Joint Research Centre

the European Commission's in-house science service

Serving society
Stimulating innovation
Supporting legislation

Technology options and local resource potentials for renewable power generation

Dr. Arnulf Jäger-Waldau

Regions and cities in the context of sustainable energy and climate change

Košice, 03 October 2019

European Commission

JRC's Mission and Role

Vision:

"To play a central role in creating, managing and making sense of the collective scientific knowledge for better EU policy."

"As the science and knowledge service of the Commission our mission is to support EU policies with independent evidence throughout the whole policy cycle."

Serving society, stimulating innovation, supporting legislation

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The Joint Research Centre

€ 386 million Budget annually, plus € 62 million earned income

Independent of private, commercial or national interests

30% of activities in policy preparation, 70% in implementation

125 instances of support to the EU policy-maker annually

More than 100 economic, bio-physical and nuclear models

Focus on the priorities of the Commission (80% of activities co-designed with partner DG's)

6 locations in 5 Member States: Italy, Belgium, Germany, The Netherlands, Spain

Policy neutral: has no policy agenda of its own

42 large scale research facilities, more than 110 online databases

1500 core research staff, out of around 3000 total staff

83% Of core research staff with PhD's

Over 1,400 scientific publications per year

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- Why Decarbonisation of Electricity
- Techchnology options
- Local potentials
- Conclusions

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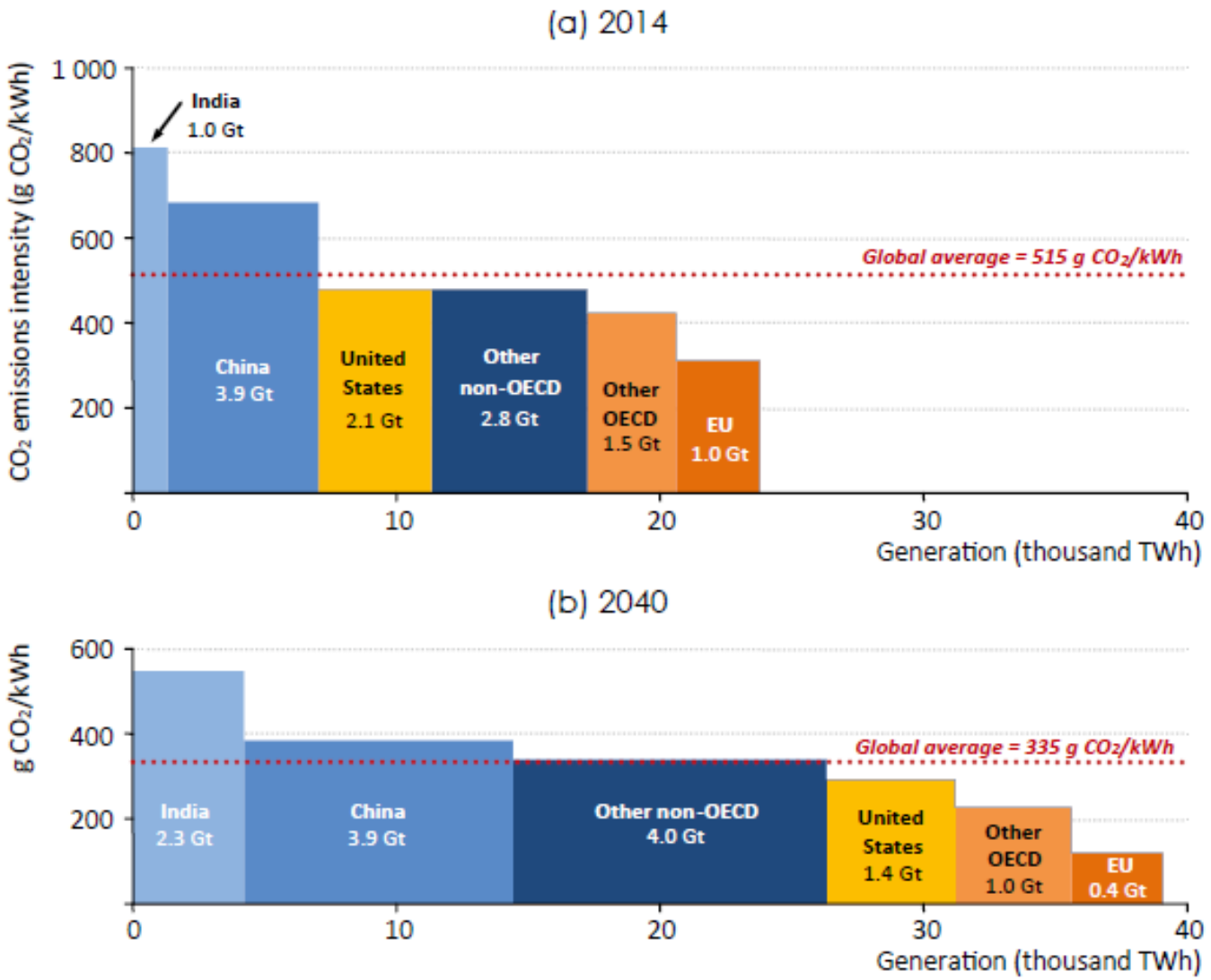
Carbon Intensity of Electricity



