

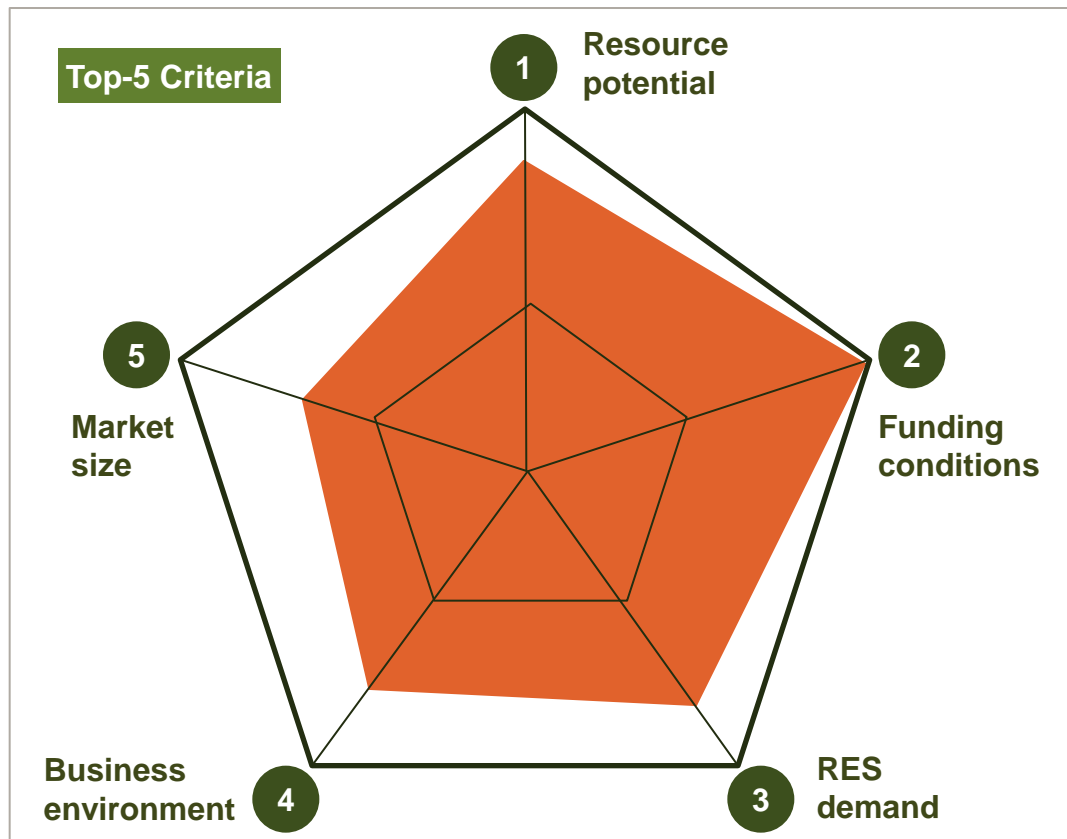


# **Renewable Energy - Renewables Markets in Europe**

TJP Advisory & Management Services GmbH

# Corporations and investors are assessing countries attractiveness according to five criteria

„According to which criteria would you evaluate which market is the most attractive one for you?”



## Further examples

- Distance to headquarter
- Country knowledge
- Relevant language knowledge of own management
- Infrastructure
- Desired co-operations
- Existing trade business

# Promotion of renewable energies is clearly in the centre of European energy policy

## 20/20/20 Rule

- The 20/20/20 rule of the European commission includes the following elements:
  - 20% increase of energy efficiency
  - 20% decrease of damaging climate gases
  - 20% increase in renewable energies (of which 10% should be from biogenetic fuels)
- According to the European Renewable Energy Council it is highly likely that the rise of 20% in renewable energies by 2020 can be reached. As can be seen in the table on the right, approx. **33.6- 40.4% of the energy consumption in 2020** is covered by renewable energy sources.
- The table shows that particular areas such as **solar thermal energy** and **photovoltaic** are expecting the highest growth rates. Biomass on the other hand will only play a second role.
- An absolute target production comparison shows that the potential of wind energy is strongest, followed by hydro-electric power and bio-mass.
- While capacity for Hydro power reached the target level for 2020 already, large scale developments construction and investments in the wind sector are expected, especially offshore.

