

Wind as local renewable resource

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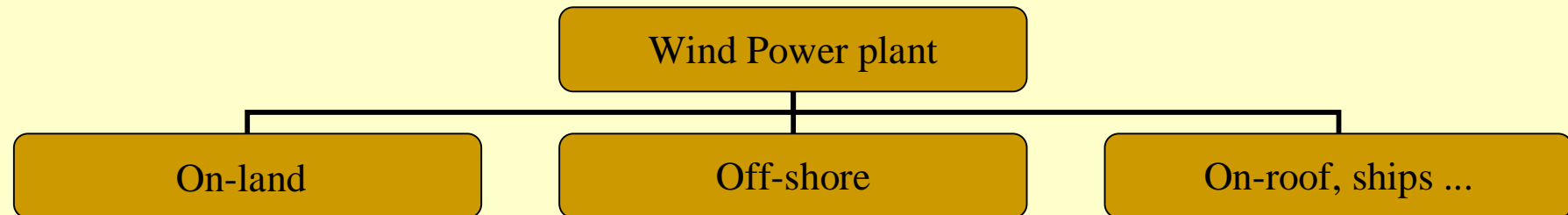
Wind Energy - The Facts Workshop
22 May 2009, Riga

Contents

1. General situation

2. Preconditions for wind energy use and development-
wind, suitable site and criteria for development of
wind energy

Classification of WPP



Sizes and Applications of WPP



Small (≤ 10 kW)

- Households
- Farms
- Remote Application



Medium

(10-250 kW)

- Village Power
- Hybrid Systems
- Distributed Power



Large (660 kW - 2+MW)