Data source: NPS IEA WTO 2106

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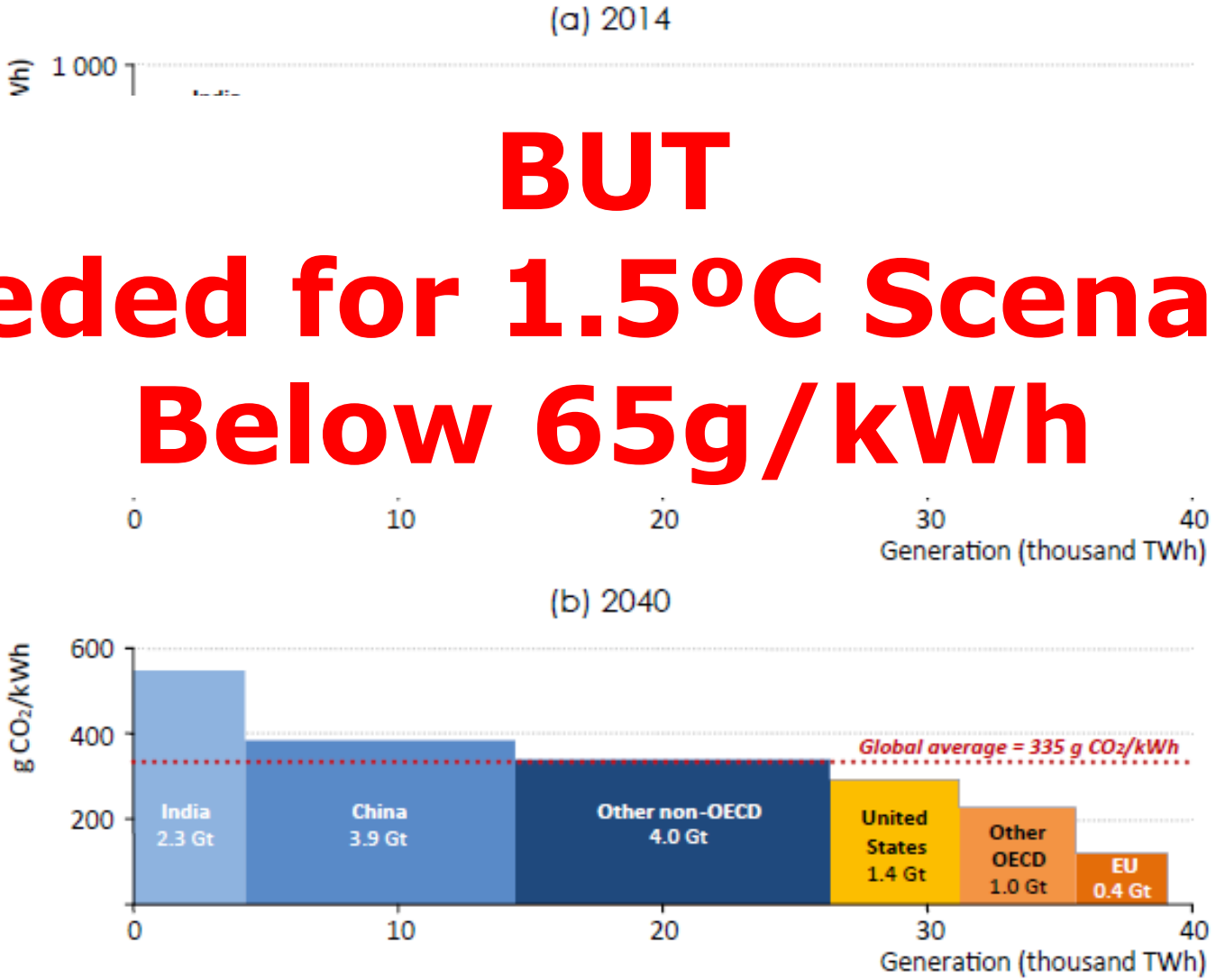
Carbon Intensity of Electricity