### RES Contribution to gross electricity production (TWh)

Type of Energy Source	2006	2008	2010	2020 Target
Wind energy	82.3	119.5	149.0	477
Hydro power	344.8	358.7	397.7	384
Photovoltaic	2.4	7.3	22.0	180
Biomass	70.2	84.5	113.3	250
Geothermal energy	5.6	5.7	5.6	31
Solar thermal energy (electric)	0	0	0.6	43
Ocean (tidal/waves)	0.5	0.5	0.5	5
<b>Total RES</b>	<b>505.8</b>	<b>576.2</b>	<b>688.7</b>	<b>1370</b>
Gross electricity generation EU-27	3,354.8	3,371.3	3,345.6	
Exp. Gross electricity generation EU-27				4,078
Increased Energy Efficiency				3,391
<b>Level of RES</b>	<b>15.1%</b>	<b>17.1%</b>	<b>20.6%</b>	<b>33.6% - 40.4%</b>

### Capacity development on future RES projects (GW)

Type of Energy Source	2002	2006	2010	CAGR 2002-2006	CAGR 2006-2010	Development 2020
Wind energy(GW)	23.2	47.7	83.2	19.8%	15.0%	180.0
Hydro power (GW)	137.7	139.7	145.0	0.4%	0.9%	120.0
Photovoltaic (GWp)	0.3	3.2	29.1	72.6%	73.6%	150.0
Biomass (GWe)	8.8	17.1	25.7	18.1%	10.7%	50.0
Geothermal energy (GW)	0.7	0.7	0.8	0.6%	2.2%	4.0
Solar thermal (electric). (GW)	-	0.2	0.5	-	25.7%	15.0
Ocean (GW)	0.2	0.2	0.2	-	-	2.5

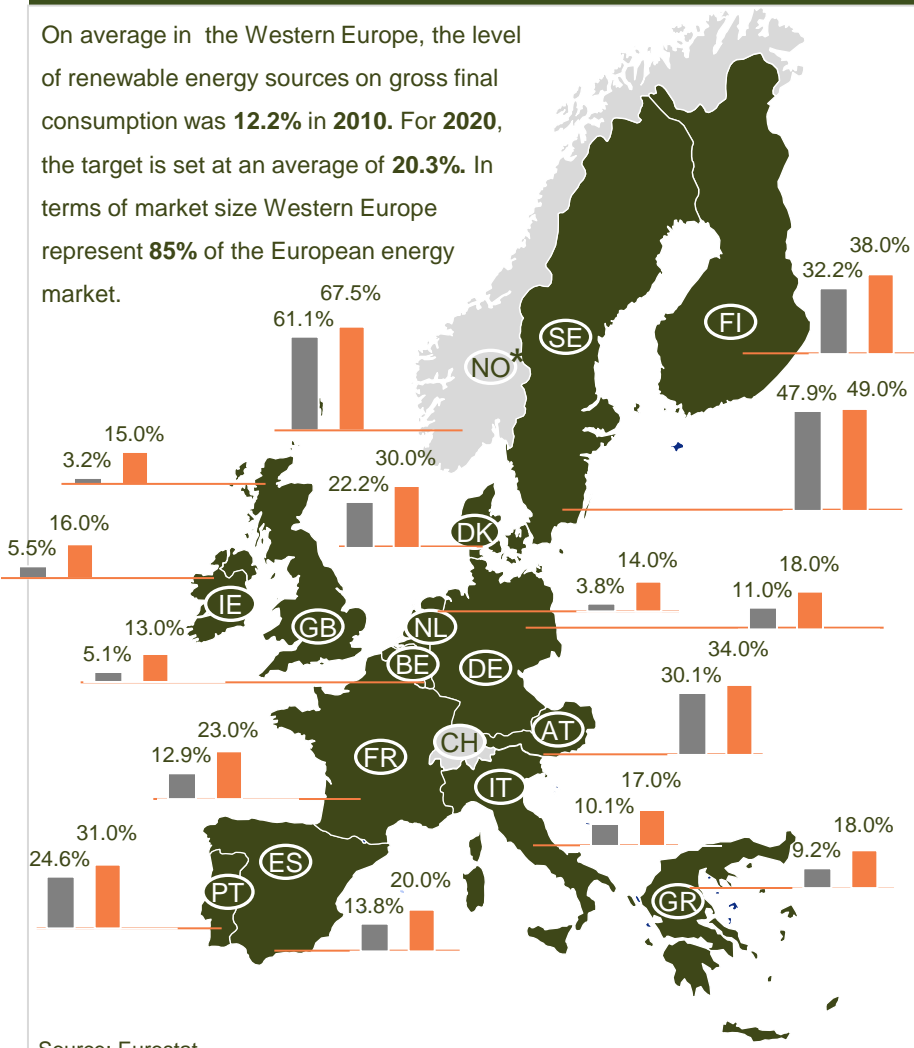
The EU is planning an increase of 20% in renewable energy sources by 2020 and therefore has made a regulation framework for long-term growth in the renewable energy area.

