Scenarios on the Wind Energy Development in Romania

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ENERO ACTIVITY FIELDS

- *Renewables*
- *Distributed generation*
- *Energy efficiency*

MISSION

to promote in Romania

- **new energy technologies**
- **European policy in energy**

Ongoing projects on distributed generation

- *European guidelines for more efficient integration of renewable energy into future infrastructures- SUSPLAN*, FP7 project
- *Classification of european biomass potential for bioenergy using terrestrial and earth observations- CEUBIOM*, FP7 project
- *Monitoring and evaluation of the RES directives implementation in EU27 and policy recommendations for 2020- RES2020*, IEE ALTENER project
- *Promoting grid-related incentives for large-scale RES-E integration into the European electricity systems GreenNet Incentives*, IEE project
- *Co-firing -from research to practice: technology and biomass supply know-how promotion in Central and Eastern Europe COFITECK*, FP6 project

- **Finalised în 2007 and 2008**

↳ *Distributed Generation in the Associated States – Research Priorities and challenges on the Open Electricity Market – DIGENAS*, FP6 project

Ţinte europene 2010

21% electricitate din SRE în balanța consumului

cel mult 19%

5,75% biocarburanți din carburanții pentru transport

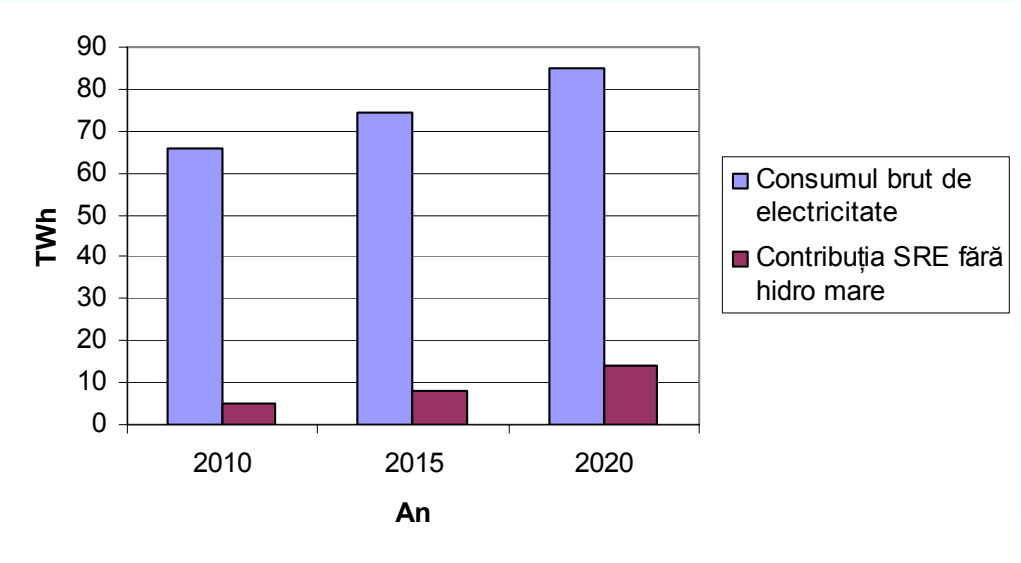
12% din consum sa fie acoperit de SRE

Acum:
iar cota electricitatii provenita din SRE din totalul consumului de electricitate
aproximativ 29% (incluzand hidro de mare putere)
1% (fără hidro de mare putere)

Cota 33% e dificil de îndeplinit
Consumul intern brut in 2010 este prognozat la cca 66 TWh/an, resultând un necesar de 21.8 TWh/an din regnerabile .
Hidro de mare putere poate contribui cu cca 17 TWh (dacă nu se face export !), lăsând 4.8 TWh pentru alte regenerabile. Un scenariu optimist de îndeplinire a cotei în 2010 ar fi:

	Output, TWh	New installed (or modernised) capacity, MW
Large hydro	**17**	
Small hydro	**0.8 to1.0**	**about 400**
Wind	**2.3 to 2.8**	**about 1000**
Biomass cogeneration	**1.2 to 1.4**	**about 250**

In strategie se propun noi ţinte pentru SRE-E şi anume 35% pentru 2015 şi 38% pentru 2020. Pe termen mediu, considerând noile cote, producţia din SRE-E fără hidro de mare putere ar trebui să fie de 8 TWh, respectiv de 14 TWh



Pornind de la o producţie actuală de cca 0,7 TWh, ţintele, mai ales cea pe termen scurt din 2010, sunt foarte ambiţioase.

Ţinte europene 2020

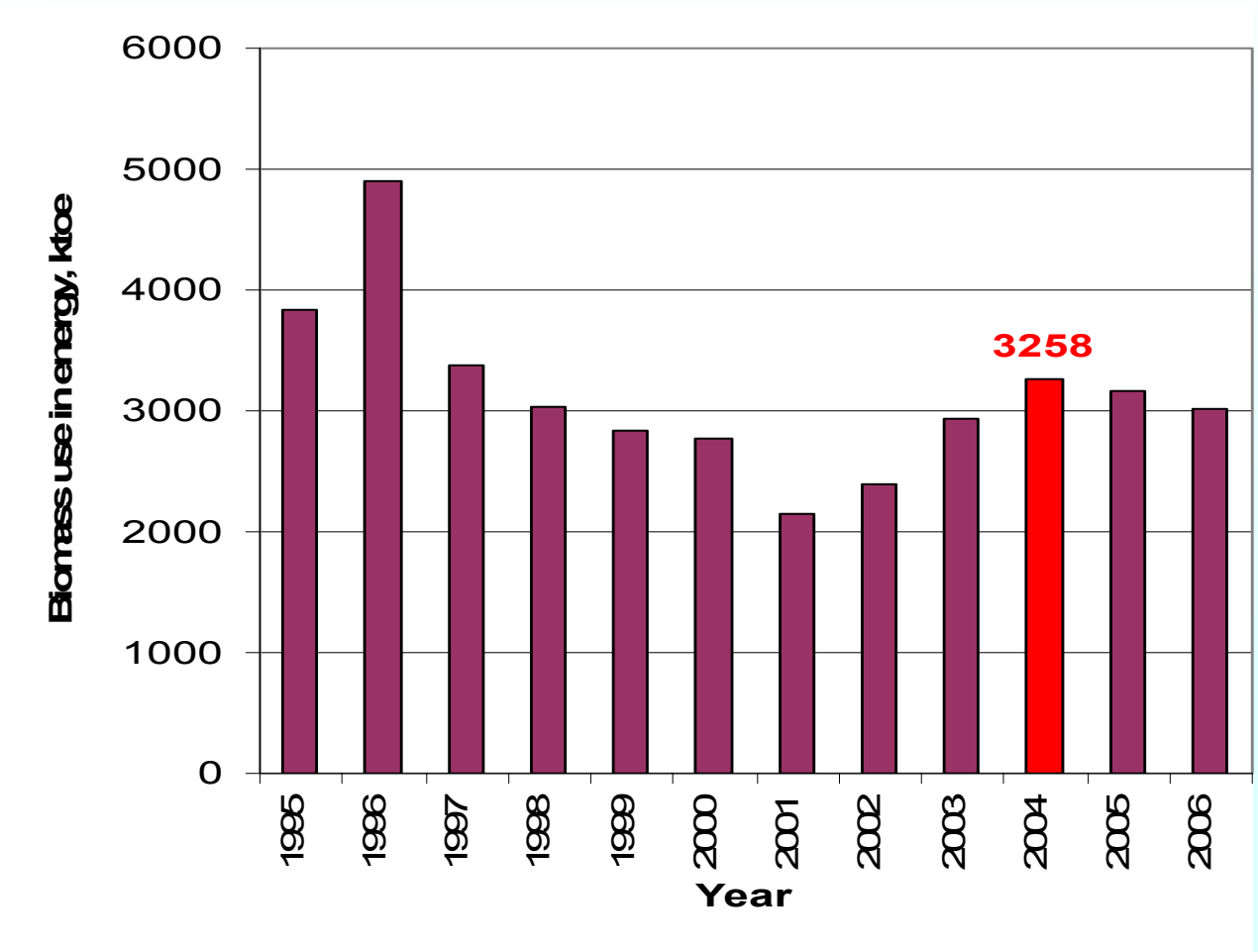
34% electricitate din SRE în balanța consumului