BUT

Needed for 1.5ºC Scenario: Below 65g/kWh

Data source: NPS IEA WTO 2106

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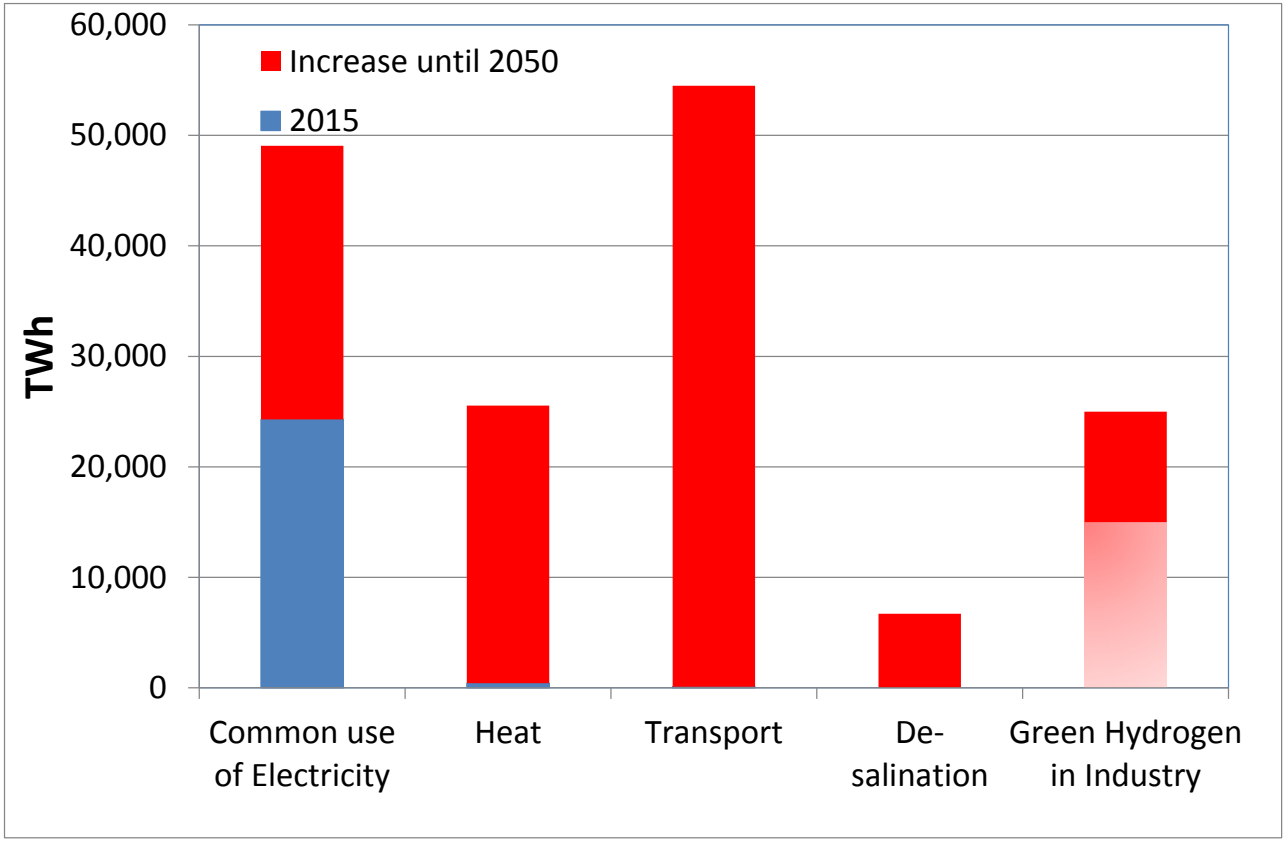
New Global Electricity Demand Projections