Source: EU 2010 Energy and Transport in Figures (EU-Commission), EREC, Eurostat

# Renewable energy status and objectives

## Western Europe

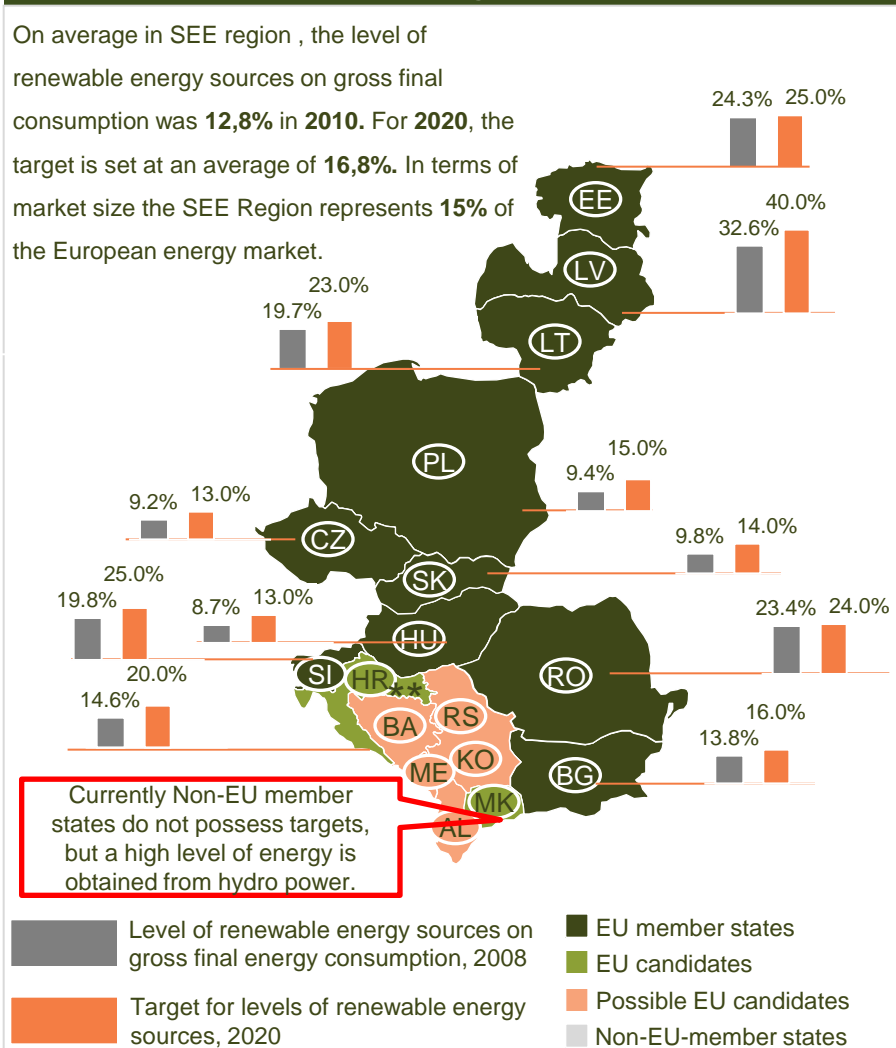
On average in the Western Europe, the level of renewable energy sources on gross final consumption was **12.2%** in 2010. For 2020, the target is set at an average of **20.3%**. In terms of market size Western Europe represent **85%** of the European energy market.