- Central Station Wind Farms
- Distributed Power
- Community Wind

Preconditions for wind energy use and development

1.Wind

2.Suitable site

3.Development criteria's of wind energy



Wind

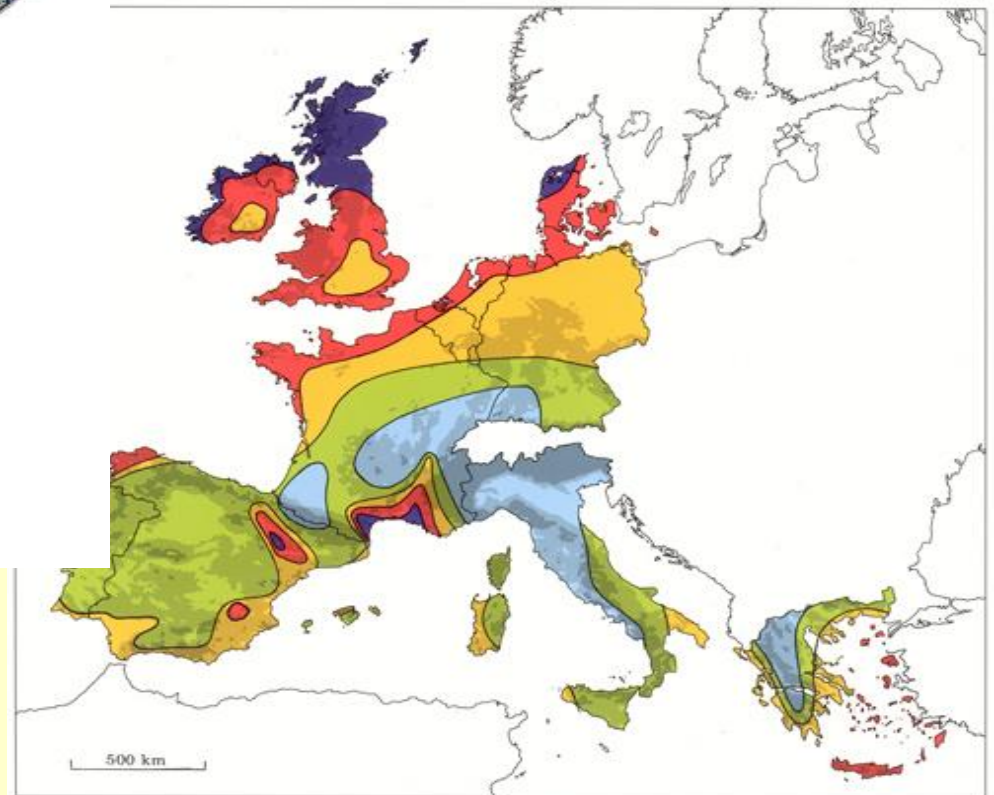
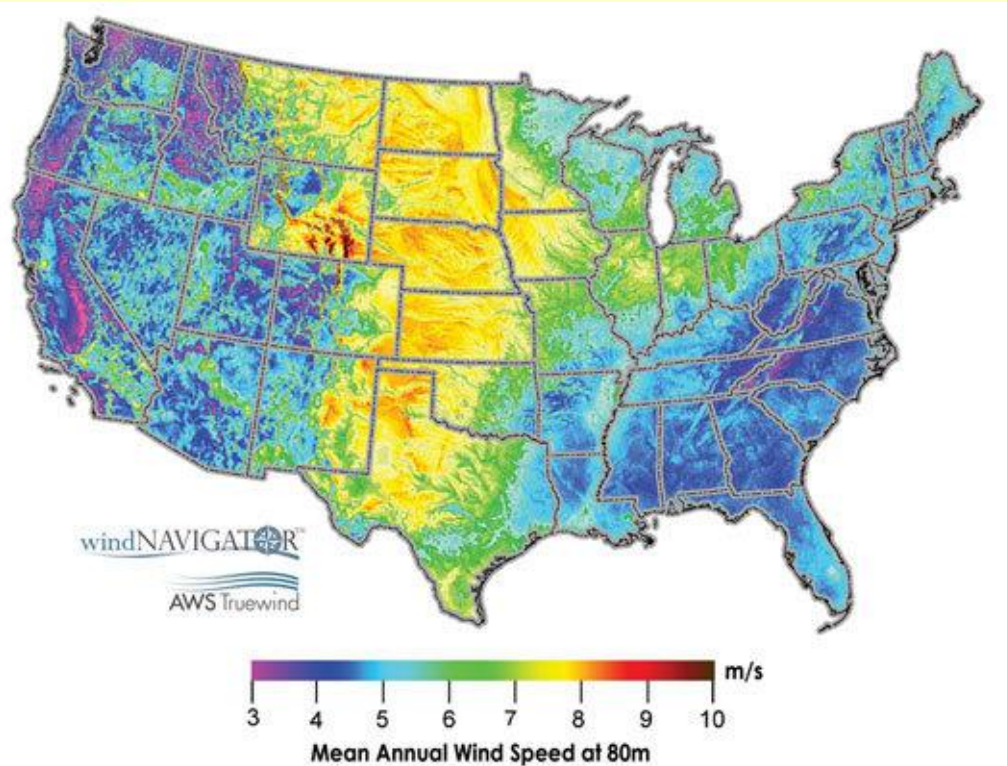
n Wind speed

n “Wind rose”

n Type of wind - Local winds (sea breeze, regional winds etc.)