2015: ~ 24,300 TWh

2050: ~ 160,000 TWh

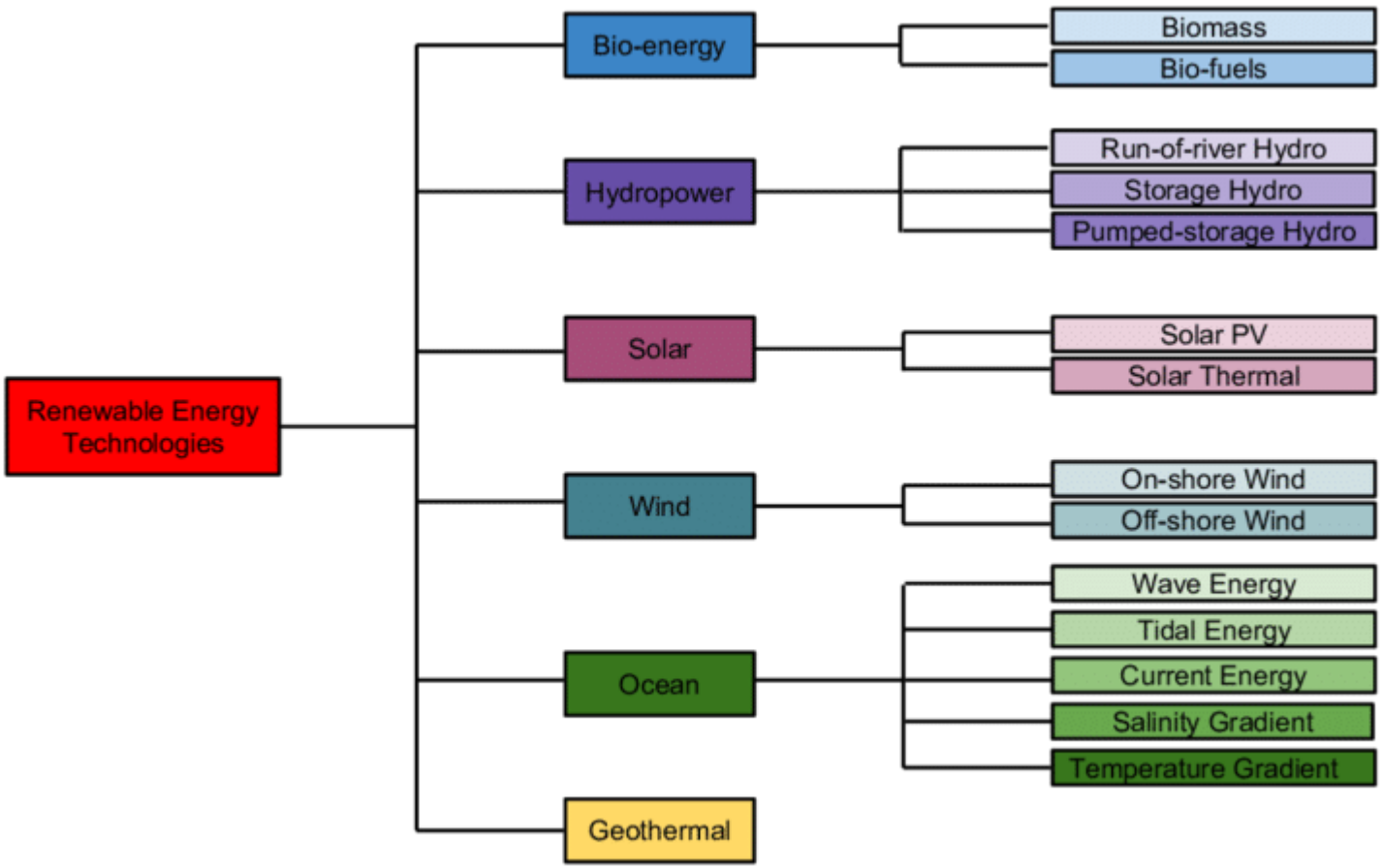
Data source: LUT U 2019, JRC

European Electric Power Scenarios for 2050

Model	Geog. coverage	Scenario	Total TWh	PV TWh
Lappeenranta Technology University & Energy Watch Group	Global+ European regions	100% RES power (classic el.)	6,221	2,634
		100% RE energy	17,781	11,052
JRC-EU-TIMES (tool for technology cost sensitivity studies)	EU-28	RES9: near-zero CO_2 for full energy system, no CCS	12,188	3,520

Data source: LUT U, Proceedings of 35th EUPVSEC

Technology Options



Source: Tran, Thomas T.D. & Smith, Amanda D., 2017
Renewable and Sustainable Energy Review,, vol. 80(C),pp 1372-1388.

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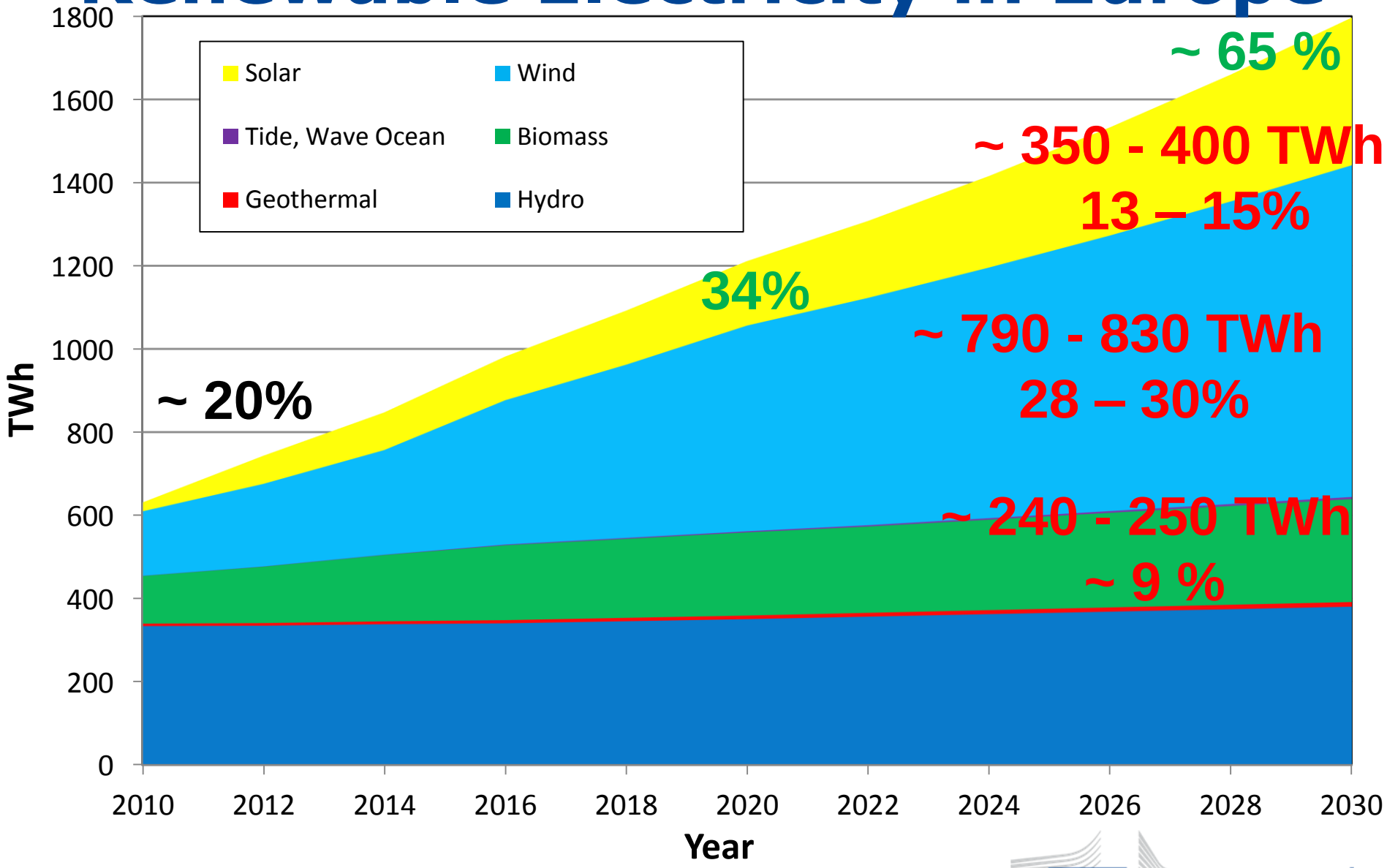
Renewable Electricity in Europe



