German WindEnergy Association (BWE)
German Renewable Energy Federation (BEE)

Supporting Renewable Electricity in the Market - Which are the best support schemes for RES electricity applied in Europe?

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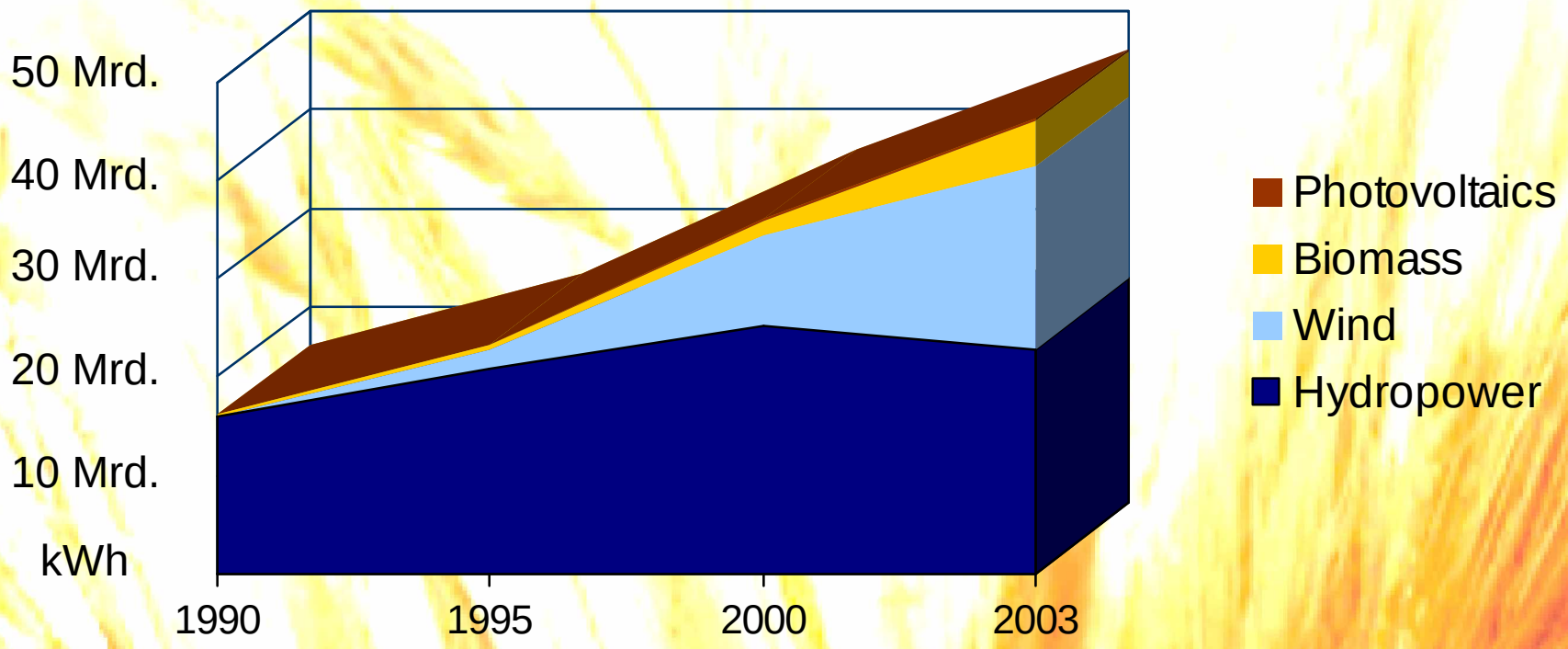
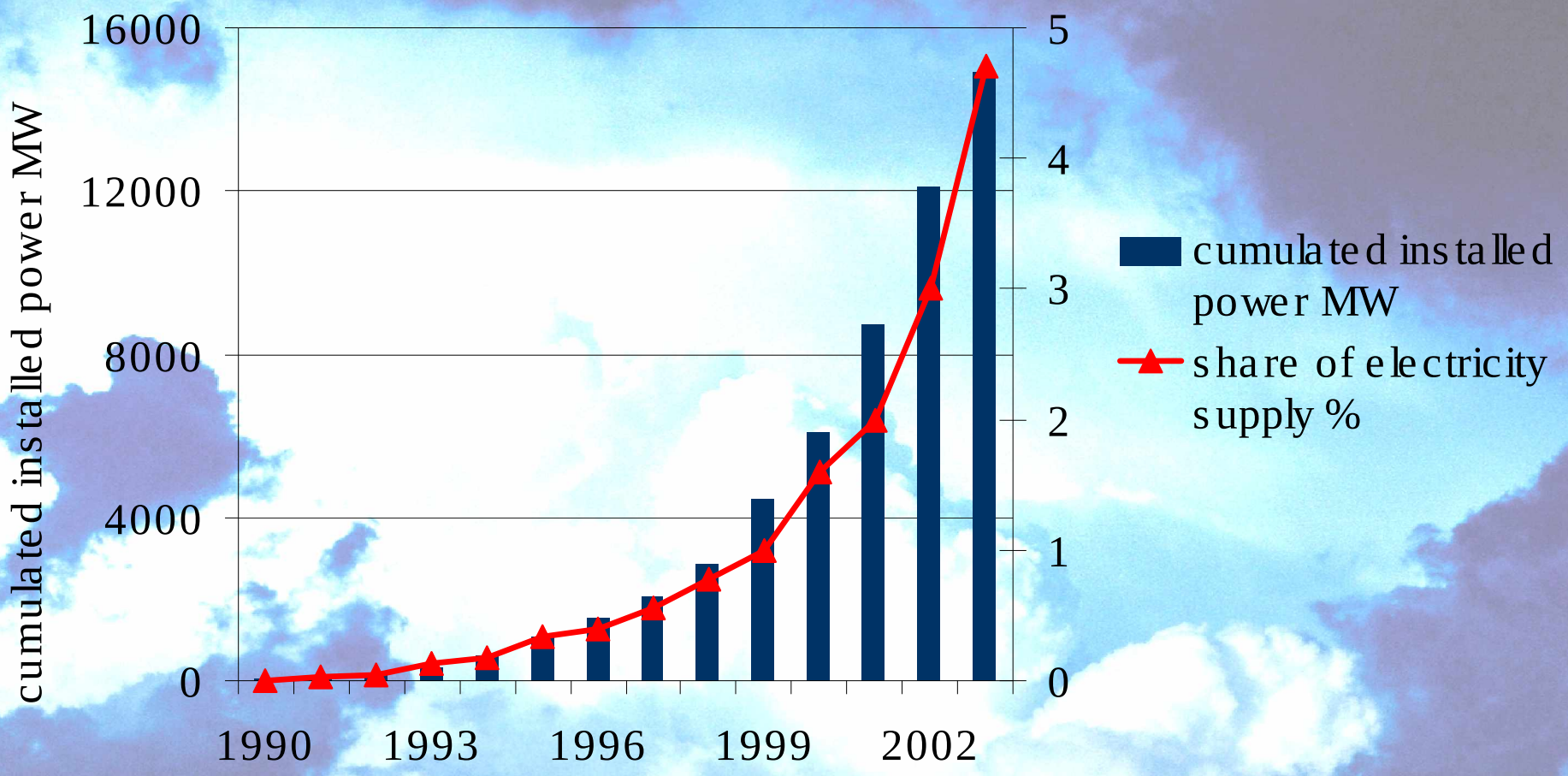
German Renewable Energy Federation (BEE)