20% din consumul de energie sa fie acoperit de SRE

Pentru România se propune

24% energie din SRE, pornind de la 17,8% în 2005

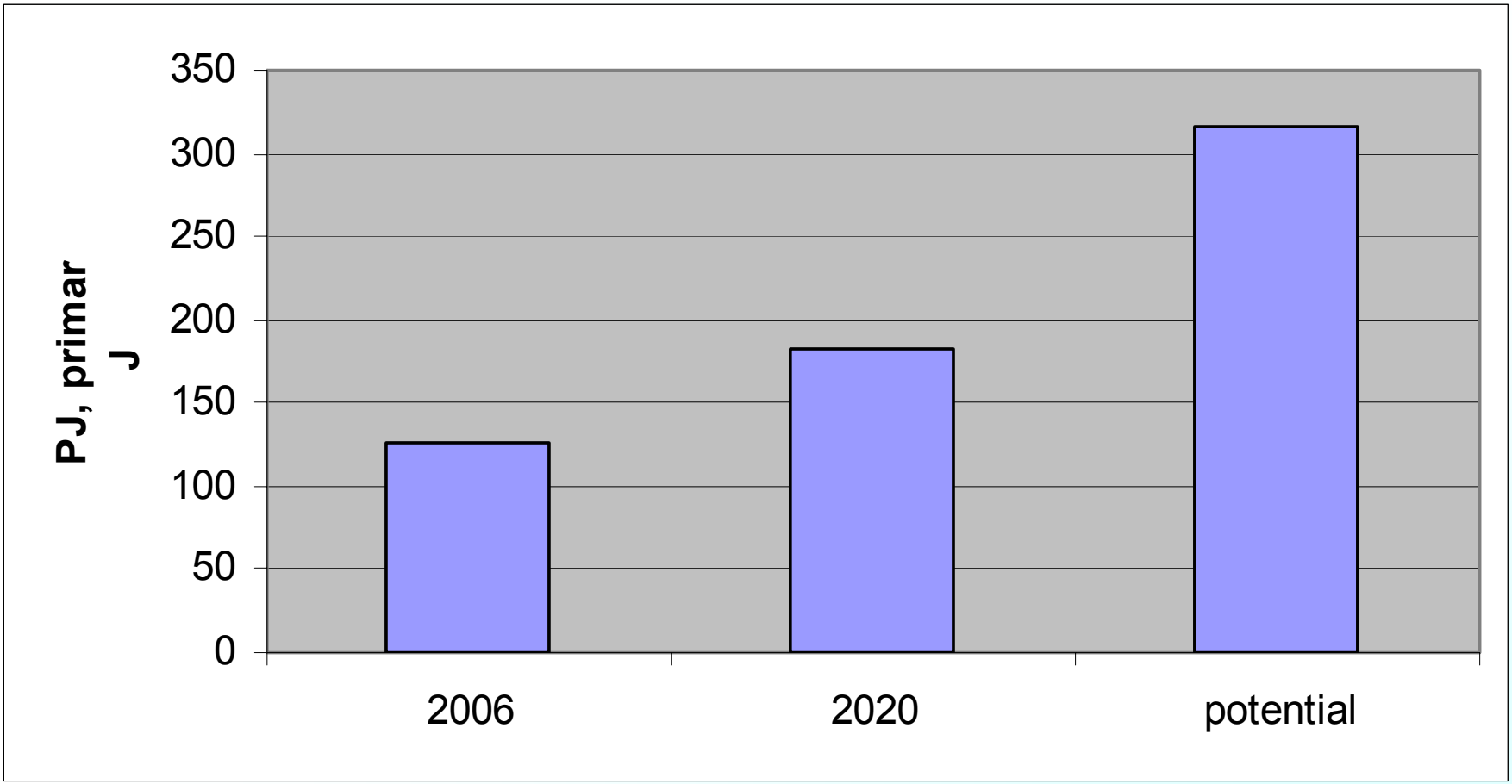
Anul 2005 a avut o contribuție mai mare din hidro şi biomasă.



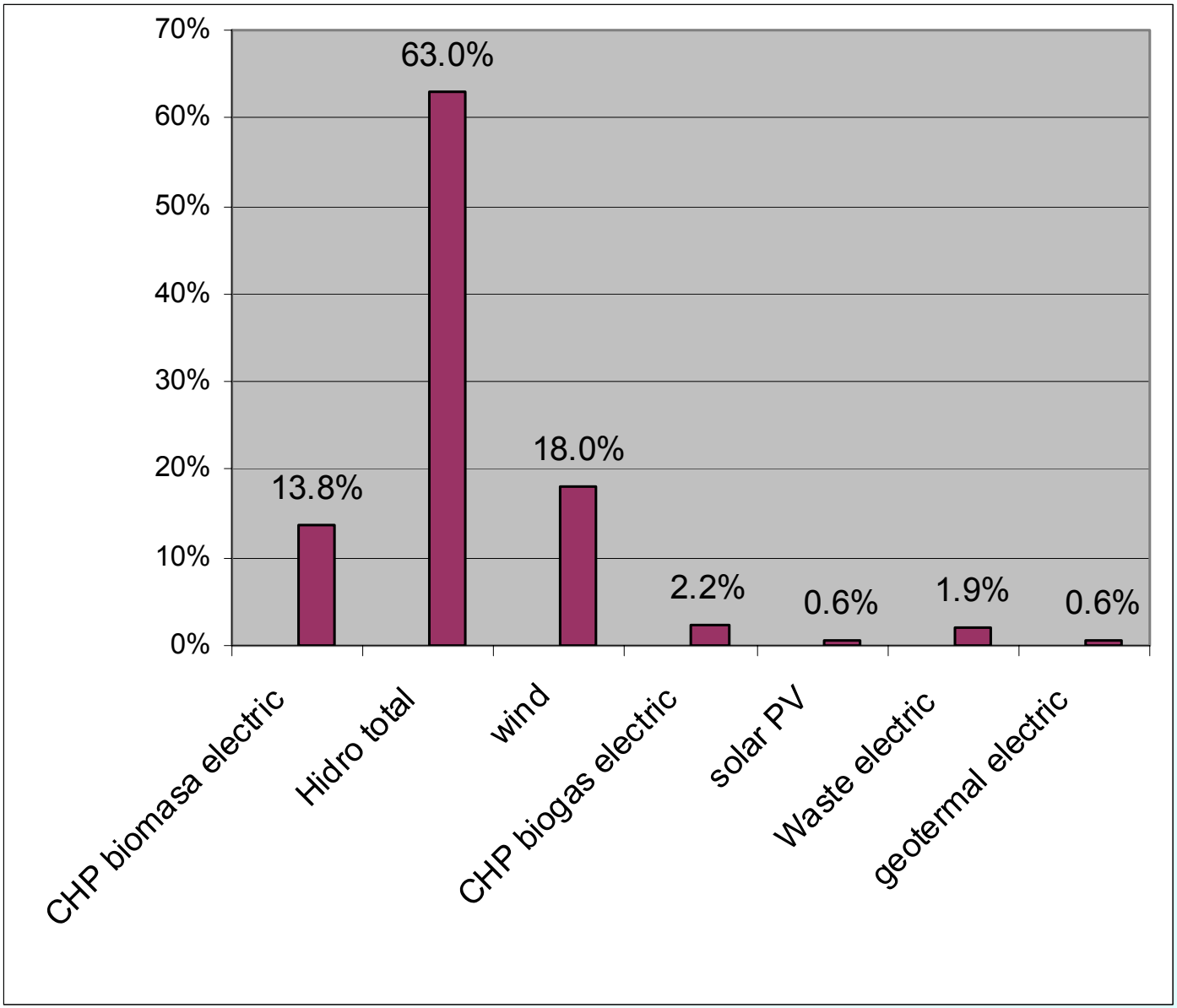
Un scenariu de îndeplinire a cotei RES în 2020