Needed for 35% RES in 2030

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Local Potentials

Picture: Fotolia 76545466

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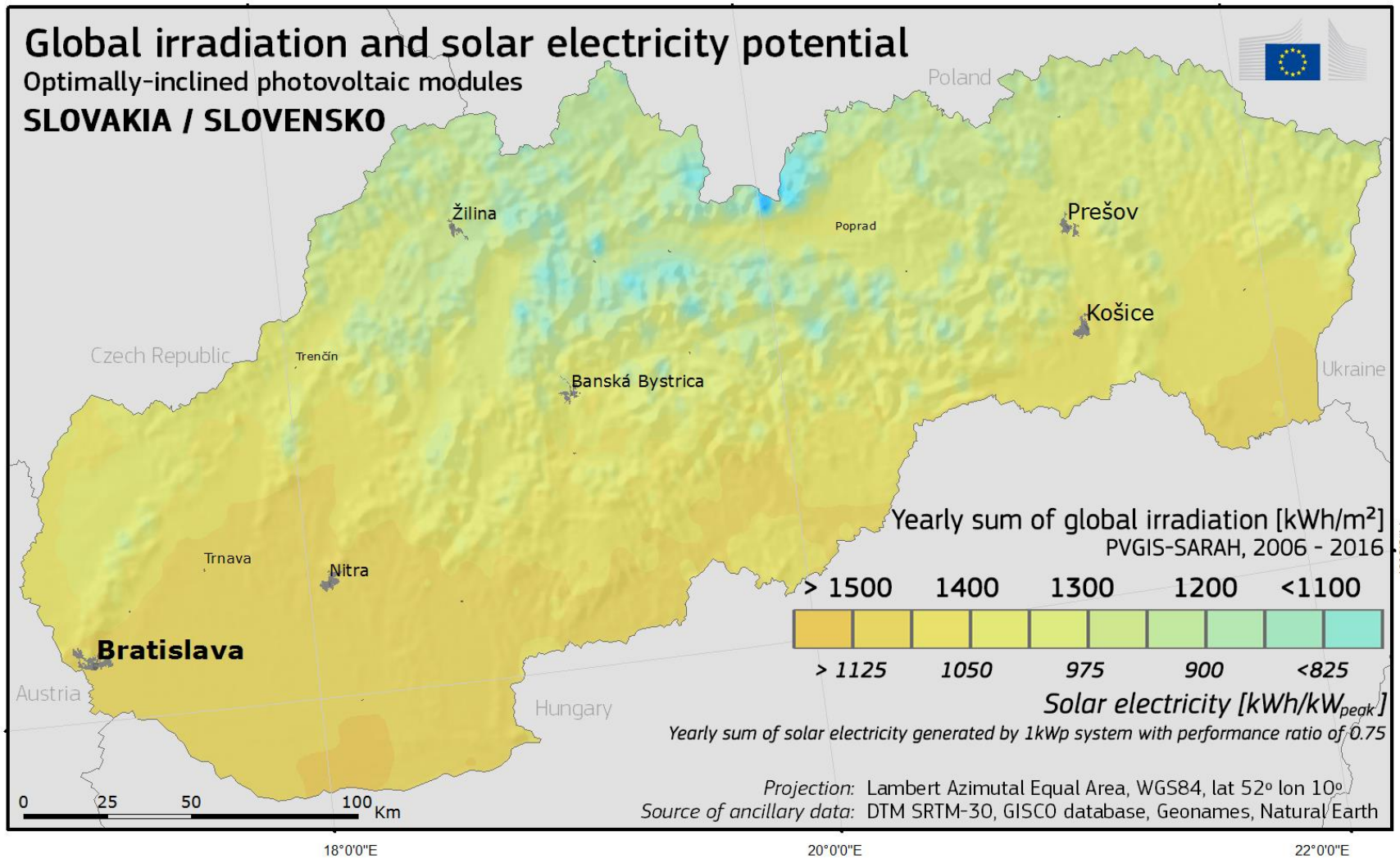
Solar Resources Slovakia