n Other meteorological parameters

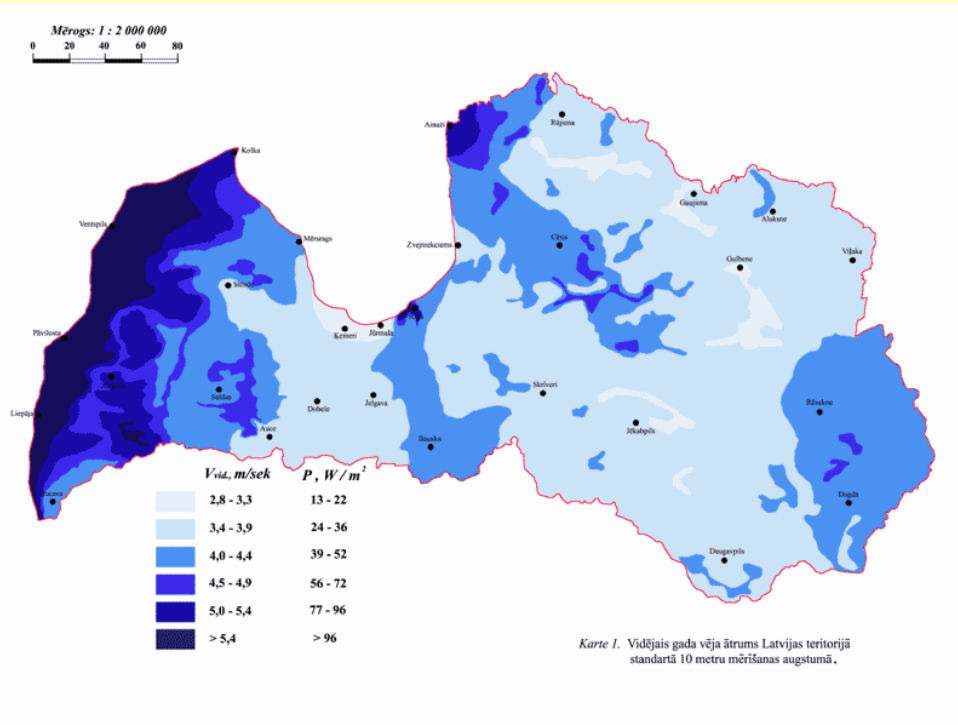
Wind maps



Wind resources ¹ at 50 metres above ground level for five different topographic conditions									
Sheltered terrain ²		Open plain ³		At a sea coast ⁴		Open sea ⁵		Hills and ridges ⁶	
m s ⁻¹	Wm ⁻²	m s ⁻¹	Wm ⁻²	m s ⁻¹	Wm ⁻²	m s ⁻¹	Wm ⁻²	m s ⁻¹	Wm ⁻²
> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0- 8.5	400- 700
< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400