7592	267.9	36.2			
2221	93.0		29.3%		biomasă solidă căldură (sobe)
931	39.0		12.3%		DH biomasa moderna
365	15.3	5.0	4.8%	13.8%	CHP biomasa electric
439	18.4		5.8%		CHP Biomasa căldură
1784	82.1	22.8	23.5%	63.0%	Hidro total
1588	*66.5*	*20.3*	*20.9%*		*hidro mare*
196	*8.2*	*2.5*	*2.6%*		*hidro mic*
509	21.3	6.5	6.7%	18.0%	electricitate eoliană
63	2.6	0.8	0.8%	2.2%	CHP biogas electric
263	11.0		3.5%		biogaz căldură
800	33.5		10.5%		biofuels
17	0.7	0.2	0.2%	0.6%	solar PV
75	3.1		1.0%		solar căldură
55	2.3	0.7	0.7%	1.9%	electricitate din deşeuri
16	0.7	0.2	0.2%	0.6%	geotermal electric
55	2.3		0.7%		geotermal căldură
ktoe	PJ	TWh	100.0%	100.0%	

Total energie din SRE 7587 ktoe în 2020 (31620 ktoe consum)



Contributia biomasei

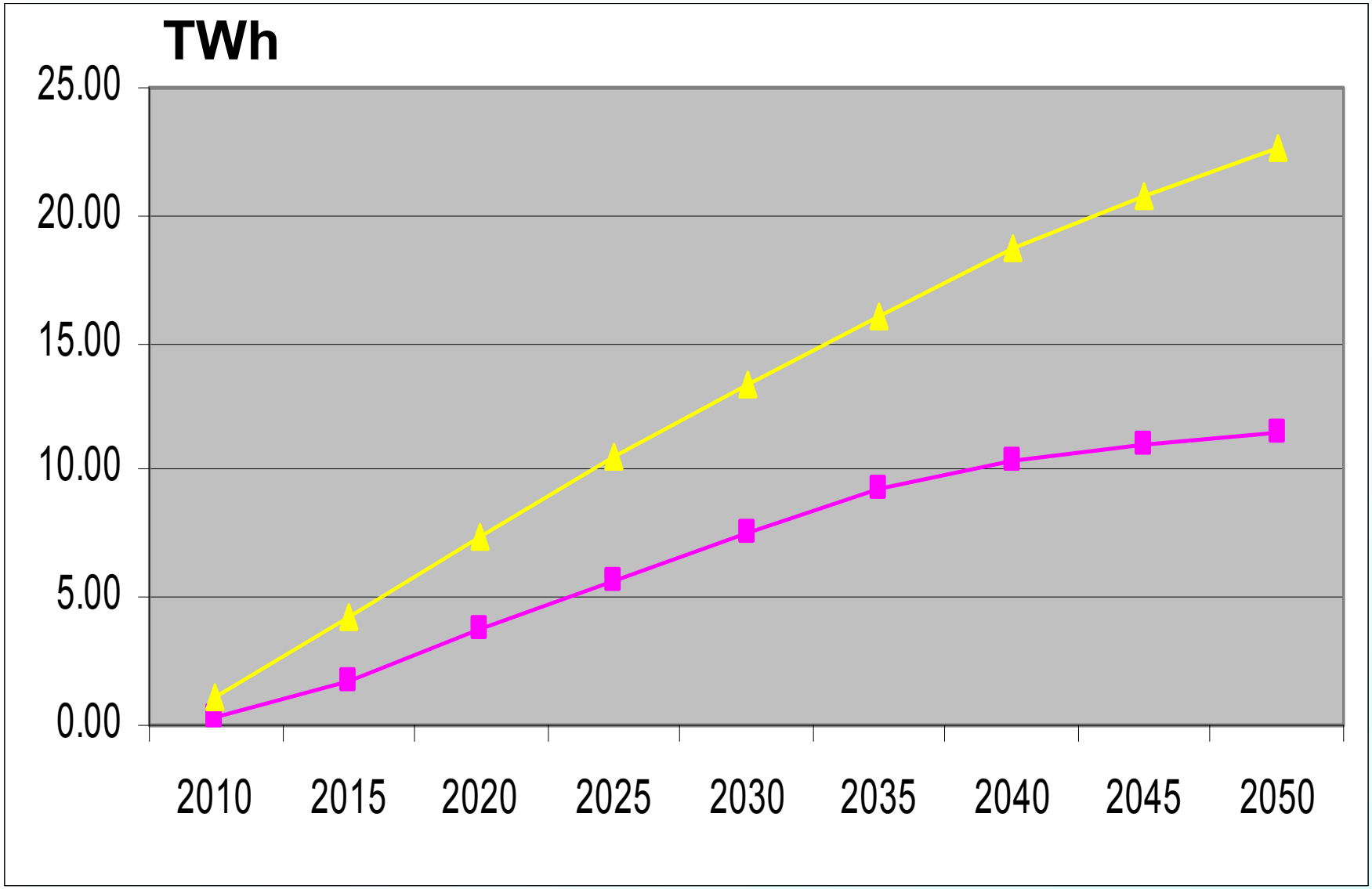

70%
60%
50%
40%
30%
20%
10%
0%
63.0%
18.0%
13.8%
2.2%
0.6%
1.9%
0.6%
CHP biomasa electric
Hidro total
wind
CHP biogas electric
solar PV
Waste electric
geotermal electric