Generation of renewable electricity in Germany

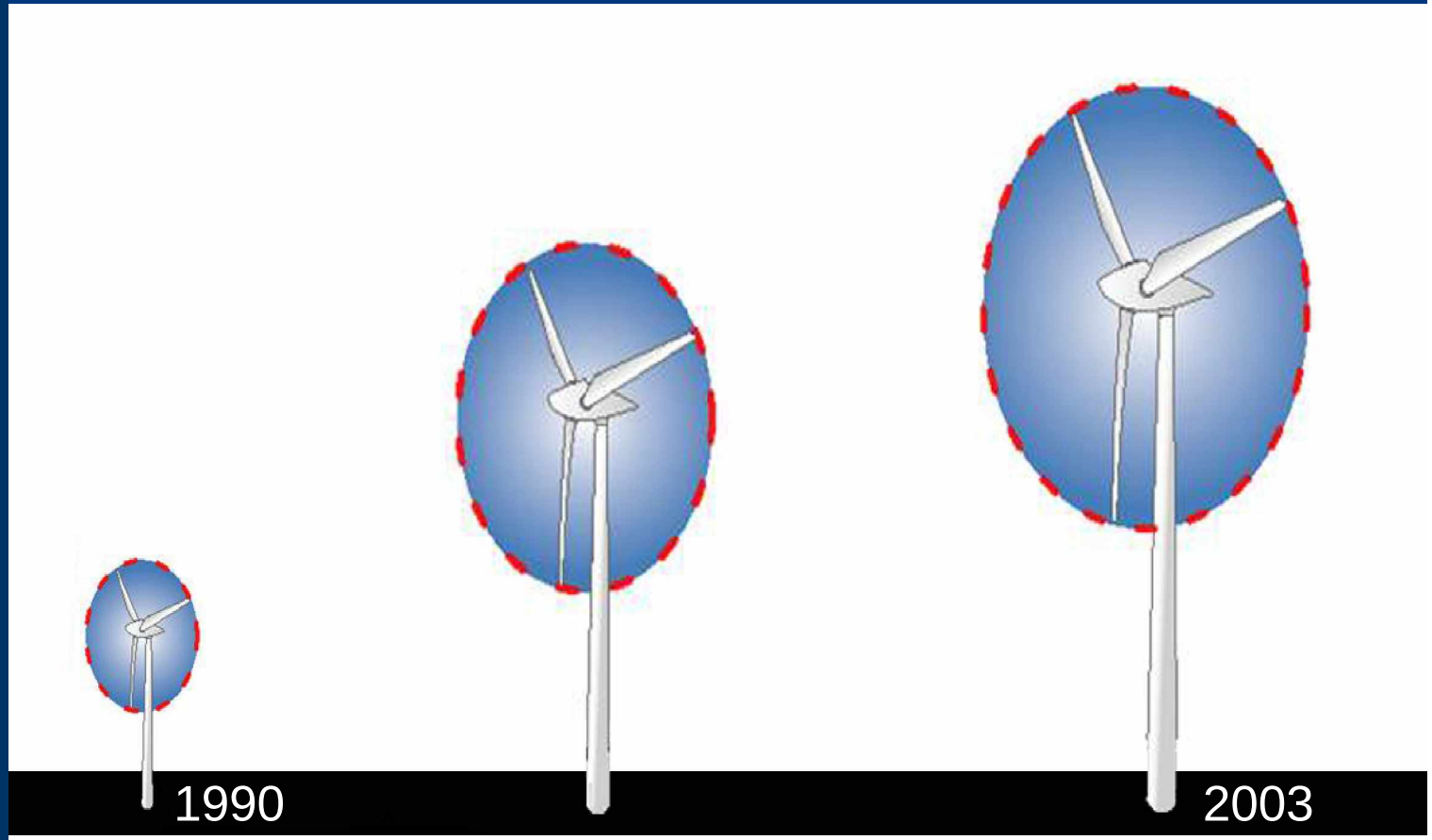


- Increase of renewable electricity production from 2,7 % (1990) to 8 % (2003)
- 135.000 jobs, 46.000 of them in the wind sector
- € 9 billion high-tech industry suited for export

Wind Energy Development - installed capacity in Germany



Size development of wind turbines



	1990		2003
Capacity	250 kW max size	2 MW current size	4.5 MW max size
Rotor diameter	30 m	80 m	112 m
Hub height	40 m	100 m	120 m
Annual output	400.000	4.500.000	12.000.000

Benefits of Renewable Energy

- Biggest contribution to achieving national Kyoto climate targets
- 135.000 jobs, 46.000 of them in the wind sector
- € 9 billion high-tech industry suited for export
- Independence via promotion of national resources

Ingredients of success

- 100.000 roofs program
- 250 MW program (1990 - 1995)
- Electricity Feed-In Law (1990 - 2000)
- Renewable Energy Sources Act - EEG (since 2000)

EEG 2000 Scope of Application

REA Plants:

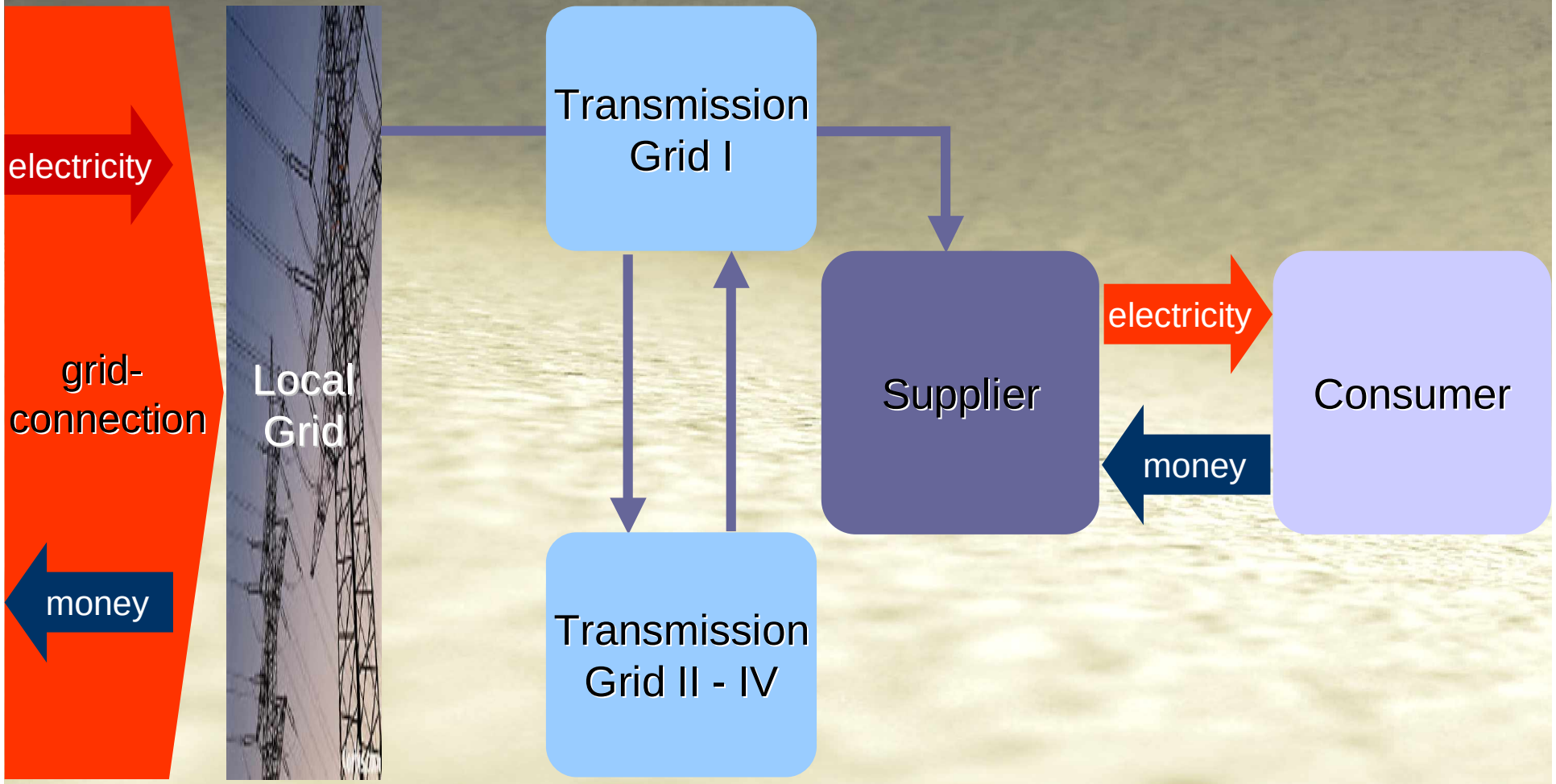
Hydro Power	6,63 - 7,65 ct
Biogas	6,63 - 7,65 ct
Biomass	8,5 - 10 ct
Geothermal Energy	7,14 - 8,93 ct
Wind Energy	6 - 8,9 ct
Photovoltaics	45,7 ct