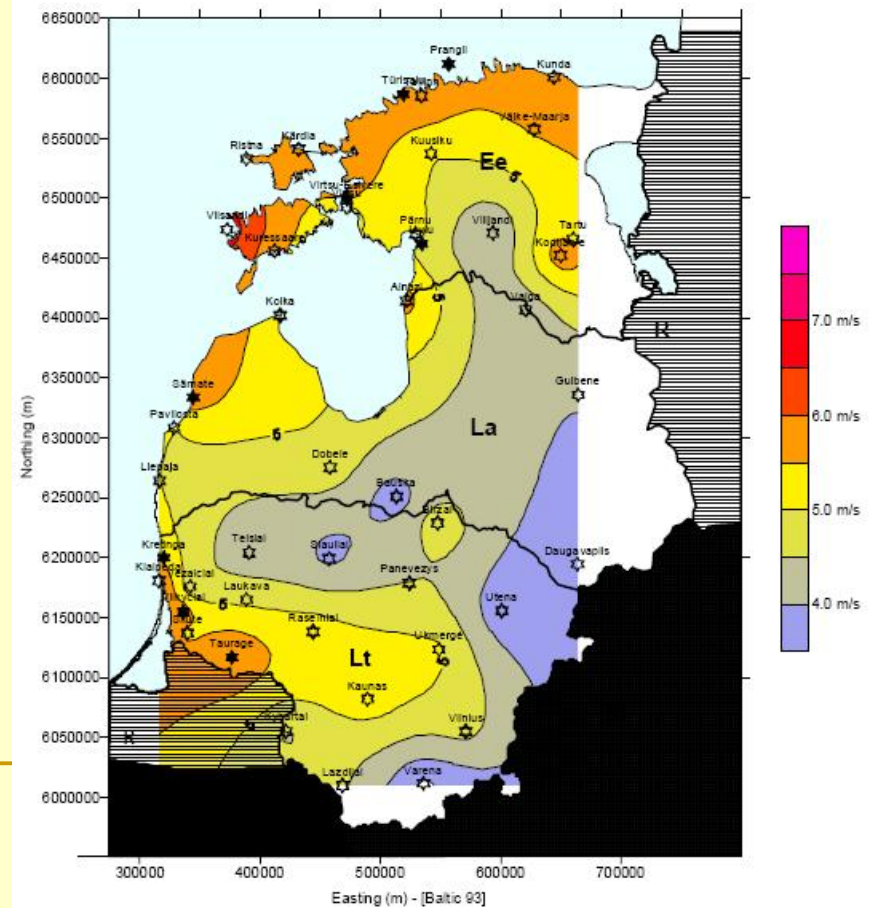
Source: www.google.com

... in Latvia



Latvian Wind Energy Guide, 2001

The UNDP/GEF Baltic Wind Atlas, 2003



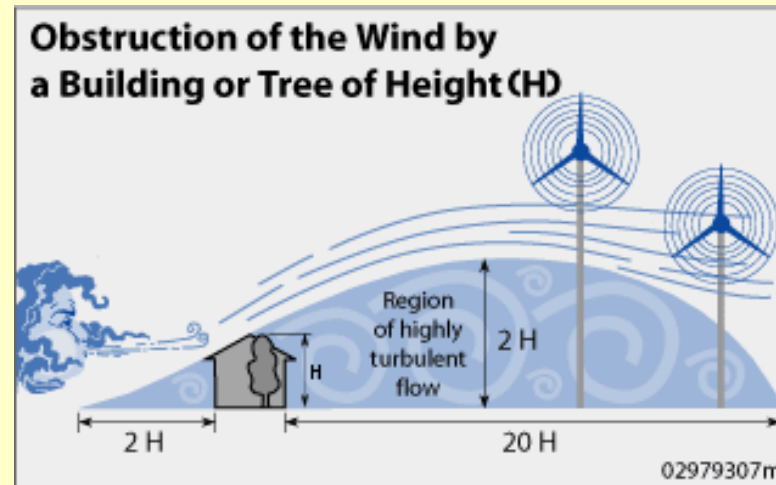
... in Latvia

Electricity produced from WPP

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Total, TWh
2006	4	3	3	3	4	2	2	3	3	5	5	8	45
2007	9	4	4	5	2	3	4	3	4	3	5	6	52
2008	9	8	4	3	2	4	2	5	2	8	7	4	58
2009	5	2	-	-	-	-	-	-	-	-	-	-	-