Distributia electricitatii din SRE in 2020 în Europa (conform EREC)

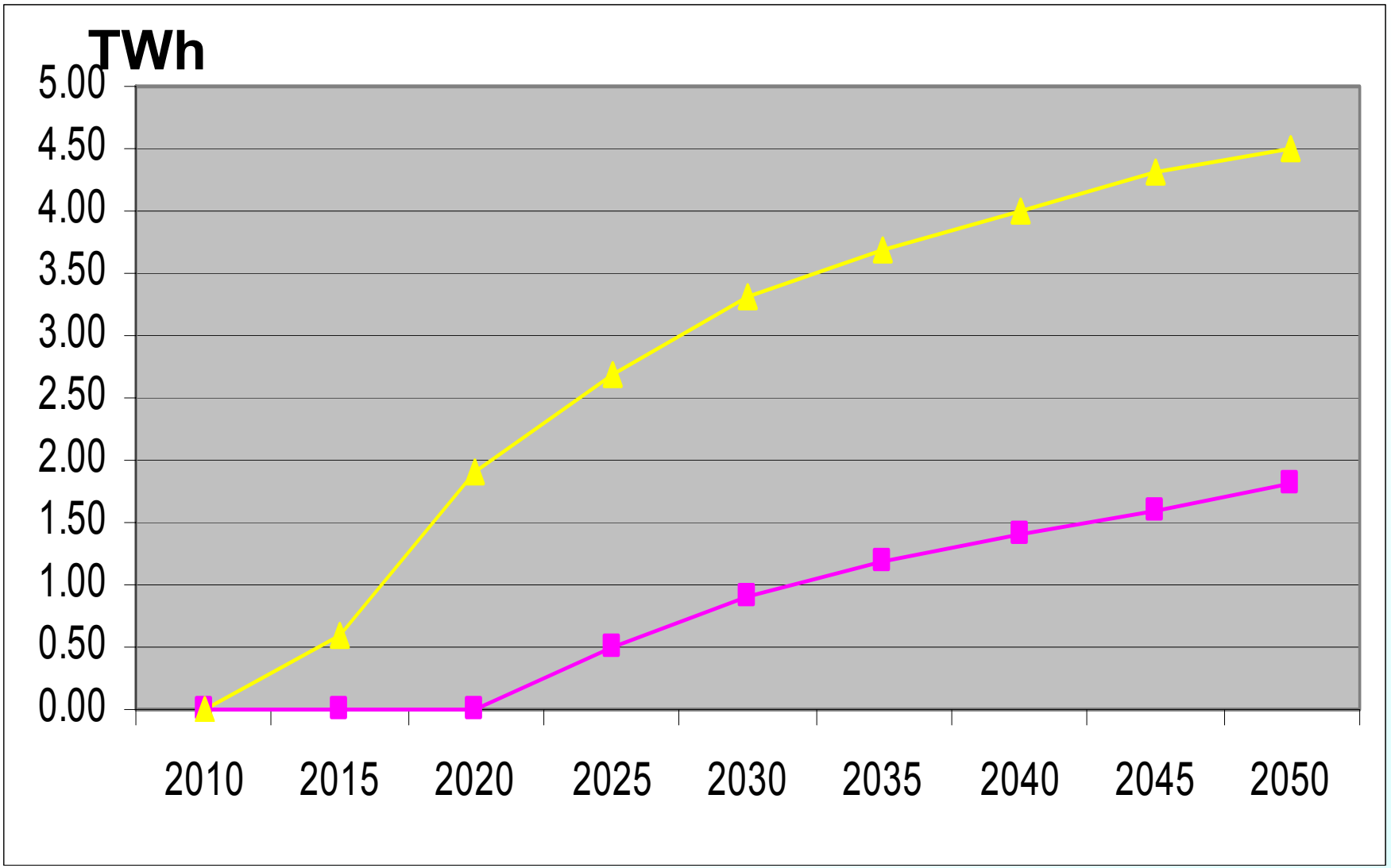
biomass (23%); 18% (inclusiv biogas, deseuri)
hydropower (30%); 63%
wind energy (almost 40%) 18%
PV(4%); 0,6%
geothermal; solar thermal electricity and ocean energy (each around 1%). 0,4%

Energia eoliană in 2020

- minim 6.5 TWh
- minim 2600 MW instalați
- unde ?
- suportă rețeaua ?