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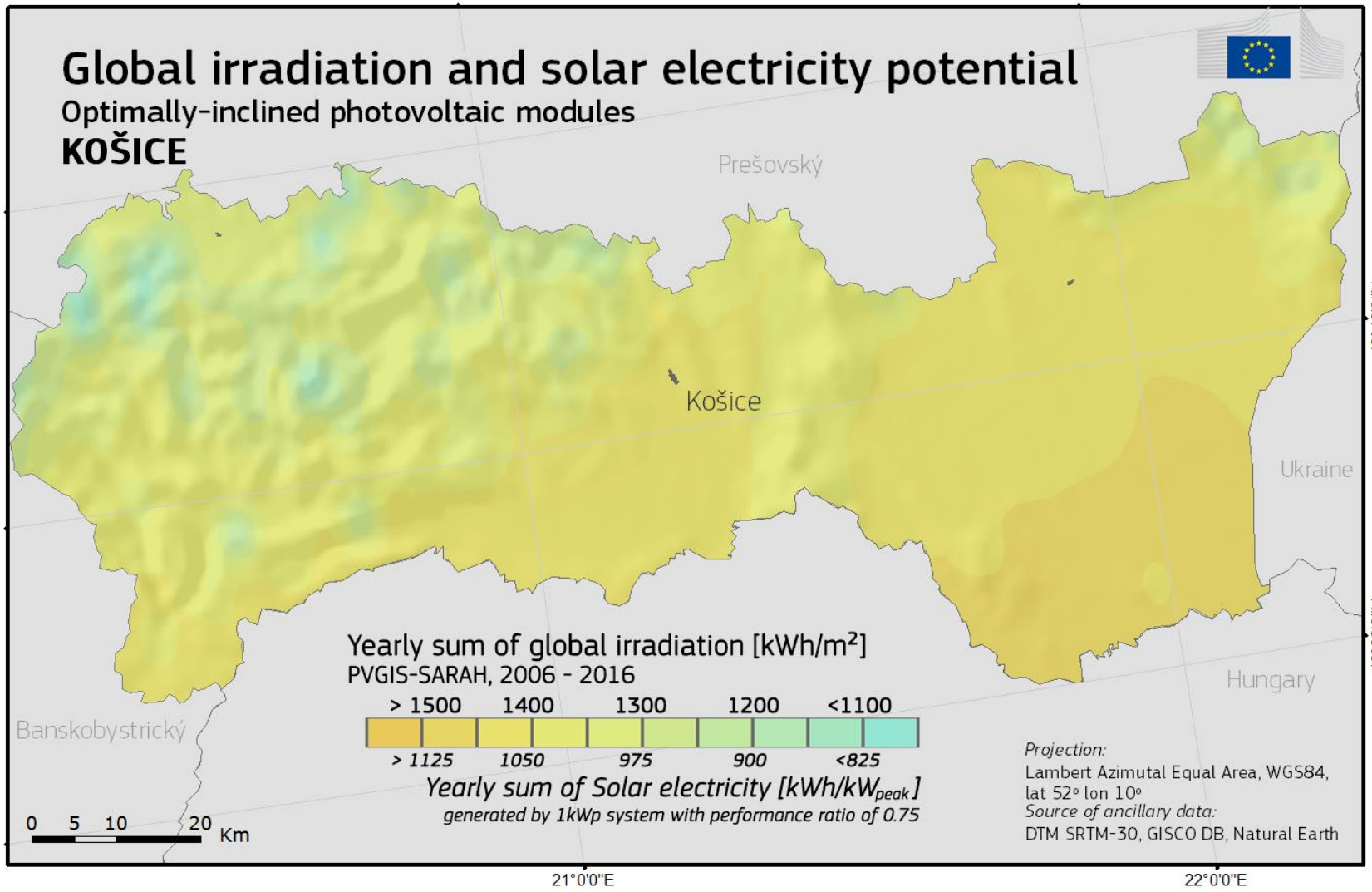
Solar Resources *Košice Region*



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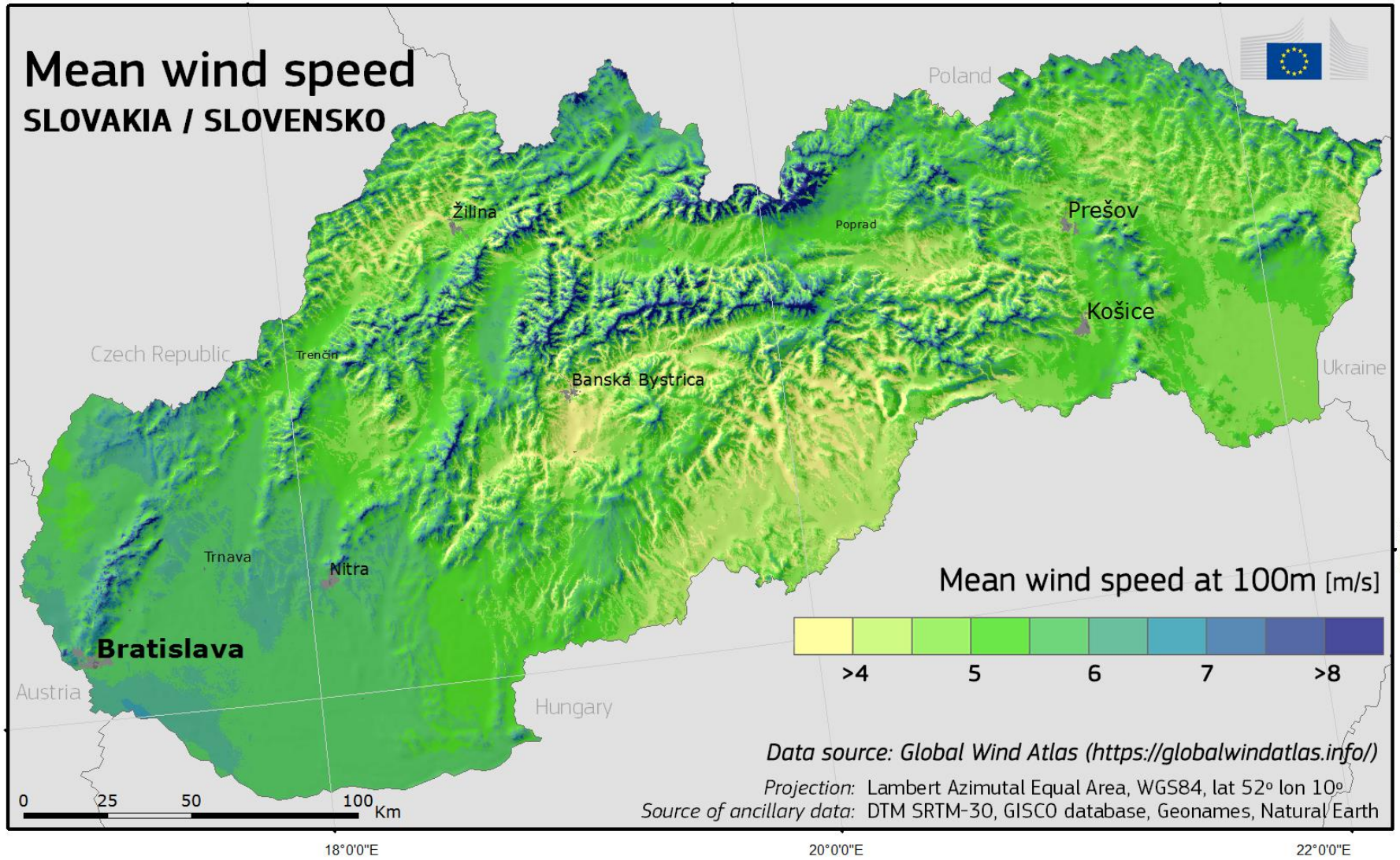
Wind Resources Slovakia