electricity

grid-connection

money

How the EEG works



EEG - cost efficiency

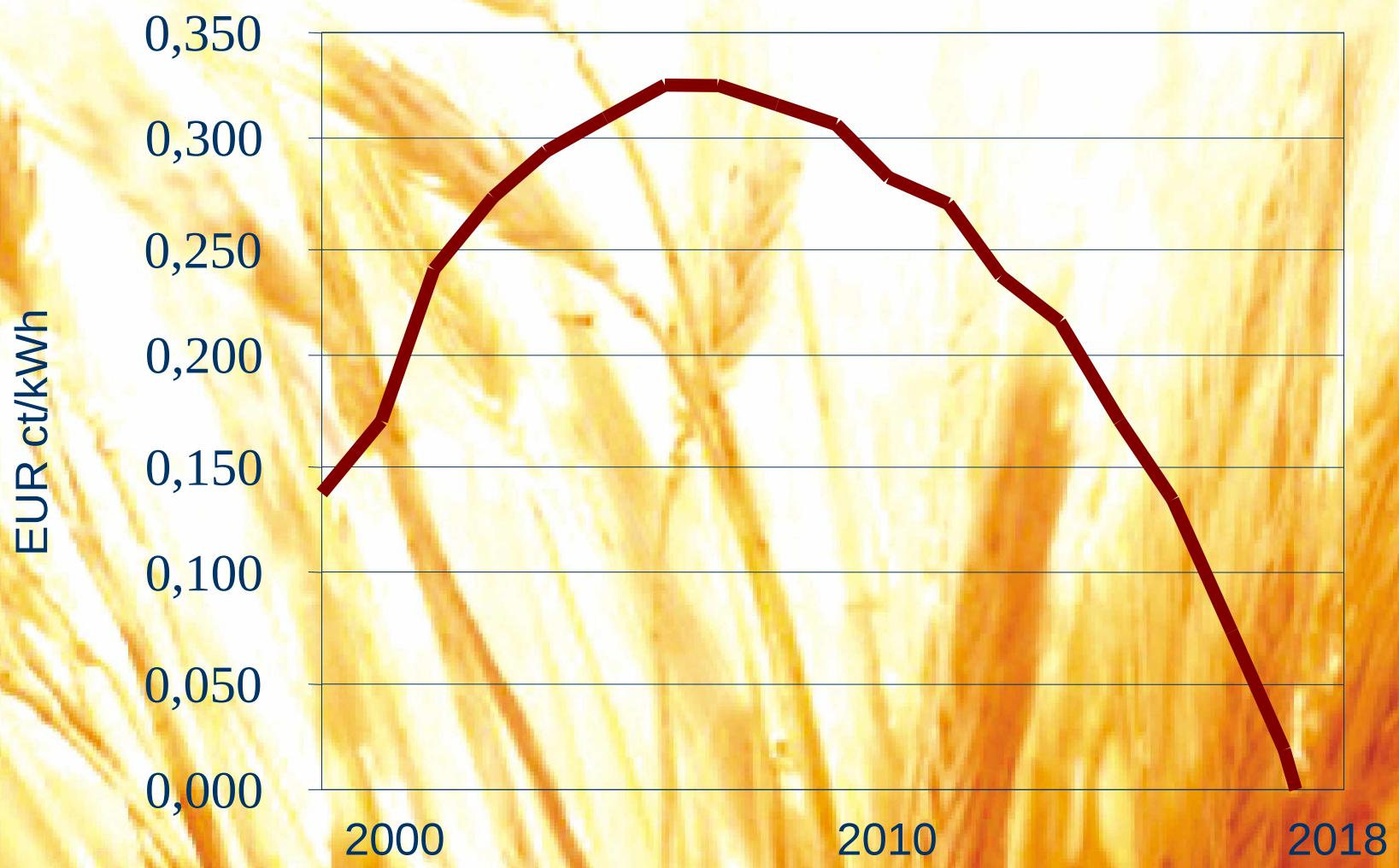
Differentiation of technologies

Differentiation according to size

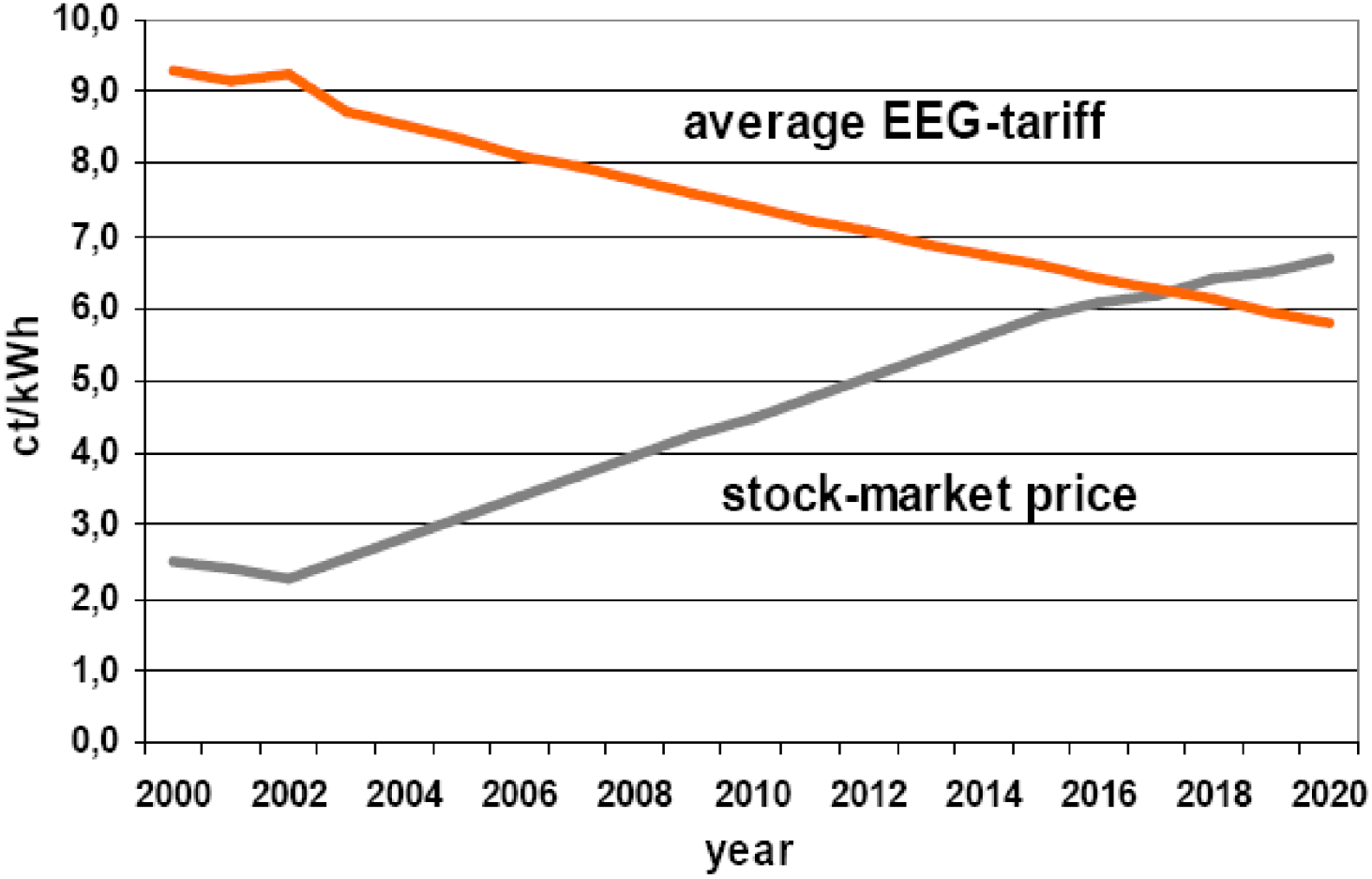
Differentiation according to development status
Declining remuneration annually

Differentiation according to site

Surcharge on german electricity cost per kWh



Convergence of EEG-tariff and stock-market price



Wind energy in Europe - Payment levels and installed capacity

	Country	Payment level (€ ct/kWh)	Installed power End 2003 (MW)	Employment effects (employees 2003)
Countries with a payment regulating system (Feed in law)	Germany	6,6 - 8,8	ca. 14.609	46.000
	Spain	6,6	ca. 6.202	ca. 20.000
Countries with a quantity regulation system (Quota system)	UK	ca. 9,6	649	ca. 3.000
	Italy	ca. 13	ca. 904	ca. 2.500