Estimarea contributiei energiei eoliene- on shore



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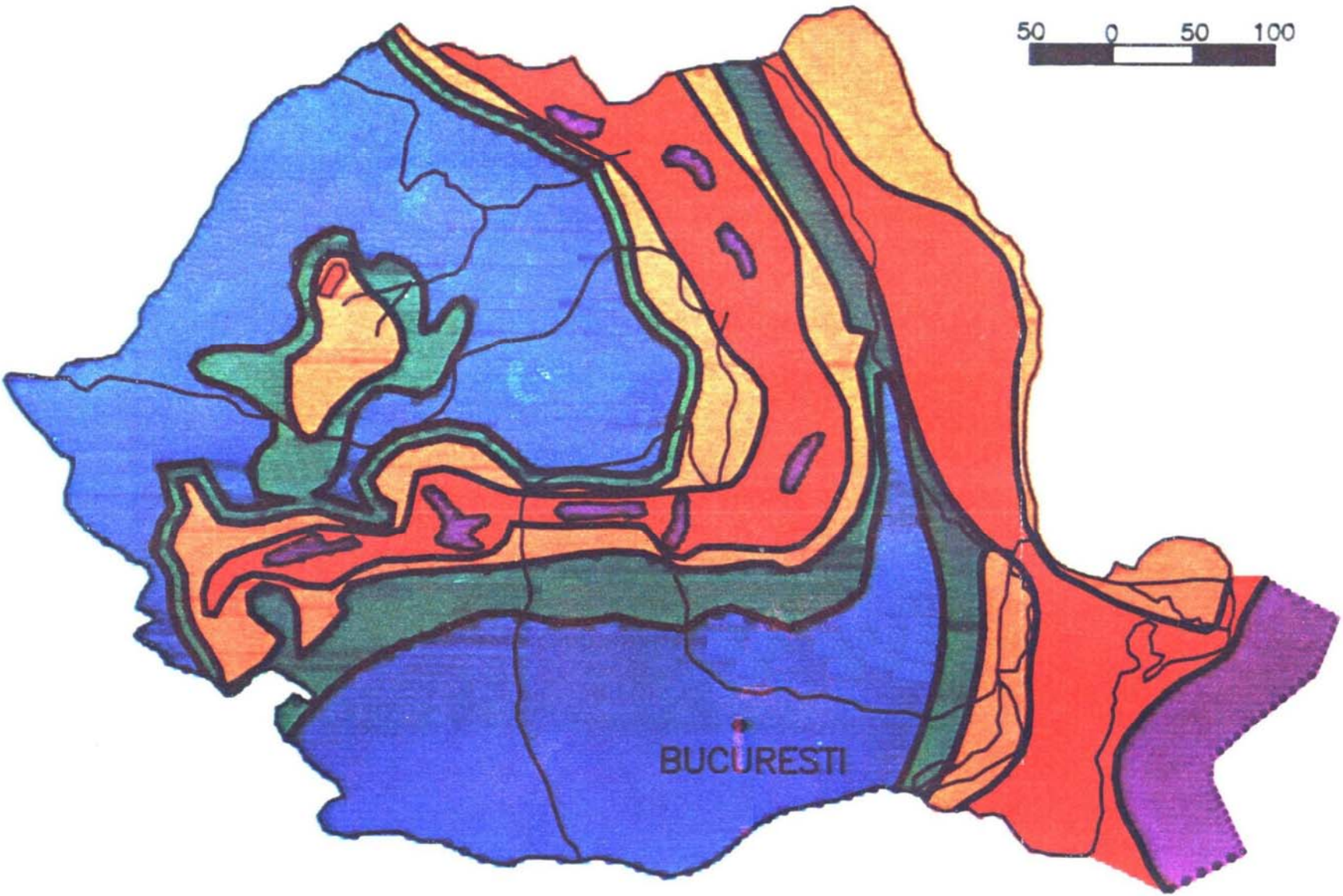
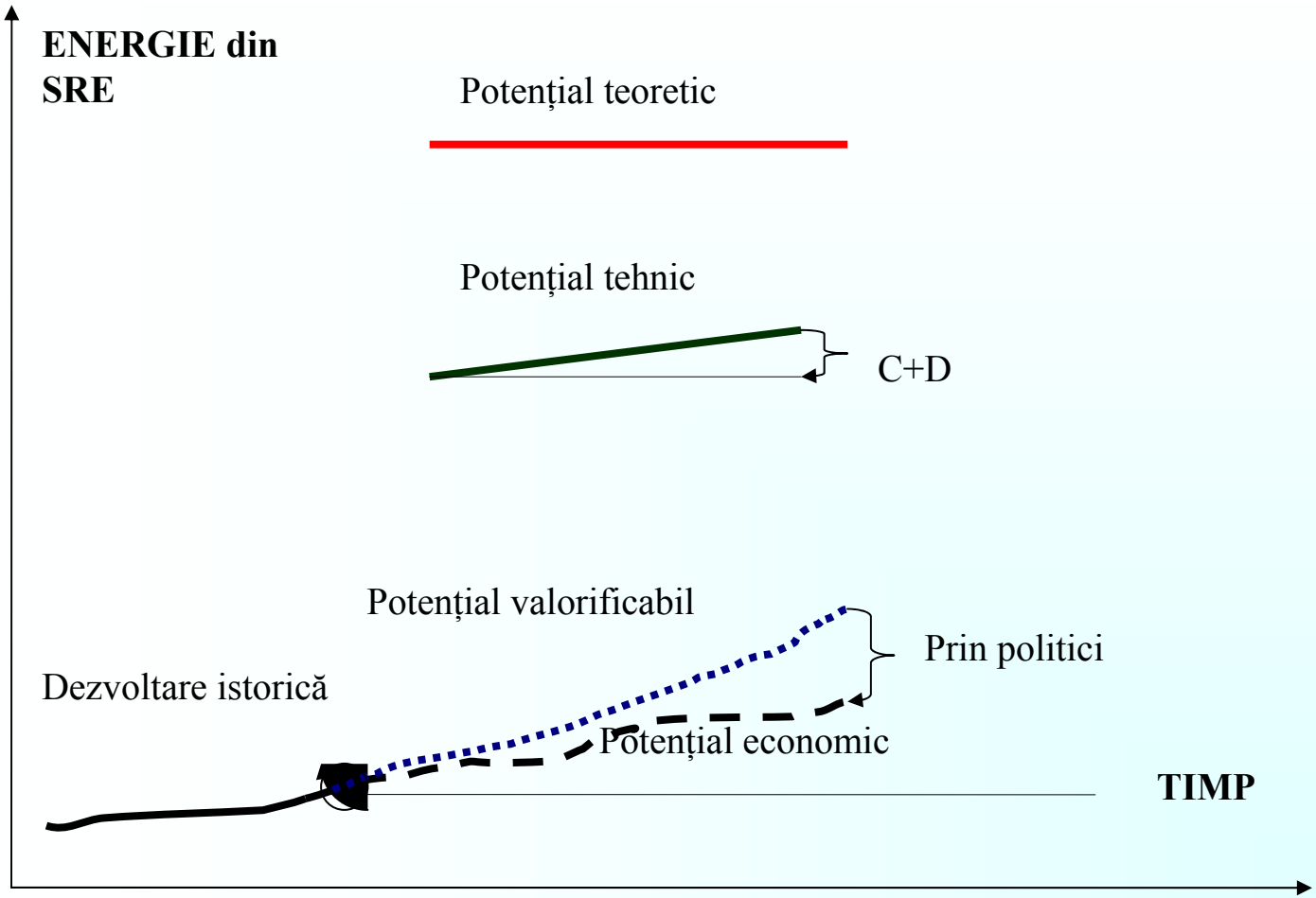
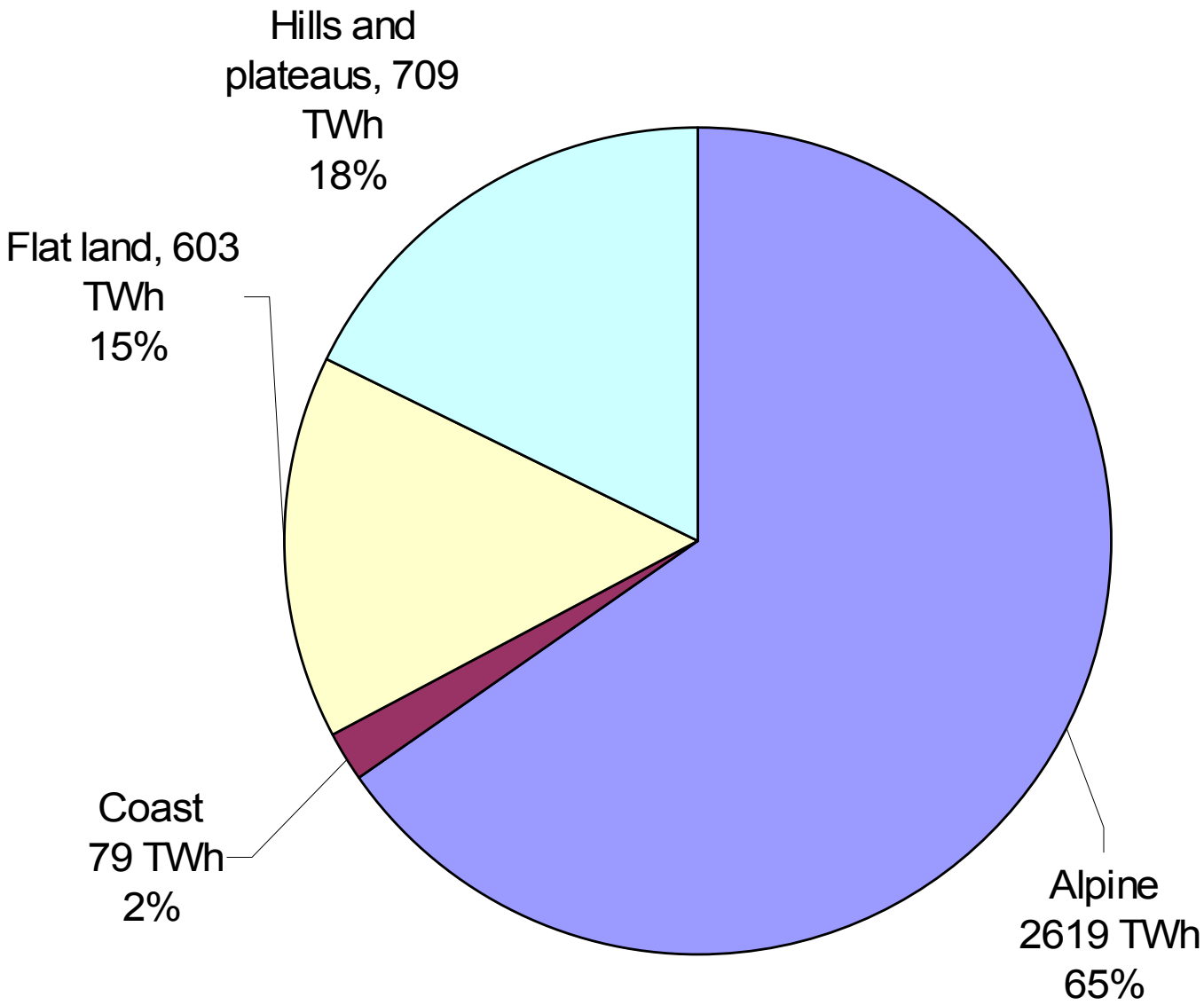