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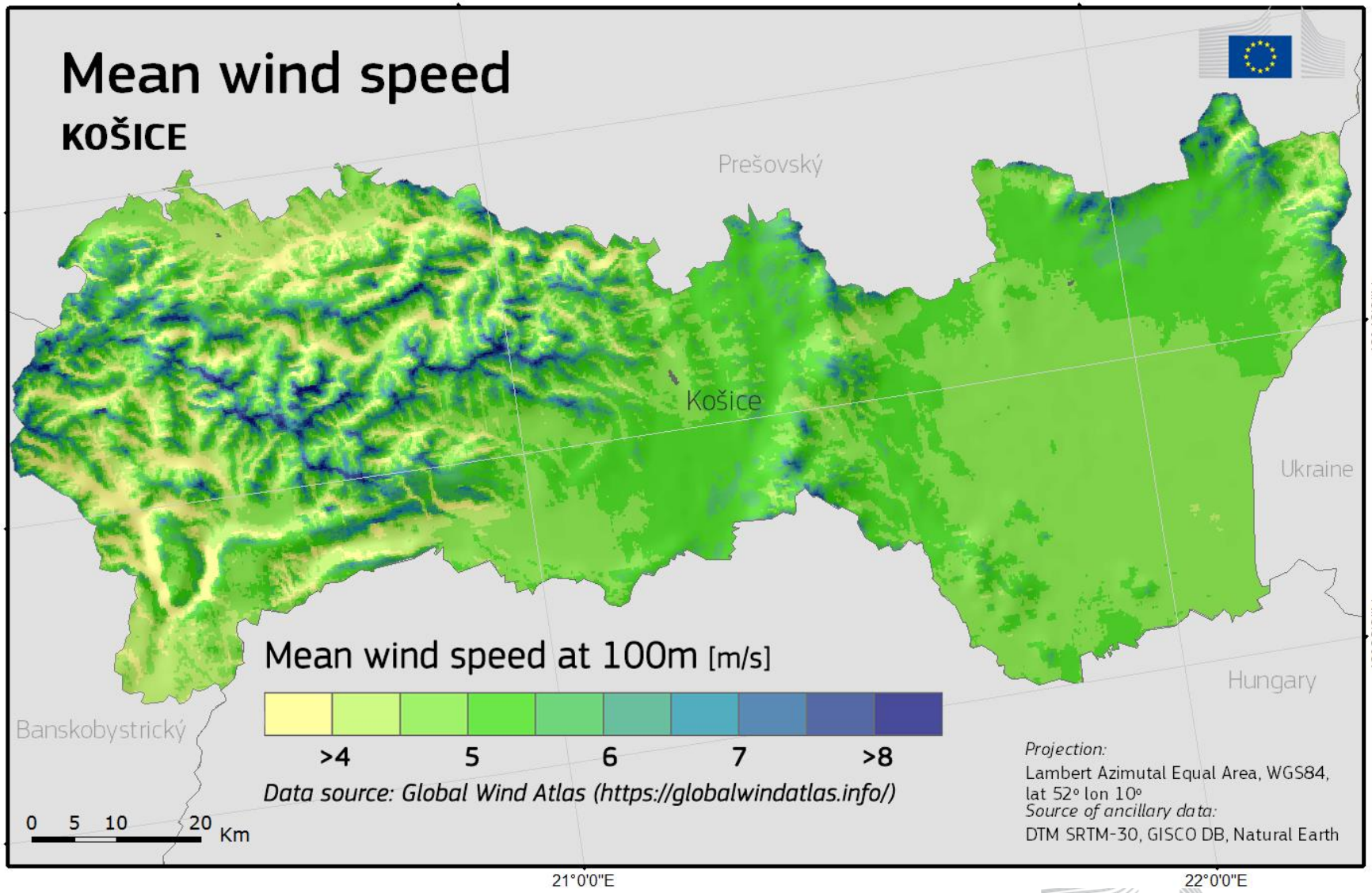
Wind Resources *Košice Region*