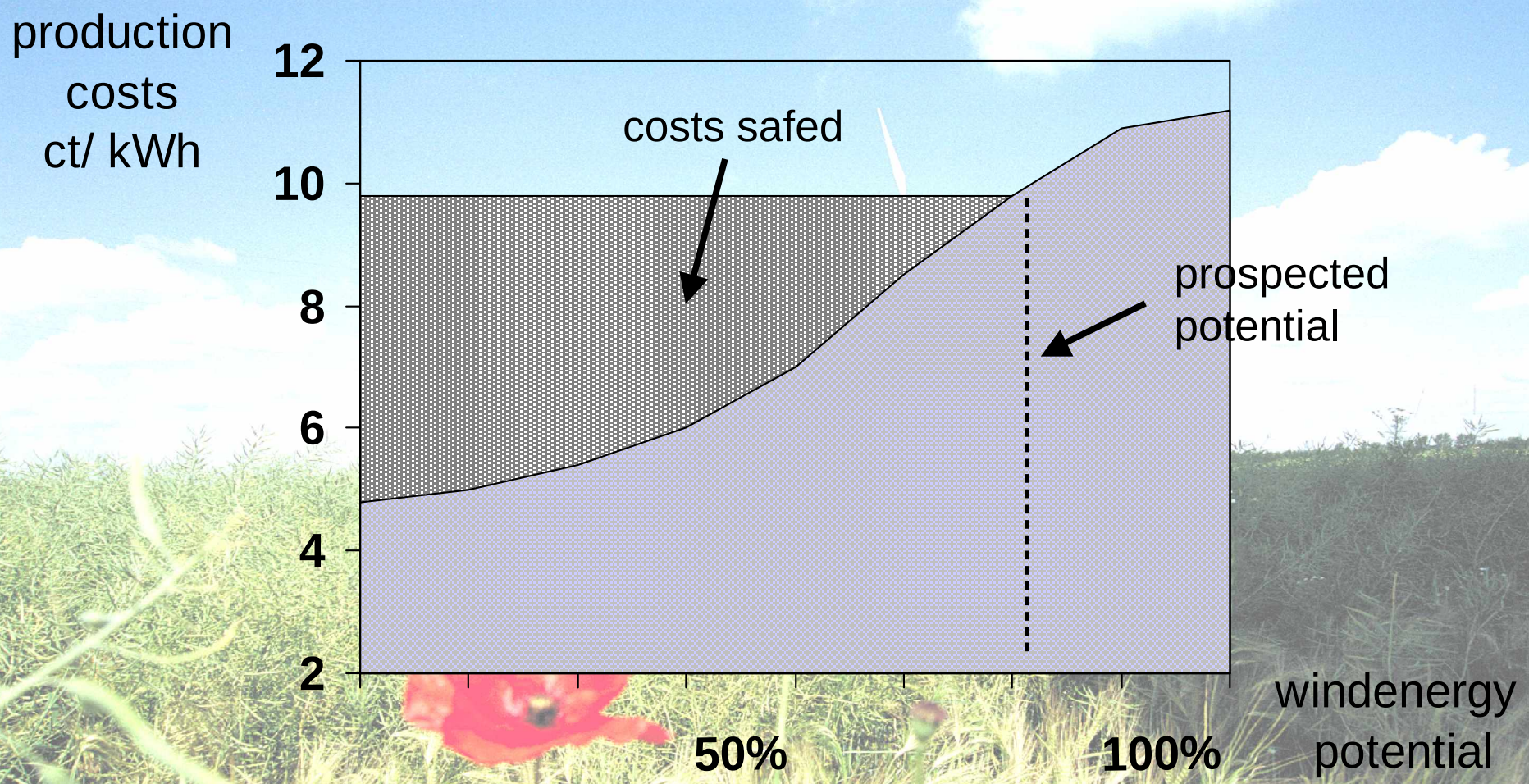
Basis for effective promotion of renewable energy sources

Stable and reliable