Source: Eurostat

## SEE Region

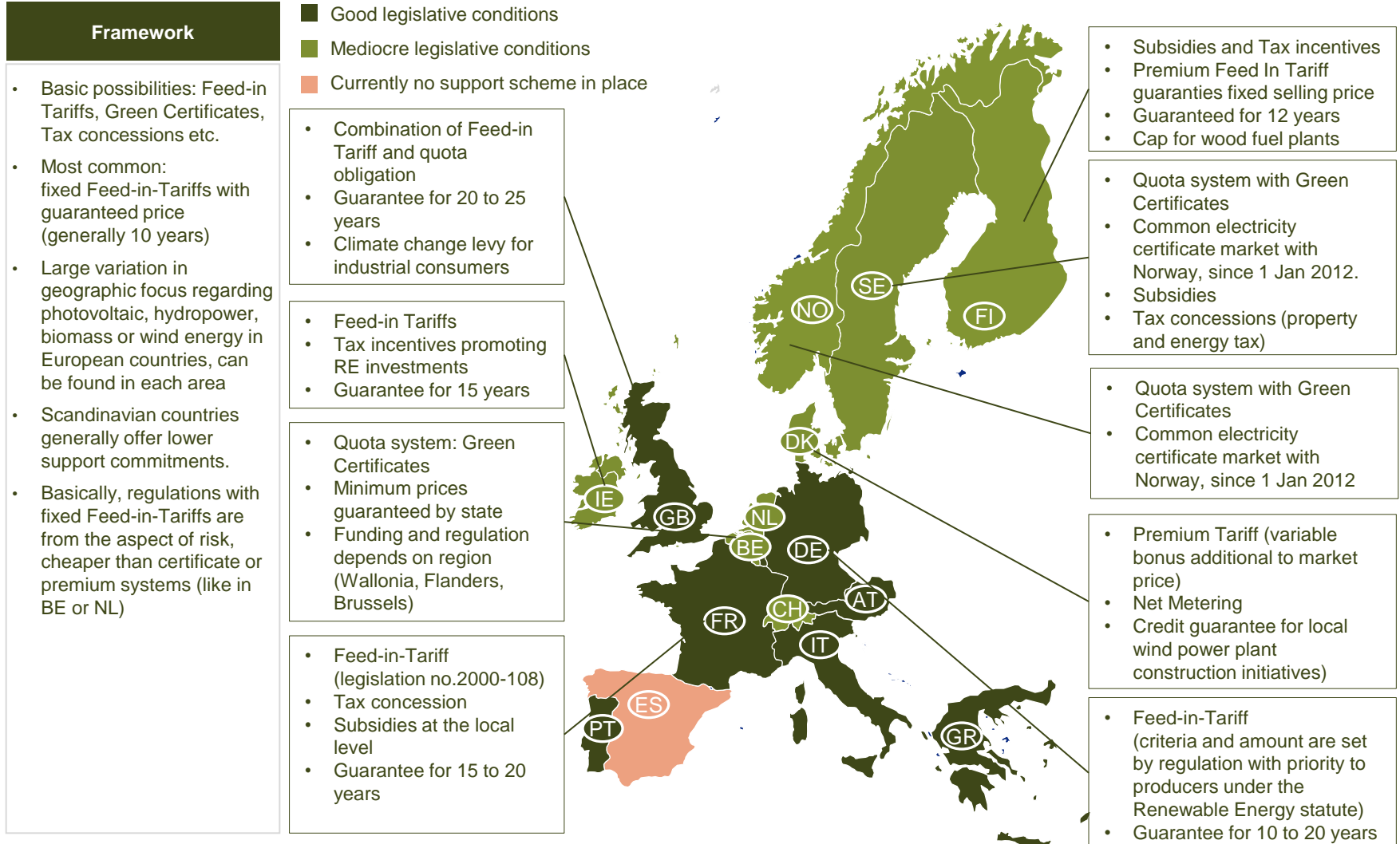
On average in SEE region, the level of renewable energy sources on gross final consumption was **12,8%** in 2010. For 2020, the target is set at an average of **16,8%**. In terms of market size the SEE Region represents **15%** of the European energy market.



