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VERBUND

Energy Transition

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RWEA Conference

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VERBUND at a Glance

96 % production from renewable sources
approx. 3,000 employees

127 hydro power plants

No. 1 in climate change mitigation
among European power supply
companies

153 wind turbines

Austria's leading electricity company

strategic focus on Austria and Germany

first green bond in German-speaking Europe

51 % owned by the Republic of Austria

Austria-wide charging infrastructure
for electric vehicles

market leader in marketing of flexibility and
green electricity in Austria and Germany

environmental measures -
€ 280 millions to be invested until 2025

environmental management – top-10-position of 160
energy companies analysed by oekom research



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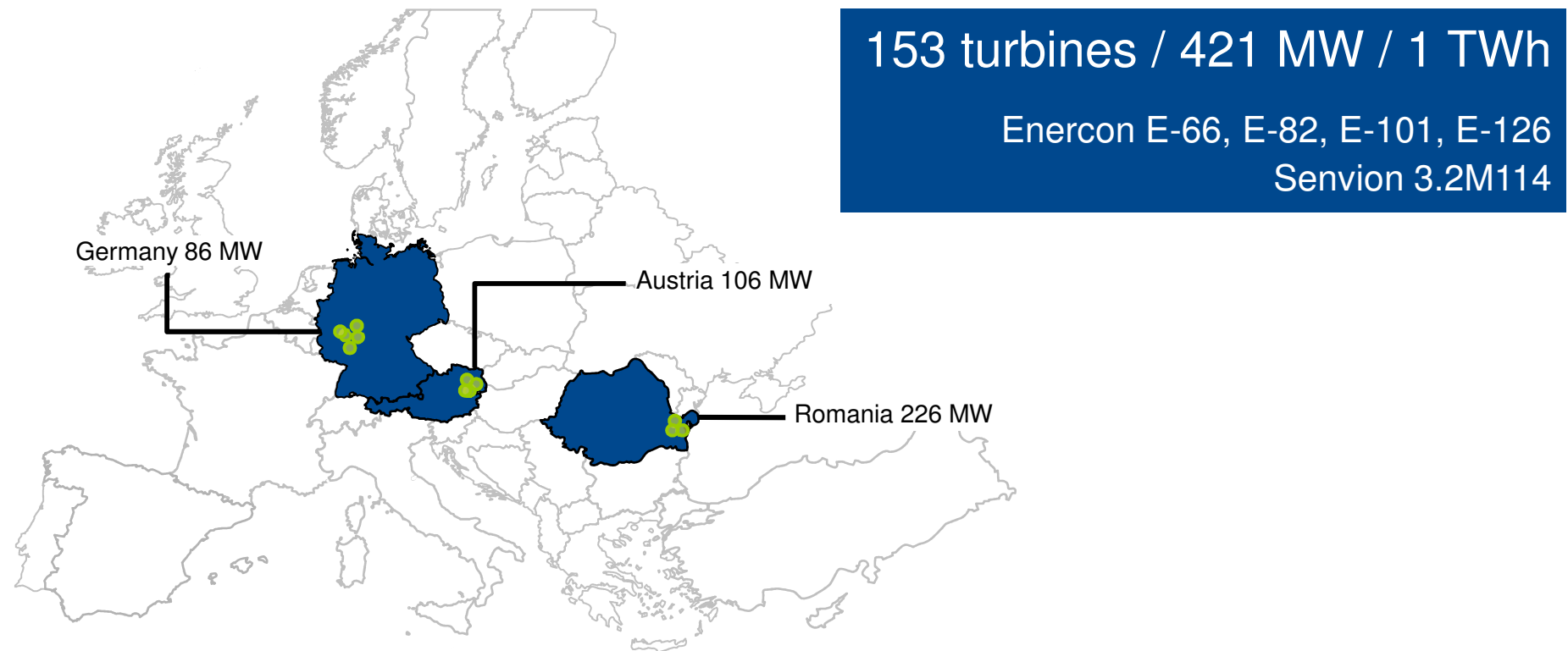
VERBUND - Highlights