Suitable site

Roughness



Orography



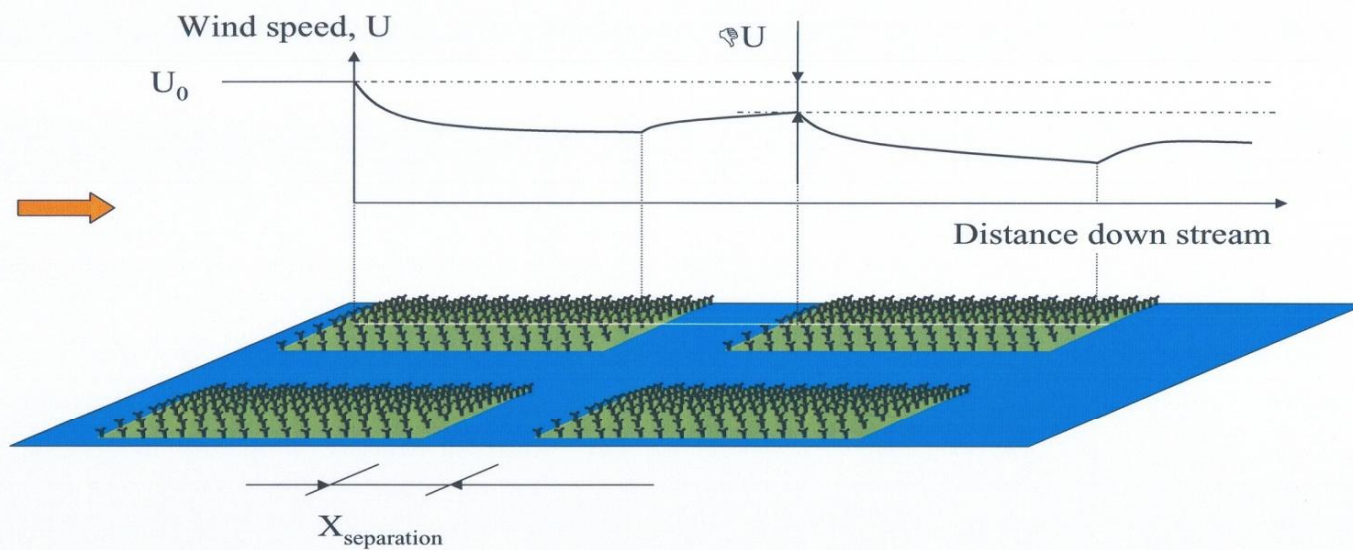
Conflict zones

- ✓ Protected areas (including marine territories)
- ✓ Sites of intensive fishery
- ✓ Fairways
- ✓ Telecommunication cables
- ✓ Port aquatories.
- ✓ Extensive minefields from World War I and World War II
- ✓ Military polygons in the Baltic Sea
- ✓ Ship sanctuaries
- ✓ Sea surveillance system
- ✓ Potential oil fields
- ✓

“Wake” effect



Wake effects in Offshore wind farms



Development criteria's of wind energy

Criteria

- 1.Environment and nature
 - 2.Political (administrative procedures etc.)
 - 3.Technical (infrastructure, innovation etc.)
 - 4.Economical (electricity market, competitiveness etc.)
 - 5.Social (public support, employment, job creation etc.)
-

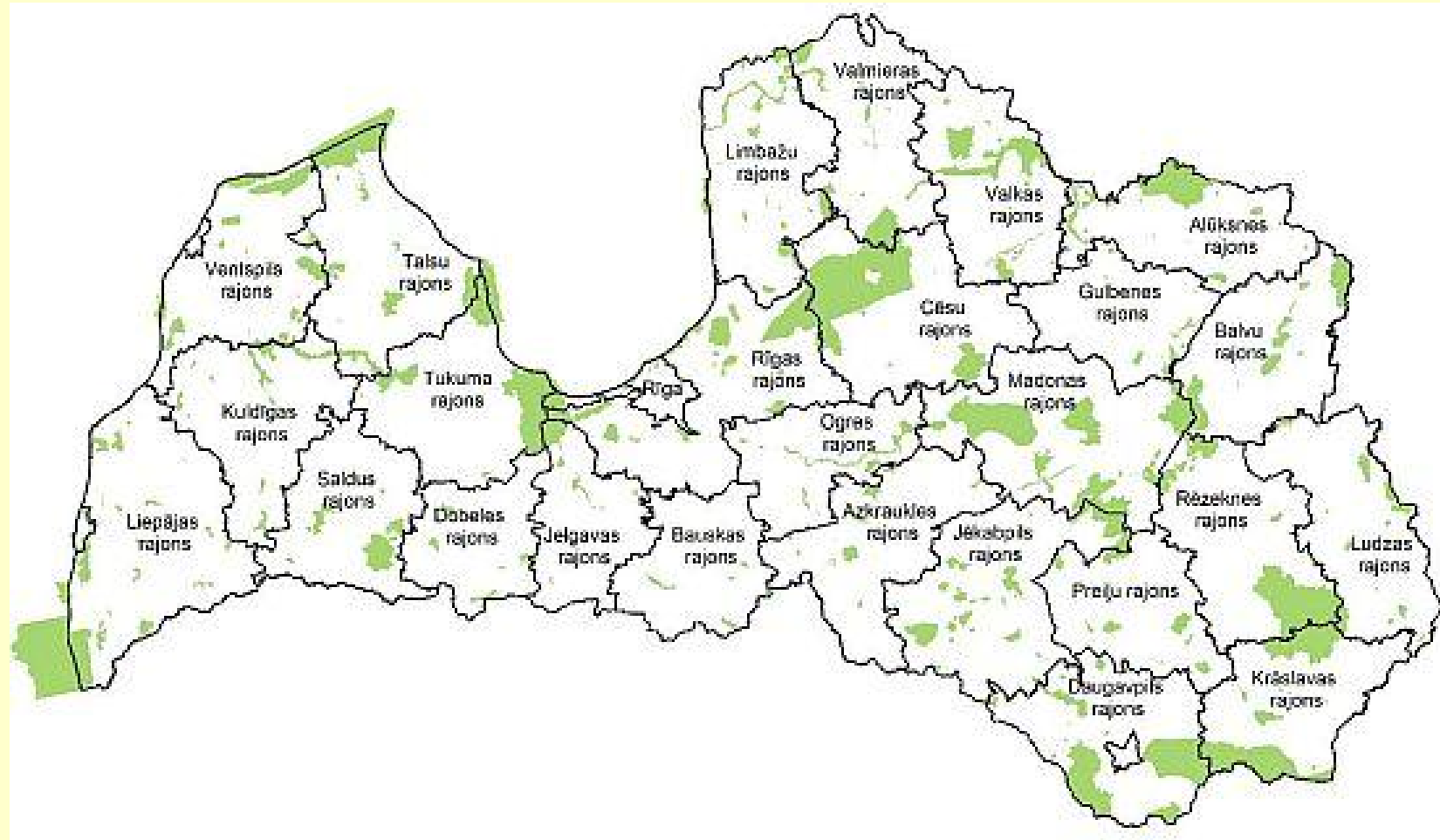
Environment and nature (1)