50 0 50 100
BUCURESTI



Proiectul PHARE "Technical and economic potential of RES in Romania"

Definițiile potențialului

Theoretical wind potential



Rather than determine a theoretical potential without any constraints (i.e. wind turbines can be built anywhere), we consider a number of technical constraints:

- Areas where there is very low wind speed
- Land /offshore location availability
- Limits for the power grid to transport electricity
- Limited demand for base load
- Social constraints
- Environment constraints

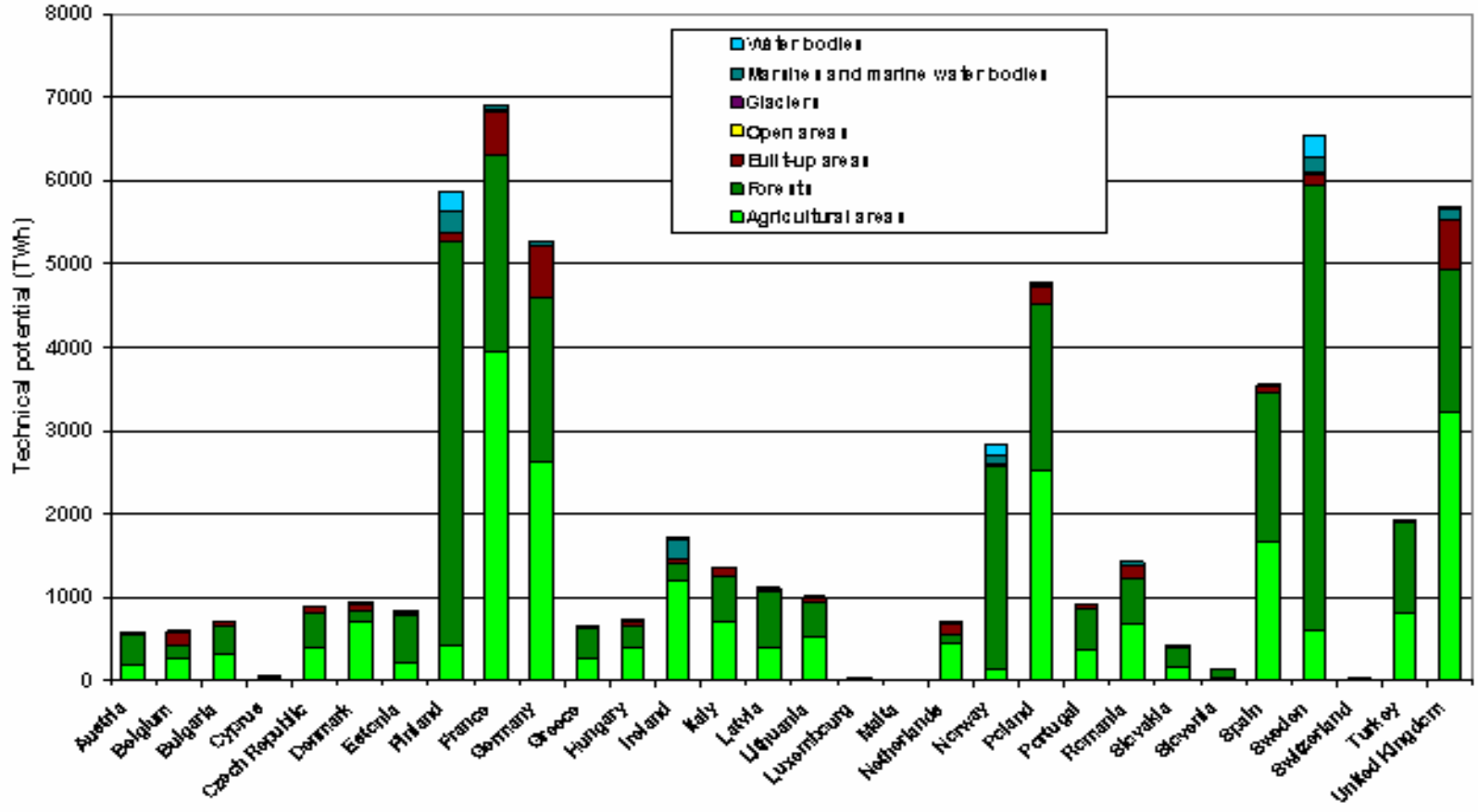
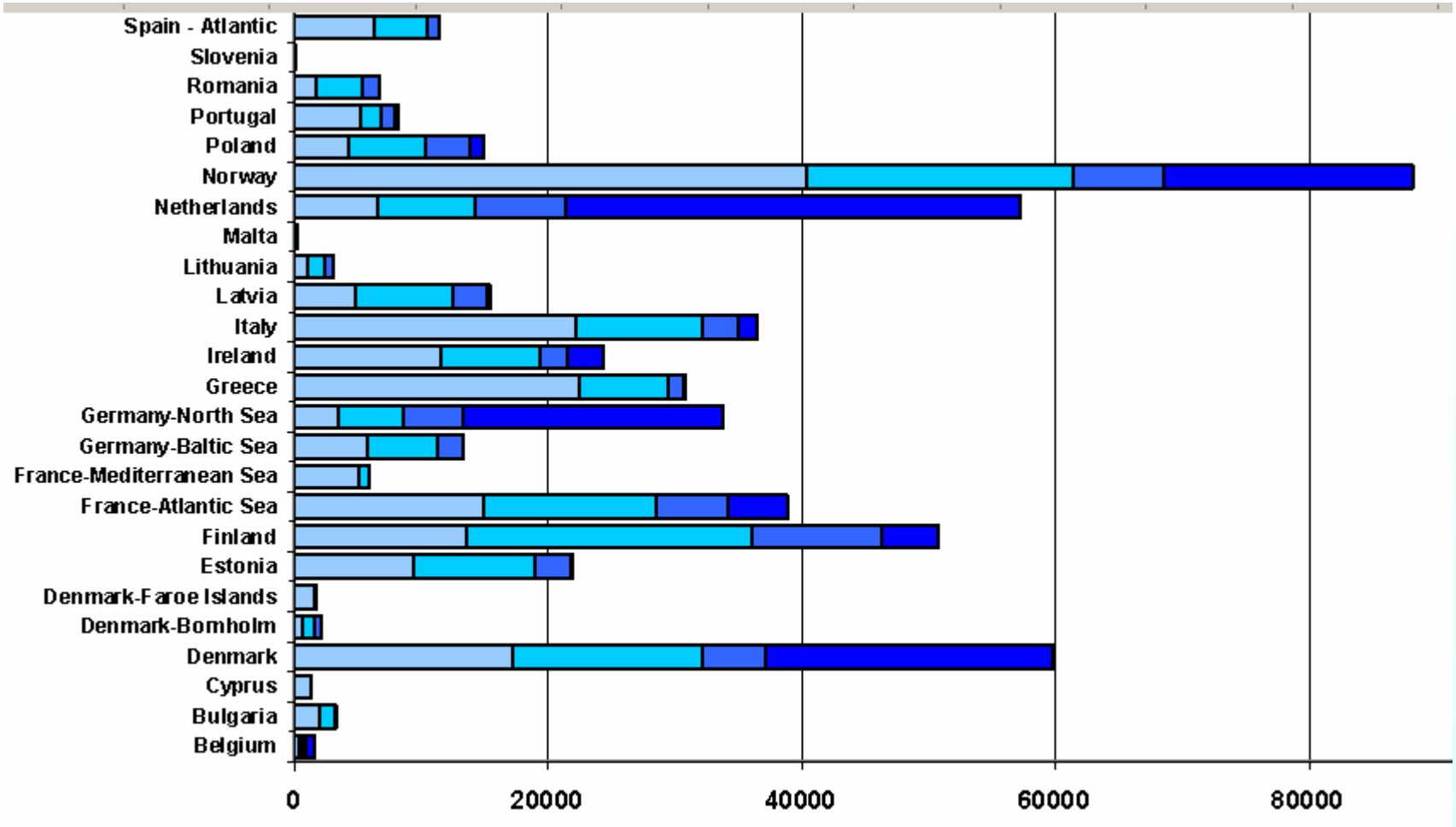