- Integrated utility with generation, transmission, trading and sales of electricity
- 127 hydro power plants in Austria and Germany (Bavaria) – approx. 8,2 GW
- 31 TWh total production (2015)
- 104 TWh trading volume in 2016, active in 10 European countries
- 3,500 km of line length of the Austrian transmission grid



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VERBUND Wind Energy Portfolio



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Energy Transition

3 dimensions to be asked:

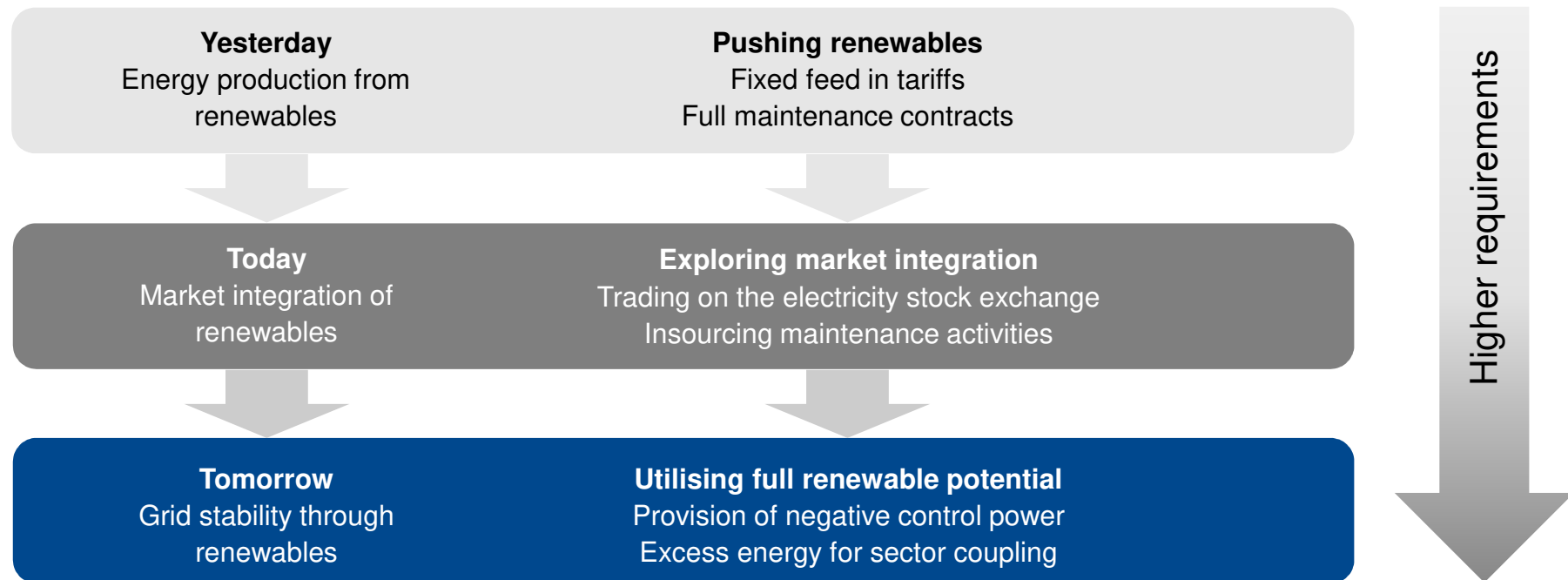
1. Technical dimension: Is Wind already an integrated part of the electrical system?
2. Economical dimension: Is Wind already competitive in the energy market?
3. Social dimension: Is the society ready for a transition?

