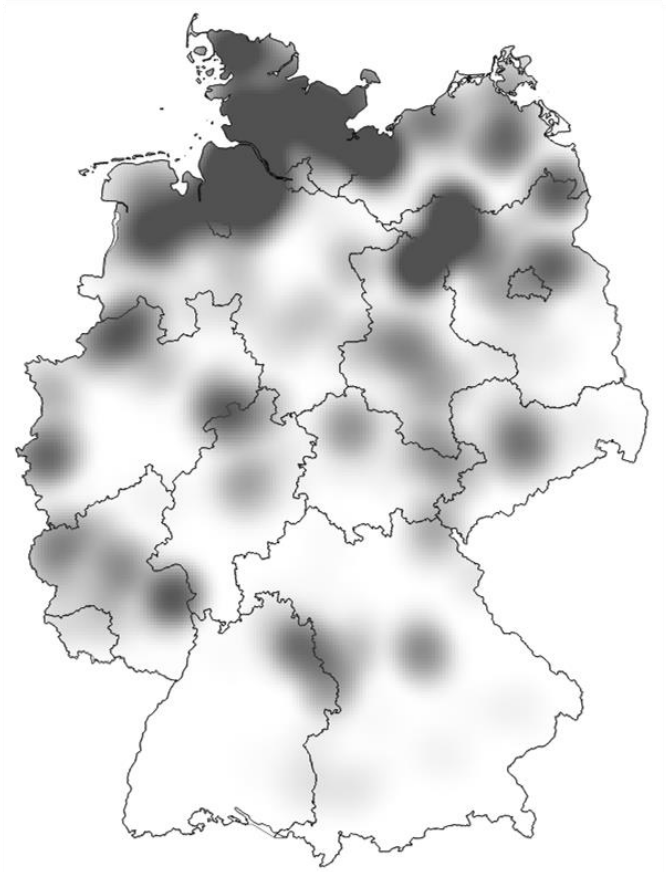
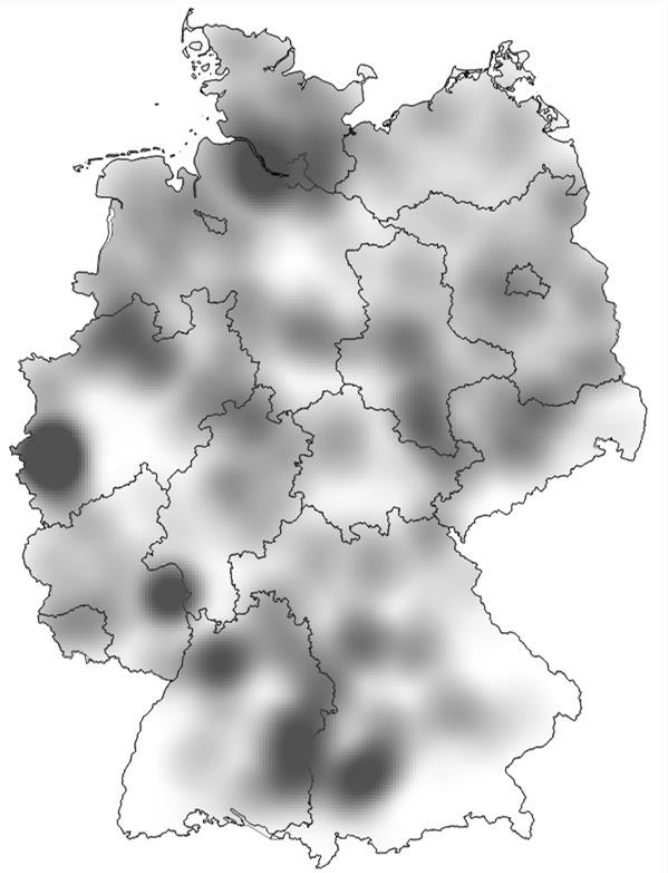
# Nature conservation as criteria



Wind turbines in scenario
“Conservation/Efficiency”
in total: 20,305



Wind turbines in scenario
“Conservation/Consumption”
in total: 23,788

# Example of results in numbers

**„Efficiency“**

| | | Risk Class: Nature conservation | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | Sum | |
| Wind turbine type | Low-wind | 0 | 0 | 0 | 5 | 10 | 0 | 15 | |
| | Middle-wind | 0 | 117 | 1,543 | 3,476 | 1,646 | 3,683 | 10,465 | |
| | High-wind | 0 | 294 | 2,041 | 2,753 | 1,725 | 747 | 7,560 | |
| | **Sum** | **0** | **411** | **3,584** | **6,234** | **3,381** | **4,430** | **18,040** | **Quantity** |
| | | 0 | 822 | 10,752 | 24,936 | 16,905 | 26,580 | **79,995** | **Conflict risk** |

**„Conservation/ Efficiency“**

| | | Risk Class: Nature conservation | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | Sum | |
| Wind turbine type | Low-wind | 0 | 1,134 | 2,164 | 95 | 0 | 0 | 3,393 | |
| | Middle-wind | 0 | 1,307 | 11,648 | 849 | 31 | 0 | 13,835 | |
| | High-wind | 0 | 365 | 2,685 | 16 | 11 | 0 | 3,077 | |
| | **Sum** | **0** | **2,806** | **16,497** | **960** | **42** | **0** | **20,305** | **Quantity** |
| | | 0 | 5,612 | 49,491 | 3,840 | 210 | 0 | **59,153** | **Conflict risk** |

# Conclusion

- What was achieved:
  - Development of generic scenarios and spatial distribution of wind turbines
  - Development of methodology for
    - Nationwide rating of nature conservation conflict risk
    - Modeling of multi-criteria scenarios with high-resolution site selection

# Thank you!

Nature conservation can be taken into account as
an equal key factor in nationwide scenario building.

What are options for implementation in policy and strategic planning?