- § Landscape
- § Noise
- § Electromagnetic waves
- § Construction impact on land
- § Protected nature territories
- § Birds, bats, fishes etc

- § CO2
- § Life cycle assessment

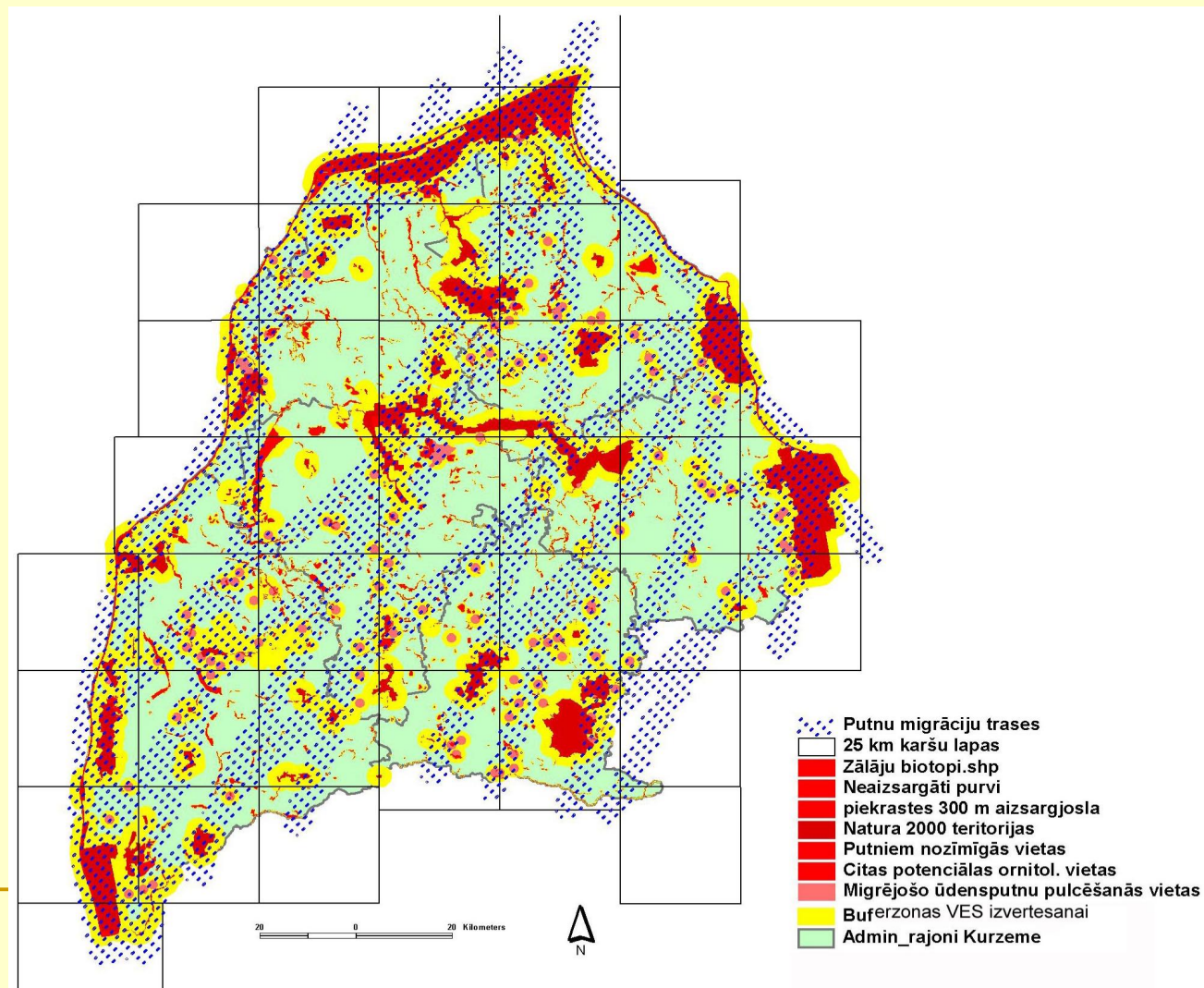
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Nature protected territories