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Technical Dimension

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Wind Energy As Integrated Part Of The Electricity System



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Wind Energy in Romania

- Energy is sold on the stock exchange (OPCOM)
 - Provision of day – ahead power performance forecasts and intraday to TSO
 - Power curtailments can be requested by the TSO
 - Intraday market with low liquidity
 - Reduction of balancing costs by short term market
- Reserve of pos. balancing energy of 1%

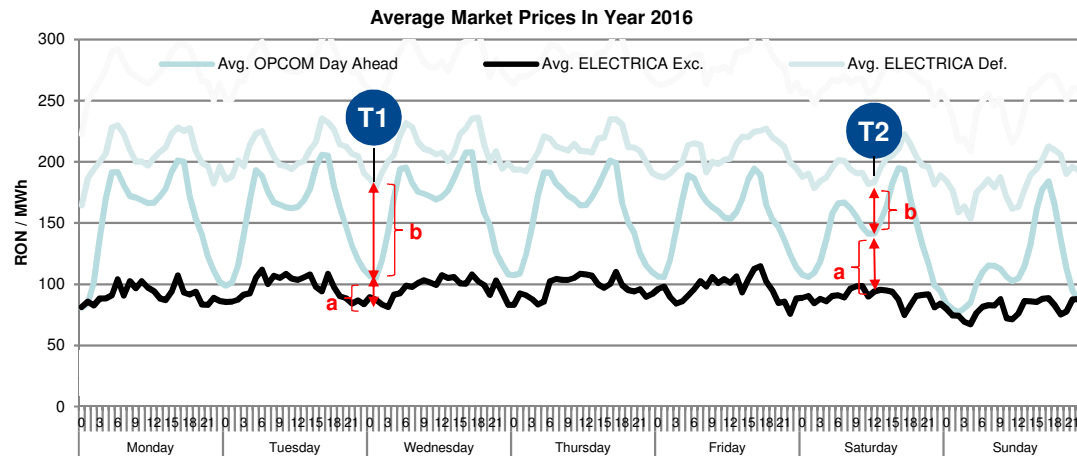
Quota obligation system	=	Energy price/MWh	+	Green certificate(s)
Incentive system for renewables, quota obligation for selling of renewable energy; can be met by purchasing green certificates by the energy seller		Selling of the produced energy on the stock market		<ul style="list-style-type: none"> ▪ Different number of certificates for different RES technologies ▪ Retrospective changes of the system

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Market Situation in Romania

Characteristic Week (2016)

- Balancing energy market not symmetrical
- High costs for deficit energy
- Low prices for exceeding energy



Market Value Wind Energy 2016 (RON/MWh)	Romania
Mean ROPEX/Day-Ahead	149,82
Profile Value Wind 0% Error	133,57 (-11%)
Specific Balancing Energy Costs	23,3

a...cost for excedent energy (lost revenue)
b...cost for deficit energy

T1 a<b -> Night

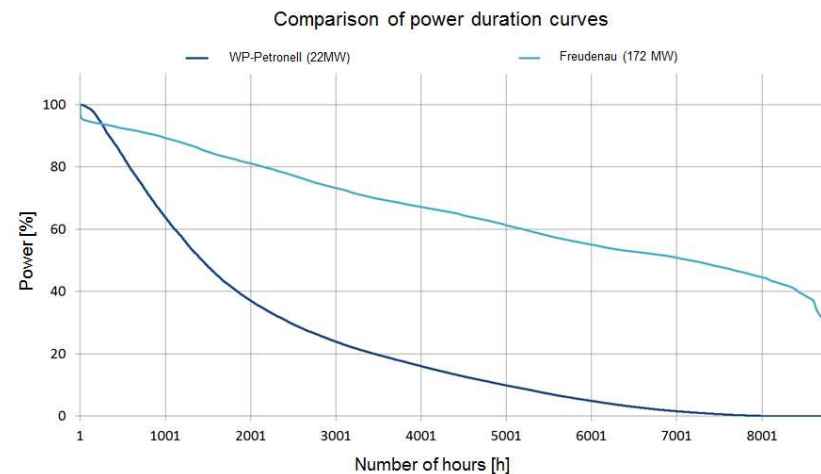
T2 a>b -> Day

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Participation in Tenders for Control Energy to Increase Revenues in Austria, relevant for Romania as well?

How and to what extent can wind energy participate?