Figure 9-2; Technical potential for wind energy on land, based on average wind speeds for 2000-2005

Source EEA study 2008

Potențialul tehnic off-shore



Source EEA study 2008

Indicators for grid penetration:

- **Installed capacity penetration:**
- **Power penetration:** at a given time
- **Energy penetration:**

At present, several grid systems have wind energy penetration of above 5%: Denmark (values over 18%), Spain and Portugal (values over 9%), Germany and the Republic of Ireland (values over 6%).

Today, in Romania, TRANSELECTRICA declares that the maximum room for wind power within the base load regime amounts to approximately 1200 MW. This means, around 3 TWh, a 5% penetration level of wind energy.

To asses for Romania the technical potential from the grid point of view, we consider the premise **on average term (20 years), a minimal wind energy penetration rate of 12% is feasible,**

- with needed investments in the grid infrastructure
- specific dispatching procedures
- taking advantage of some 3000 MW hydro not running on base load

Assuming around 2030 year a gross power consumption of 100 TWh,

it results 12 TWh output in wind energy,

corresponding to around 4000 MW capacity in wind farms.

450Ha concessioned in Casimcea

CWP develops 350 MW

Port Constanta bid for feasibility study wind farm on dig

Iberdrola bought 50 projects from Rokura

EVIVA Martifer to commission first wind farm in Babadag 2008

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- Schnittstelle zu Behörden
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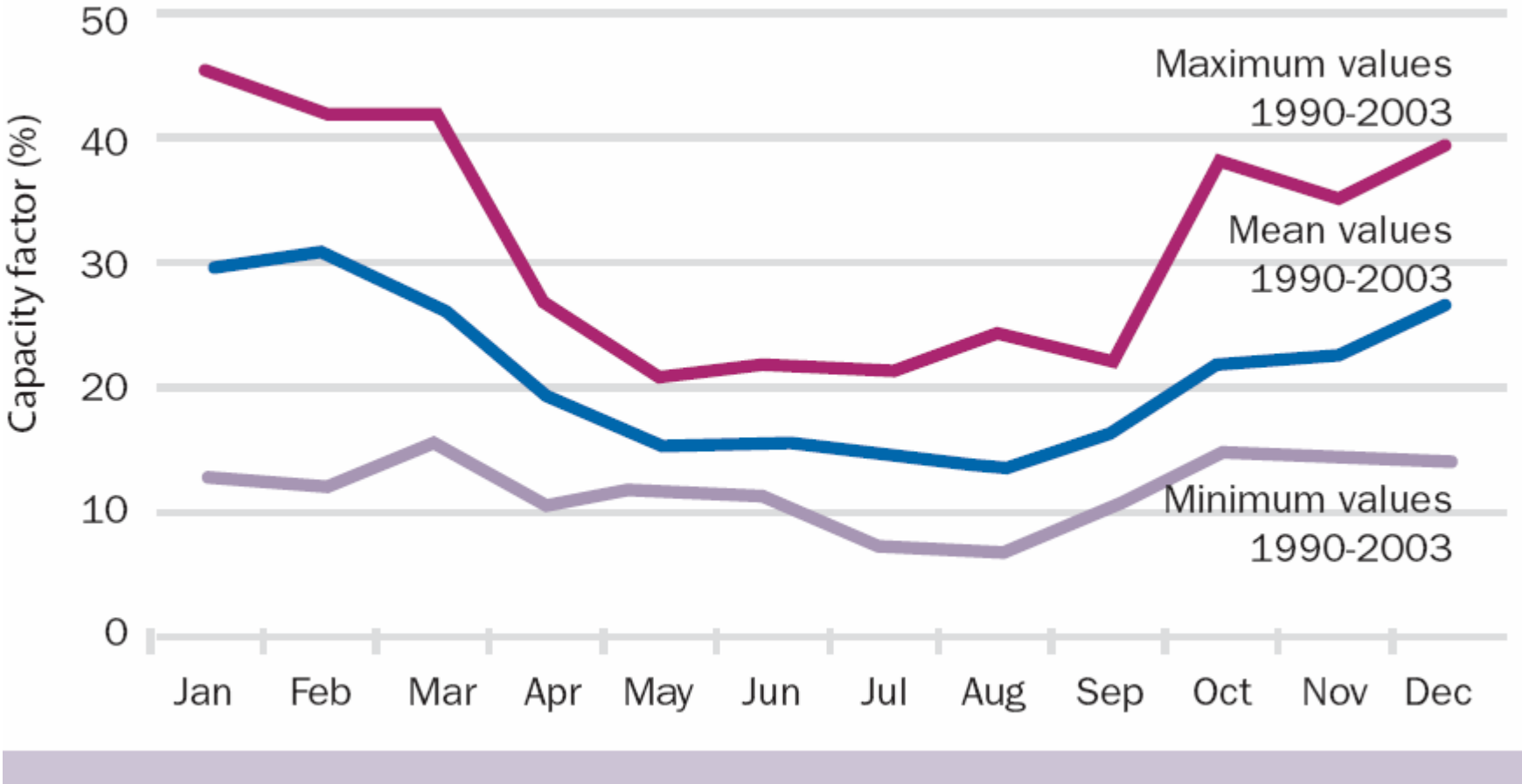
Integrarea energiei eoliene în rețea