instruments of support

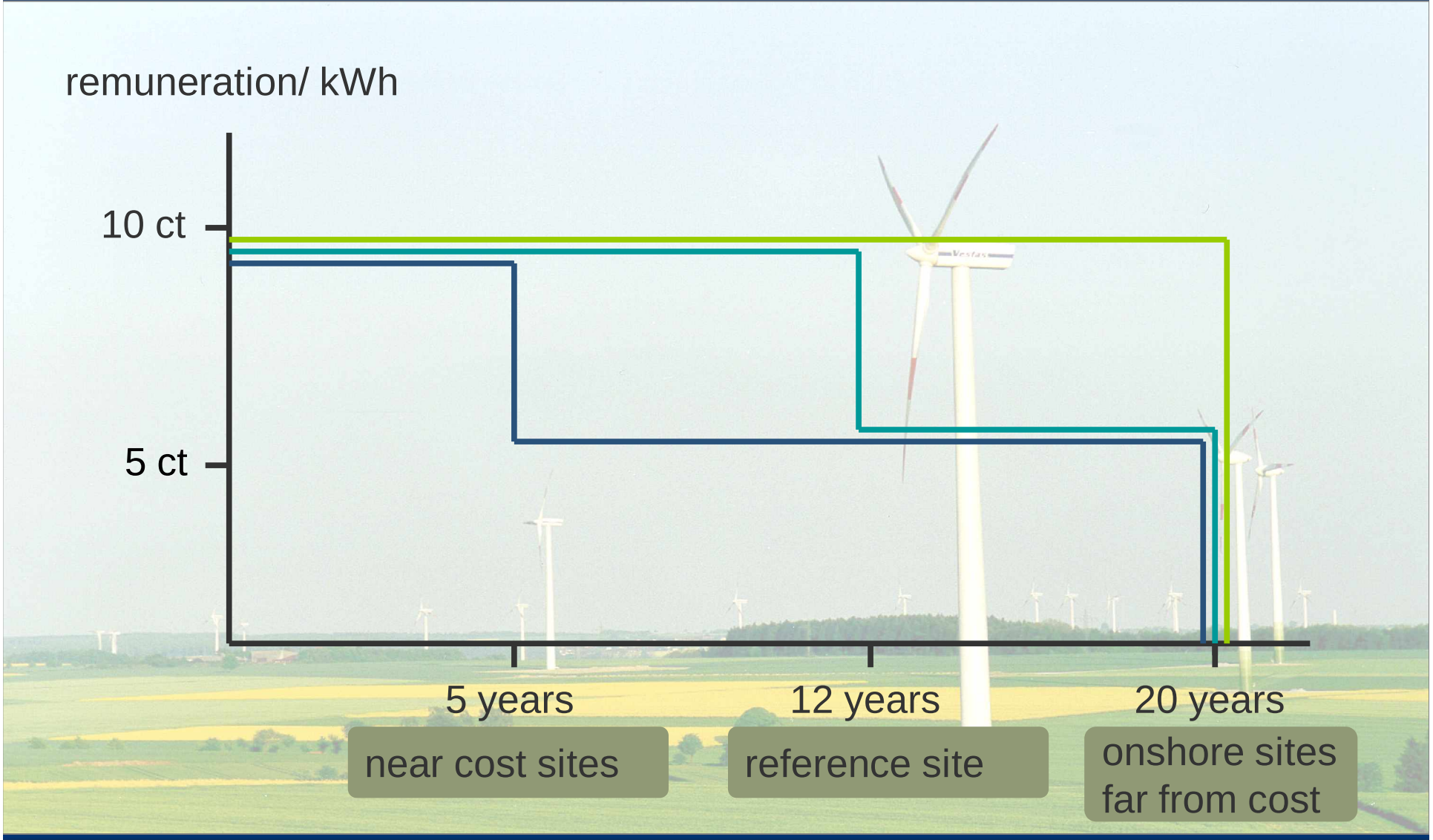
Transparent and unbureaucratic instruments of support