Currently Non-EU member states do not possess targets, but a high level of energy is obtained from hydro power.

- Level of renewable energy sources on gross final energy consumption, 2008
- Target for levels of renewable energy sources, 2020
- EU member states
- EU candidates
- Possible EU candidates
- Non-EU-member states

# Regulatory Framework Western Europe (1/2)



Source: EU-Commission, RES-Legal, TJP Analysis

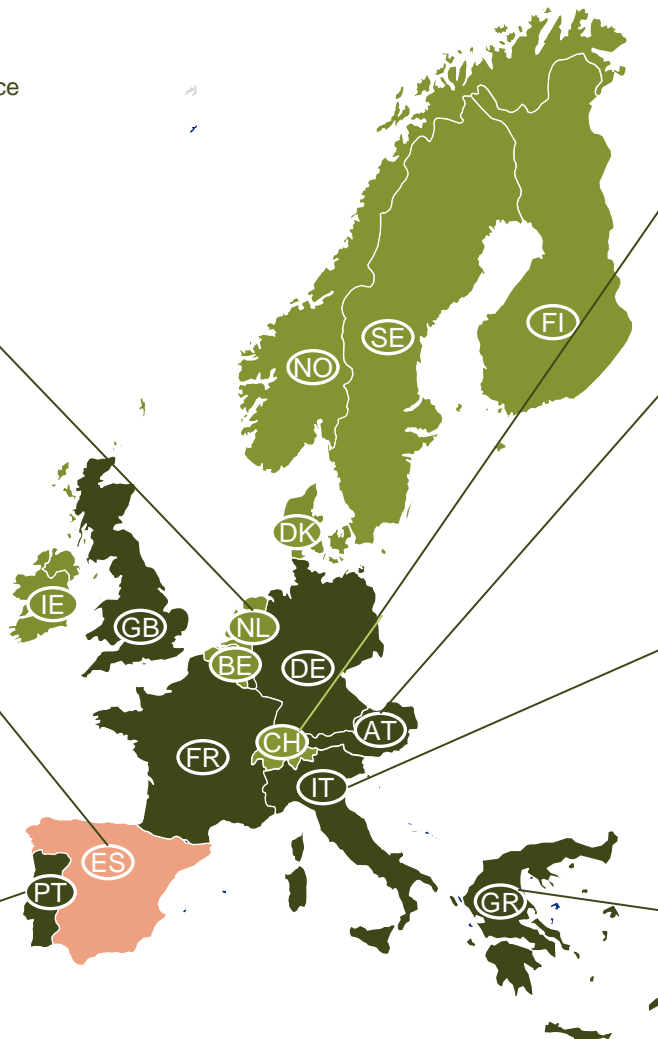
# Regulatory Framework Western Europe (2/2)

- Good legislative conditions
- Mediocre legislative conditions
- Currently no support scheme in place

- Bonus compensation (SDE programme; guarantee for 12 to 15 years)
- Distribution of bonus payment through tender
- Subsidies (Support system EOS)
- Tax concession