- Prequalification according to framework conditions in Operation Handbook ENTSO-E, Policy 1 mandatory
- Long term control power products (secondary control) difficult to offer due to volatile wind production
 - Fall back hydro power plants for reserve capacity (Synergies within VERBUND)
- Prequalification for negative reserve power only
- Wind energy capable for tertiary control power
 - Minimum bid of 5 MW
 - Tendering of 4 hour time slices
 - Capacity charge and commodity price
 - Provision of service within 15 min

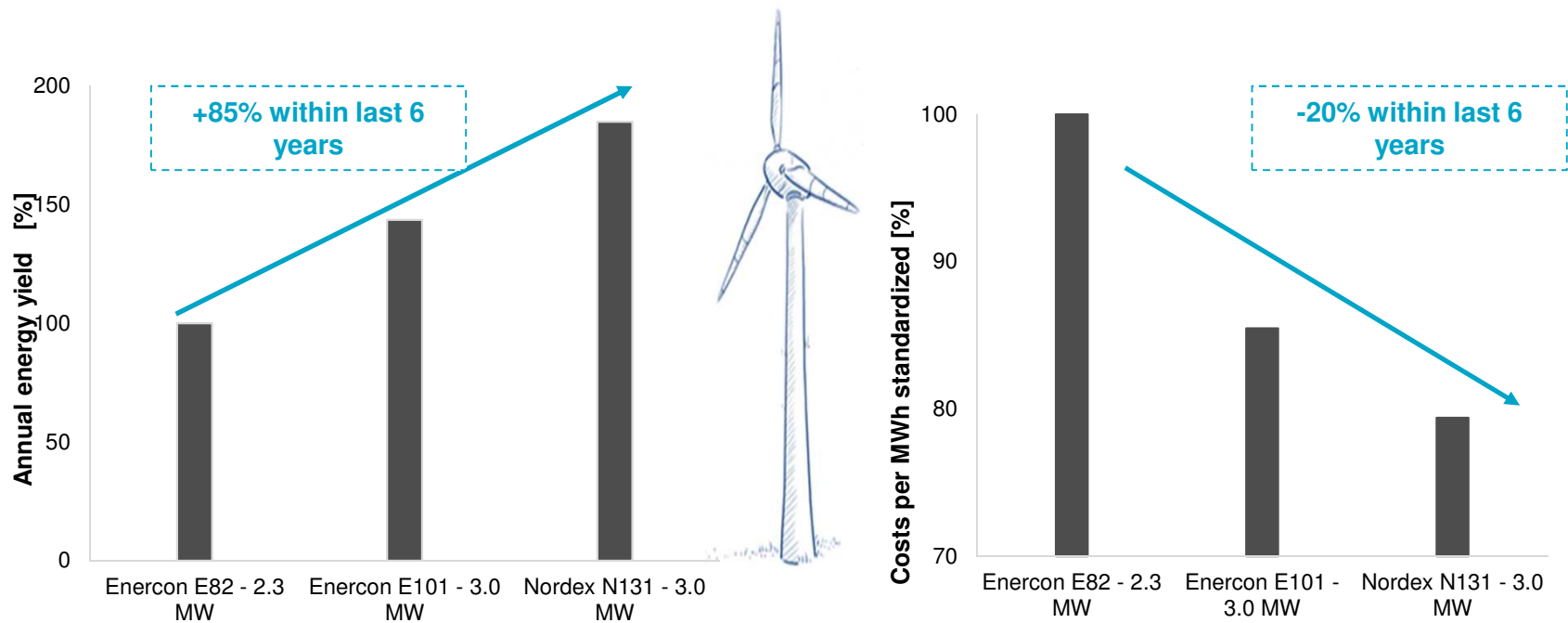


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Economical Dimension

Verbund Economical Costs

- Significant increase of annual energy yield, still continuing
- Significant decrease of CAPEX and OPEX, further reductions ongoing
- Level of app. 40,-- EUR/MWh achievable