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Ornithological restrictions



Political

The main aspect!!!

... Latvia

- Wind energy policy formed by two main political documents:
 - ✓ National Energy Strategy 2007-2016 (2006)
 - ✓ The Strategy of Use of Renewable Energy Resources for 2006-2013 (2006)
- Strategies determine that potential wind energy capacity is about 600 MW, though mostly terrestrial part is considered.
- Prediction for 2010 is up to 135 MW, but only in terrestrial wind farms.
- Legal basis for permitting and licensing is not yet fully developed for the EEZ and Territorial Sea.
- There are no standards or guidelines developed for wind parks.

Technical

- § Transmission line capacity
- § Connection to the electrical grid
- § Parameters of power quality (stable voltage, harmonics etc.)

Balancing of Electricity

... Latvia

Grid connection

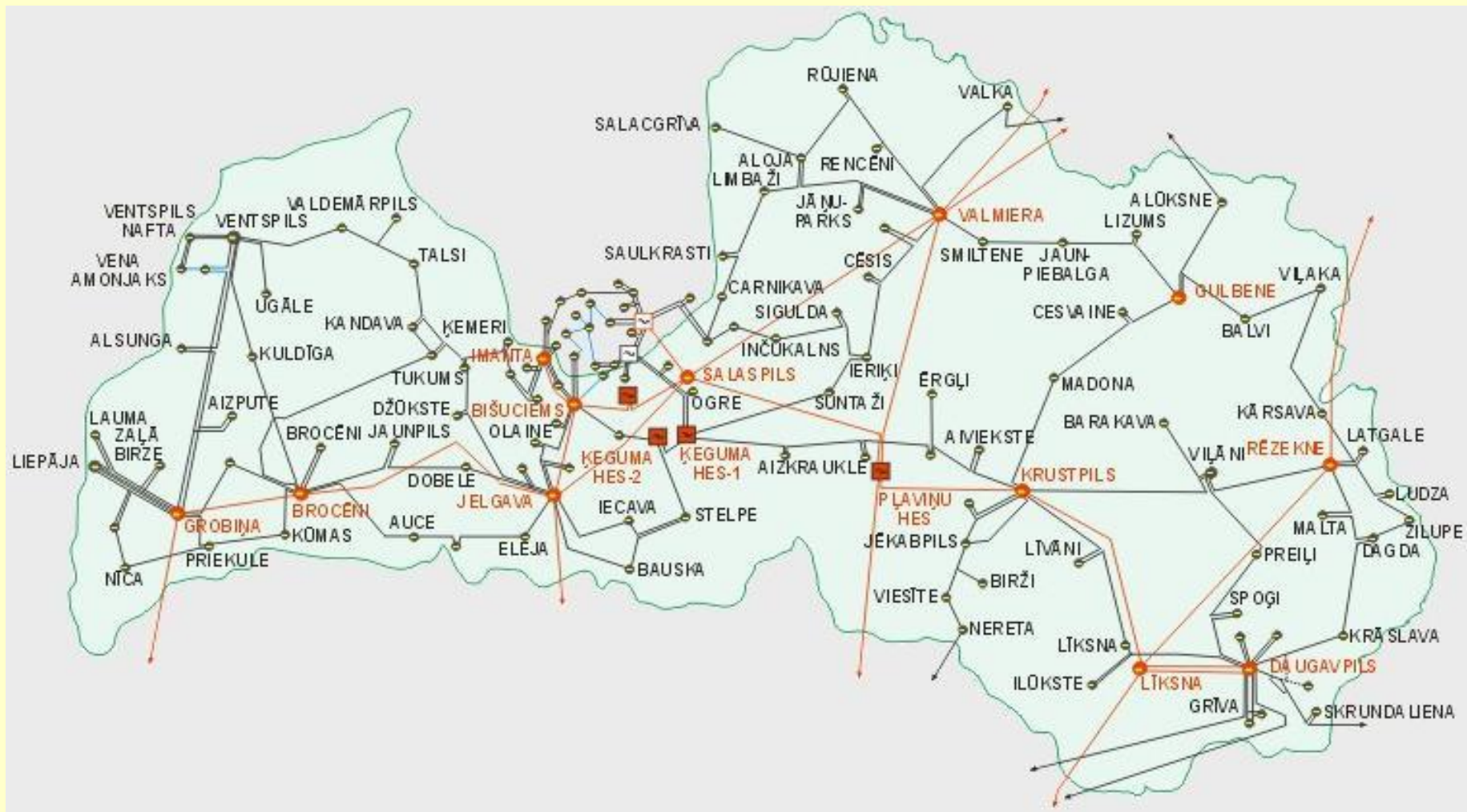
- Grid infrastructure near sea coastline, specially in the north of Kurzeme, is poorly developed and strongly limits installation of new facilities, including offshore.
- At present, leading energy production company “Latvenergo” analyses potential for new high voltage grid projects.