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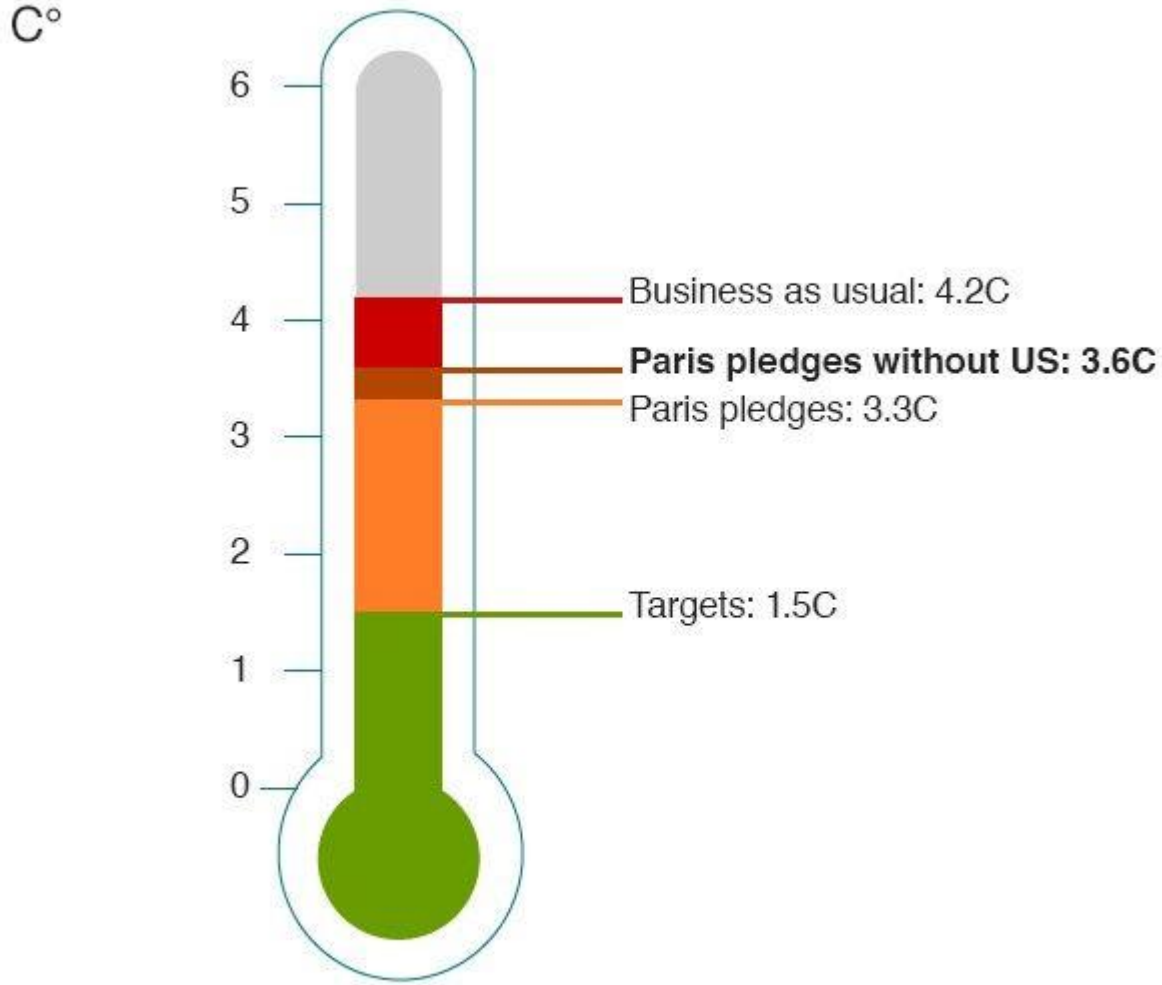
Biomass Potential *Košice Region*

Primary energy (GWh)	Plant Capacity (MW)	Electricity Generation (GWh)	Heat Generation (GWh)
Total			
9,706.75	368.09	2,921.78	5,328.95
Crop Residues (1)			
1,103.76	41.39	331.13	607.07
Municipal Solid Waste (2)			
1,145.64	45.83	343.69	630.10
Livestock Methane (3)			
195.17	8.54	68.31	97.58
Forest biomass (4)			
7,262.18	272.33	2,178.65	3,994.20

Conclusions

- Decarbonisation of Energy sector mandatory for fulfilling the Paris Agreement
- Solar and wind have the highest growth potential in the power sector
- Local Renewable Energy Resources important for a fair Energy Transition
- Local Renewable Energy Resources offer high potential of local jobs
- Most regions can produce enough power for themselves or even export it

Increase in global temperature by 2100



Uncertainty range on US prediction is 2.1C to 4.7C

Source: Climate interactive

BBC

European Commission


Thank you for your attention!