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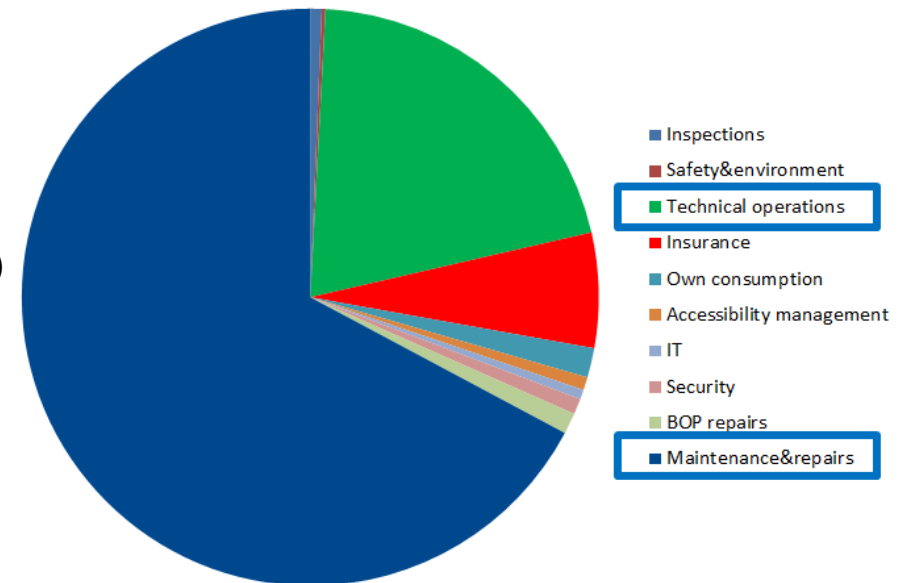
Further Reduction of OPEX in Romania possible?

Reduction of maintenance and repair costs

- Negotiation about alternative maintenance concepts

Reduction of costs for technical operations

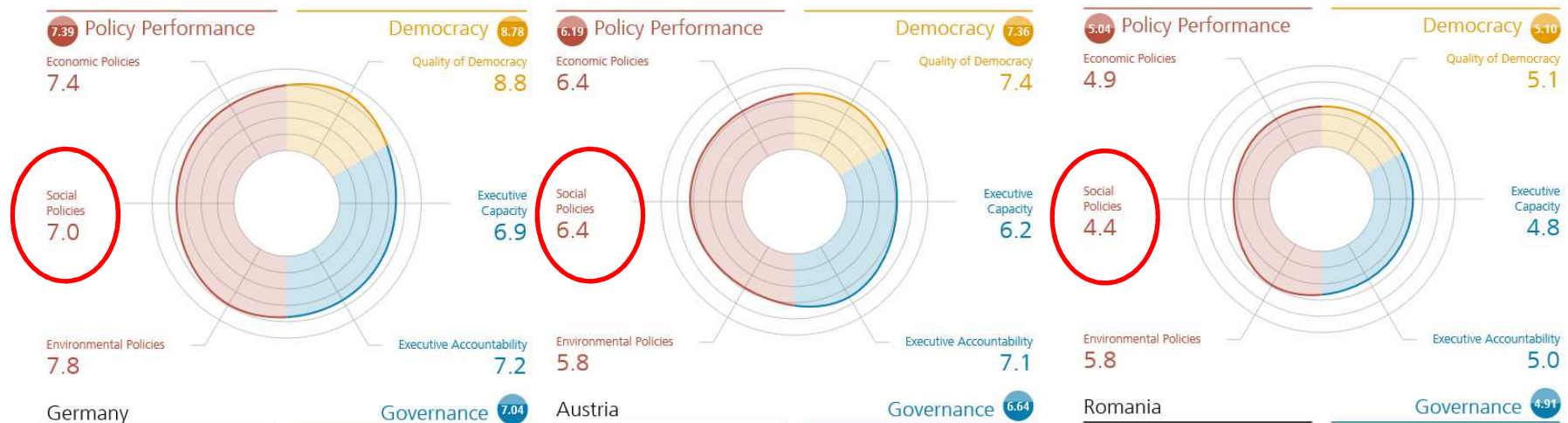
- Insourcing of the operation of the substations and changing the legal condition (unstaffed and remote SS)
- Insurance contract: establishing a risk community
- Decreasing the transmission and distributing tariff
- Changing the energy balancing system (symmetric market, controlling power range through auctions, prequalification)
- Increasing the liquidity in intraday trading (technical change of trading system)