- Apar probleme noi,
- dar exista soluții şi experiență,
- şi lucrurile nu stau chiar aşa de rău

- Variabilitatea
- Costuri suplimentare

Sursa principală: studiul EWEA, *Large scale integration of wind energy in the European power supply: analysis, issues and recommendations,* **decembrie 2005**

Factorii de încărcare lunari, Germania 1990-2003



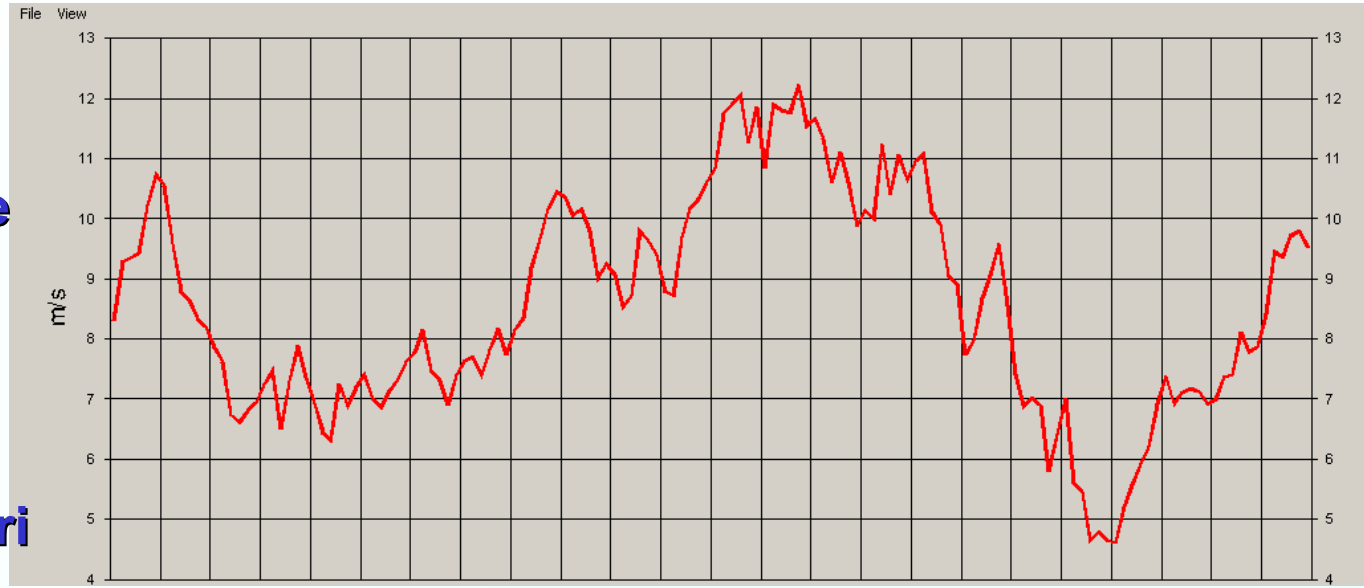
urce: ref. 25, ISET 2004

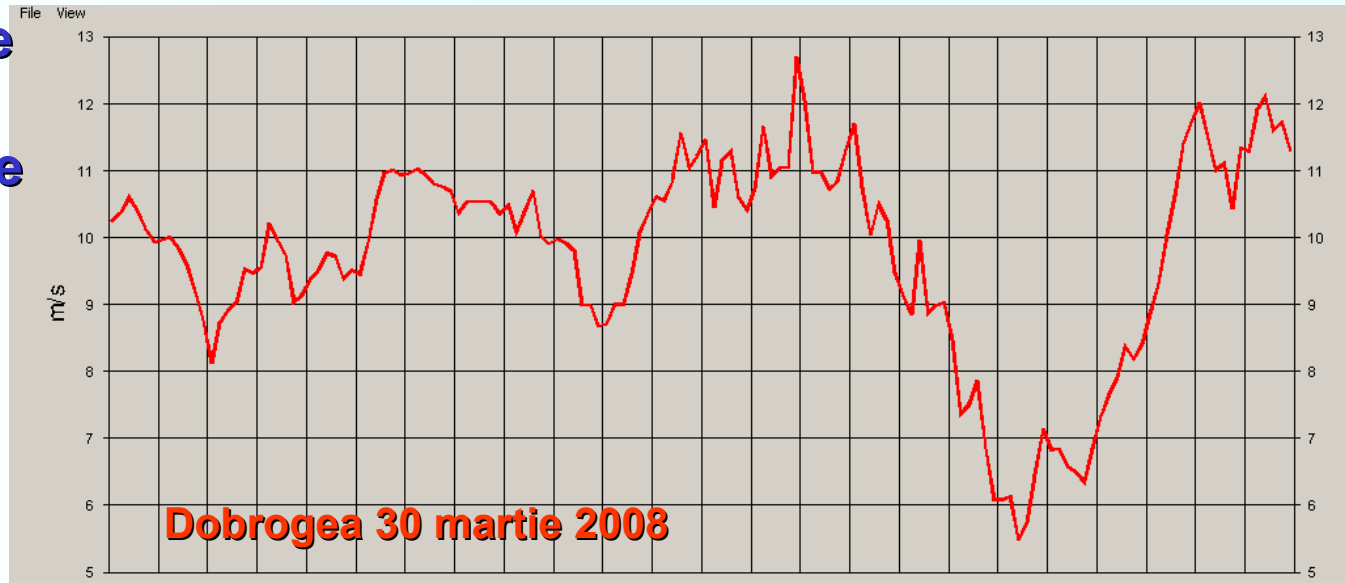
Table 6: Largest variations of wind power (with respect to size of the area considered and (ref. 2) for different time periods (hourly and 4-12 h variations)

Area size (km x km)	Largest variation % (up or down)	Example
Hourly variations		
100 x 100 km	50	UK (ref. 28)
200 x 200 km	30	Denmark (ref. 2)
400 x 400 km	20	Germany, Denmark, Finland
Group of countries	10	
4-12 hour variations		
One country	40 – 60 80	Denmark Germany
Larger area	35	Nordic area (ref. 2)
400 x 400 km	4h: 80% 6h: 80% 12h: 90%	United Kingdom (ref. 28)

Operatorii de transport şi distribuție se pot pregăti deja

- metode şi tehnici de dispecerizare
- predicția producției
  - achiziție date prin măsurători de vânt
  - programe de calcul
- simulări cu serii reale de date de vânt





For a wind speed of 10 m/s, from North

The air flow will pass over Dobrogea, in
150 km /10 m/s = 15000 seconds = 4 hours !

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