Opportunity for small and mid-sized enterprises / new players

Production costs of wind energy depending on site-quality



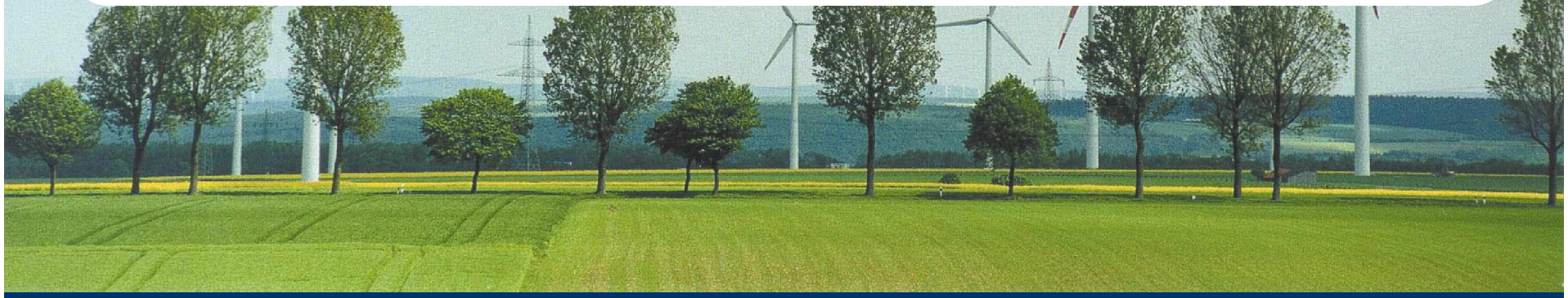
Remuneration steps according to Reference Revenue Model



Reference Revenue Model - Features

1) The amount of aid needed to make a wind turbine investment profitable can be adjusted to different wind resources without any bureaucratic intervention. Therefore the volume of aid is altogether less than with schemes that promote all sites uniformly.

2) Since the calculation of reference yield of turbines is based on power curves according to obligatory legal standards, it is easier to evaluate the efficiency of different types of turbines. The use of reference yields provides transparency in determining tariffs and facilitates comparisons of different wind turbine designs and manufacturers, thus stimulating competition.



Reference Revenue Model - Features

3) The reference yield model is neutral to different technologies. Determining the feed-in tariff does not depend on nominal power or rotor diameter. It rewards all improvements to wind turbines' profitability without favouring particular technical characteristics.

4) The comparability of typical reference yields permits banks and investors to easily evaluate the prospective financial performance of any wind power project.

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