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Social Dimension

Verbund Sustainable Governance Indicator (SGI) Index



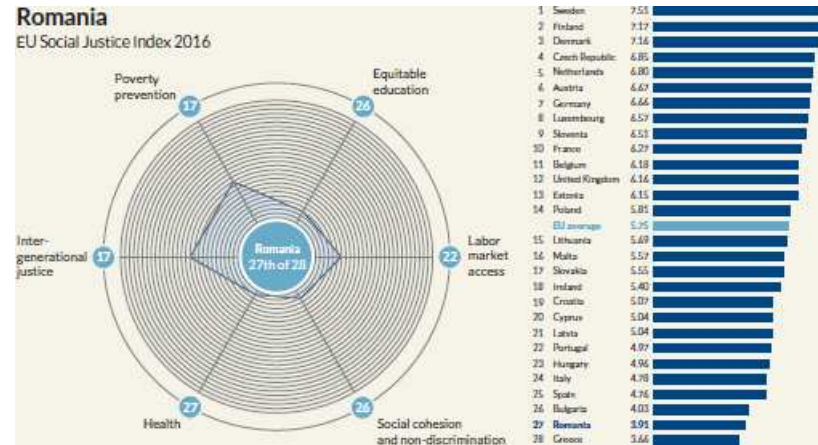
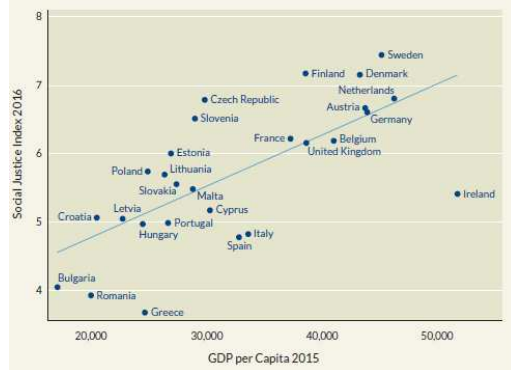
Source: www.sgi-network.org

The SGI is a platform built on a cross-national survey of governance that identifies reform needs in 41 EU and OECD countries. In almost all Indicators, Policy Performance, Democracy and Governance, Romania is placed on the lower ranks.

Verbund Social Justice

FIGURE 4 Social Justice 2016 and GDP per Capita 2015

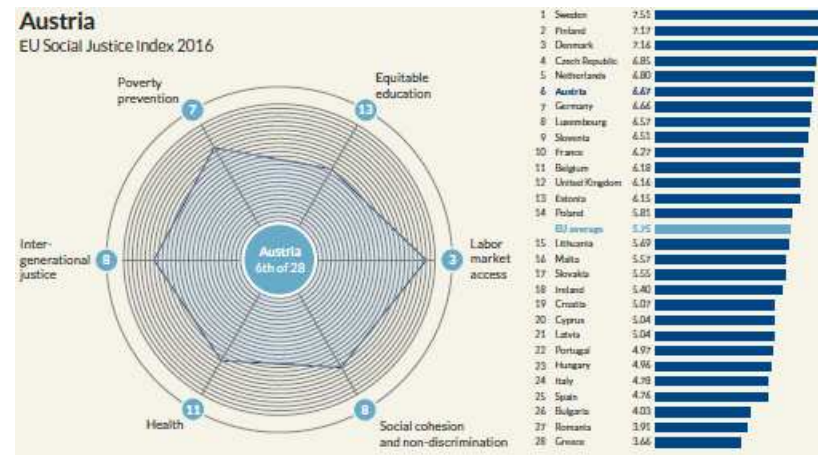
Unit: SJI Score / GDP per capita, PPP



„Romania’s overall performance on the SJI places it among the EU countries to the worst.

Most worrying, it ranks second to last in the **areas of poverty prevention and health**. With regard to our focus on **children and youth**, Romania’s score on this subindex of 2.77 places it **last in the EU**.

Source: Social Justice in the EU – Index Report 2016 by Daniel Schraad-Tischler and Christof Schiller published by Bertelsman Stiftung



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Conclusions and Outlook

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Technical Dimension

Economical Dimension

Social Dimension

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