At present:

- 330 kV – 5 substations – 20 transformers – 1249 km
- 110 kV – 117 substations – 241 transformers – 3427 km

... Latvia

Grid connection



... Latvia

Grid connection

<i>Connection of power plant to electrical grid</i>	
Nominal capacity (kWel or MWel) of power plant	Connection point
till 15 kW	0,4 kV transmission line (EPL)
till 250 kW	0,4 kV busbars
till 600 kW	6,10,20 kV EPL
From 0,6 MW till 20 MW	6, 10, 20 kV busbars 110 kV a/st.
from 20 MW till 100 MW	110 kV a/st. busbars
Under 100 MW	330 kV a/st. busbars

Economical (1)

Different Ways to Buy Renewable Energy

- n Rate Based as Part of Utility Portfolio
 - n Green Pricing
 - q No competition, monopoly utility offers customers choice of supporting wind power construction.
 - n Green Marketing
 - q In competitive market, customers empowered to choose service providers that contract to purchase renewables
 - n Green Tags
 - q Environmental attributes divorced from energy
-

Economical

- § Financing and Ownership Structure
 - § Different Ways to Buy Renewable Energy
 - § Taxes and Policy Incentives
 - § Plant Size: equipment, installation and O&M economies of scale
 - § Turbine size, model, and tower height
 - § What is included: land, transmission, ancillary services
-

Social

- n Land Lease Payments: 2-3% of gross revenue
- n Local property tax revenue
- n 1-2 jobs/MW during construction
- n 2-5 permanent O&M jobs per 50-100 MW
- n Local construction and service industry: concrete, towers usually done locally
- n Investment as equity owners: production tax credit, accelerated depreciation

Wind Power Isn't Perfect

Wind Power output varies over time

Wind Power can only meet part of your load

Wind Power is location-dependent

Wind Power is transmission-dependent

Wind Power has environmental impacts

. . . But Wind Power has a Great Future!

Legal acts and support mechanism are developed,
however **why the use of wind energy in Latvia is
not booming?**

Thank you for attention!

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