how many wind turbines is a region able to tolerate?

balance between supporting sustainability objectives and the assessment of environmental effects

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outline

- Challenge in assessing a green power technology
- Contribution to sustainable development vs. impacts on the environment
- Status of wind energy development in Austria
- Proper assessment instruments?
- Approaches towards spatial policies
- Ideas

global status of renewables

Country	Total installed by the end of 2002	Total installed during 2003	Total installed by the end of 2003
Germany	11,994	2,645	14,609
USA	4,685	1,687	6,374
Canada	236	81	317
Spain	4,825	1,377	6,202
India	1,702	408	2110
Austria	**140**	**276**	**415**
Europe total	**23,308**	**5,467**	**28,706**
North America total	**4,921**	**1,768**	**6,691**
Global total	***31,228***	***8,133***	***39,294***

Source: EWEA. AWEA

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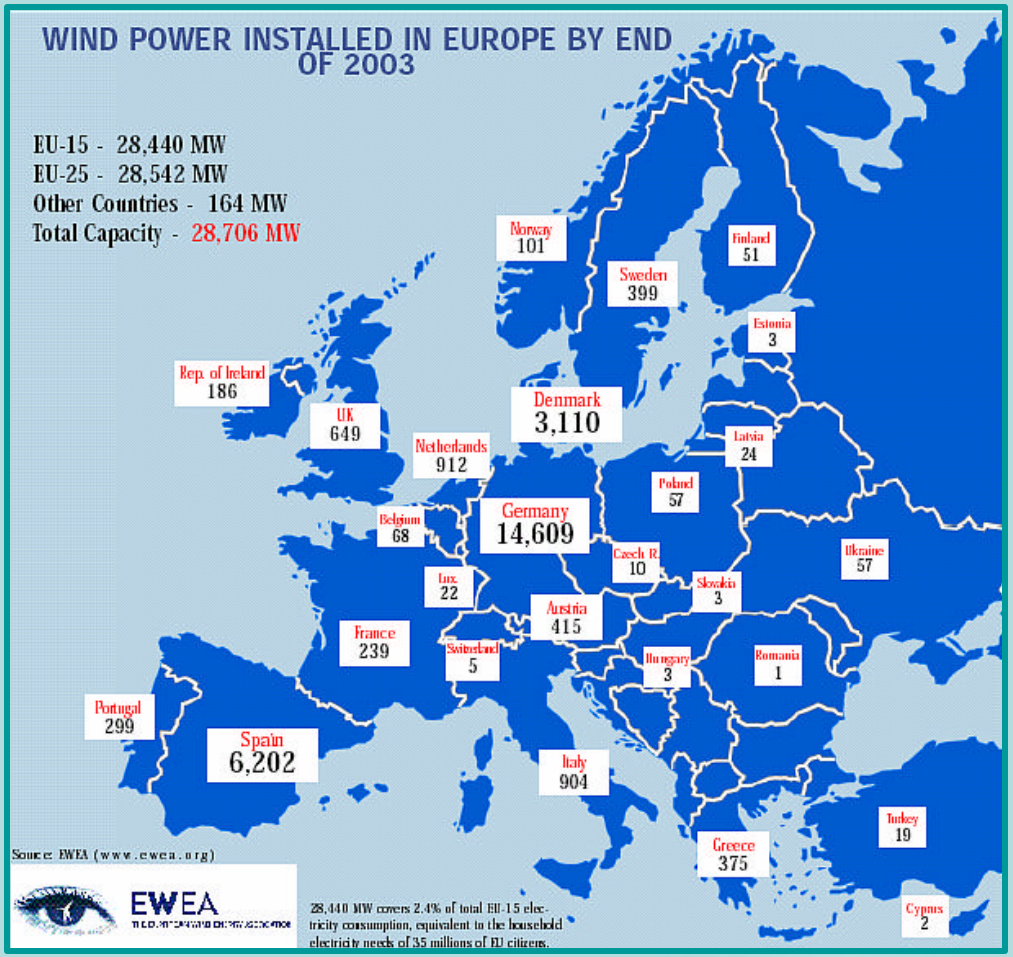
installed wind power in europe



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global renewable resource base (exajoules/year)

Resource	Current use[a]	Technical potential	Theoretical potential
Hydropower	10.0	50	150
Biomass energy	50.0	>250	2,900
Solar energy	0.2	>1,600	3,900,000
Wind energy	0.2	600	6,000
Geothermal energy	2.0	5,000	140,000,000
Ocean energy	-	-	7,400
TOTAL	62.4	>7,500	>143,000,00

a. The current use of secondary energy carriers (electricity, heat and fuels) is converted to primary energy using conversion factors involved.

Adapted from: Goldemberg, J. (ed) 2000. World Energy Assessment: Energy and the Challenge of Sustainability. New York: UNDP.

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towards sustainability

- Climate experts recognize wind power as an economic solution to global warming
- Trend to substantially increase the share of renewable energy sources
- New ambitious targets for the share of renewable energy sources are set for 2020 from the EU
- The EU is committed to a strong policy framework
  - Support for the Kyoto Protocol
  - Green Paper on the Security of Energy Supply
  - White Paper 'Energy for the Future: Renewable Sources of Energy'
  - Community Legislation directives

wind energy has come of age

- State-of-the-art modern technology
- Generating capacity up to 5 MW
- Larger machines with fewer components
- Growth rate of over 35% over the past 5 years
- Low costs – competitive with coal and gas

common wind turbine issues

- Acoustic noise emission
- Visual Impacts
- Impact on bird behaviour, Avian Mortality
- Shadow Flicker
- Effects on Nearby Electrical Equipment

overview austria

- Located in Central Europe
- National territory of about 84 000 km^2 with about 8 million inhabitants
- Only about 37% of Austria's national territory is suitable for permanent settlement
- High Population density
- Wind measurements show two regions in particular where high productivity can be expected

res in austria

- 70% of Austria´s electricity is already produced by renewables (hydropower)
- Target to raise share of RES up to 78.1% until 2010
- Legal framework:
  - 'eco-electricity' law (in compliance with EU RES-E directive), effective from 01/01/2003 with guaranteed feed-in tariffs
- Total installed power 415 MW (01/01/2004) from 318 wind turbines

assessment instruments

- Threshold for EIA: - 20 MW installed power or
  - 20 turbines
- Without EIA: different permissions from several authorities
- Investigation at the project level vs. cumulative effects
- Current planning system does not provide for legal site planning regarding implementation of SEA

case studies

- Initiation of case studies to value impacts of multiple wind farms
- 'zoning out' approach:
  - certain distances to roads, dwellings
  - landscape amenity
  - wildlife disturbance
- Within suitable zones: certain height maximums

case study area

- Region of 200 km² in the east part of Austria
- 130 wind turbines installed– extension of another 50 turbines is foreseeable
- Challenge for State government in assessing cumulative effects as

- zoning approach only led to an exclusion of small strips
- sensible assessment of visual impacts only possible by evaluating multiple wind farms together
- projects are not submitted at once – who describes cumulative effects?

Concept of 'strategic development zones':

- Designation of suitability zones
- Simplified planning process
- Concentration of wind farms sharing connection to the national grid
- Reducing development costs
- Step towards SEA by implementation into legal framework

Source: Wind & Spatial Planning Altener AL/98//542

concluding remarks

- Balance between supporting wind energy as a clean, renewable and cost-effective energy option and a critical view on the environmental effects →

  Challenge for assessing the rapid development of the wind energy sector

- Certain need of collecting more basic data
- Mapping for 'strategic development zones'
- Adaptation of the legal framework

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austria`s topography

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