- In Spain, the main support scheme (the "Régimen Especial") operated until the end of 2011 and was suspended at the beginning of 2012.
- Only tax credits for solar thermal and biofuels in transport.
- RD&D support for RES-E

- Feed-in-Tariffs are set by fixed rates and prefixed formulas
- Feed-in-Tariffs are guaranteed for 12 to 20 years
- Tax concession (VAT)



- Feed-in remuneration at cost covers the difference between the production and the market price
- Guarantee for 20 to 25 years

- Base framework for all support systems: Green energy law and statute 2011
- Feed-in-Tariffs
- Guarantee for 13 to 15 years
- Subsidy for small and medium hydro power plants

- Promotion RES-E through a number of feed-in and premium tariffs and a tendering system
- Depending on technology, the producer of electricity from renewable sources, may opt for a Feed In tariff or premium tariff or a quota system.
- Depending on technology the support mechanism has a eligibility period of 15 to 25 years.

- Feed-in-Tariffs (legislation 3468/2006)
- Special Feed-in payment for PV on-roof systems
- Guarantee for 20 years
- Tax concession and subsidies

Source: EU-Commission, RES-Legal, TJP Analysis

# Regulatory Framework CEE/SEE (1/2)

## Framework conditions

- Basic possibility of Feed-in tariffs, green certificates, tax reductions etc.
- Most regularly selected method in CEE/SEE: fixed Feed-in tariffs in conjunction with price guarantee periods.
- Length of the permitted price guarantees is less well defined in western Europe.
- Large variation in geographic focus regarding photovoltaic, hydropower, biomass or wind energy in European countries, can be found in each area
- Clear dominance of fixed Feed-in pricing is to be found except for Romania and Poland which have systems of quotas and green certificates.

- Good legislative conditions
- Mediocre legislative conditions
- Moderate legislative conditions
- Currently no support scheme in place

- Quota regulation with green certificates
- Credit at reduced interest rates from Environmental Fund
- Tax reductions (VAT exemption)

- Choice of possibilities between:
  - Feed-in tariffs
  - Bonus payments
- Subsidies
- Tax reduction (income tax exemption)
- Since 2010 Feed-in tariffs only now roof plants smaller than 30 kW
- In 2010 a 26% tax on revenues has been introduced for PV plants installed in 2009 and 2009

- Feed-in tariffs (amount dependent on power station type and/or energy source)
- Guarantee for 12 years



- Premium tariff (additional to the electricity price)
- Amount dependent on the energy source
- Guarantee for 12 years

- Feed-in tariffs
- Subsidies by the Lithuanian environmental investment fund
- Tax incentives
- Guarantee for 12 years

- Feed-in tariffs
- Guaranteed for 15 years
- Subsidies within the scope of the European structural fund
- Tax reductions (VAT exemption)
- Change in the law (from April 1, 2011) abolition of Feed-in tariffs for new PV plants larger than 100 kW

- Feed-in tariffs
- Guaranteed for 15-25 years
- Change in the law 2011: Fixed Feed-in tariffs now only for a certain number of projects
- In August 2012 the tariffs for plants in operation have been reduced. Reduction was subject to technology and date of installation

Source: EU-Commission, RES-Legal, TJP Analysis

# Regulatory Framework CEE/SEE (cont.)

- Good legislative conditions
- Mediocre legislative conditions
- Moderate legislative conditions
- Currently no support scheme in place

- Feed-in tariffs for plants < 5 MW
- Bonus payments for plants < 125 MW
- Subsidies for investment projects
- Credits subject to public offering

- Three autonomous areas
- Feed-in tariffs exclusively in the Republic of Serbia for plants > 5MW
- No subsidy system in the other countries of Bosnia and the district Brcko.

- Currently no support mechanism in place

- Feed-in tariffs only apply to projects with agreed concessionary contracts with small hydro plants (capacity <15 MW)



- Feed-in tariffs
- Contains elements of a regulation on quantities
- With particular technologies (bio-mass, bio-gas, solar, wind)
- Feed In Tariff guaranteed for 10 year (PV 20 years)

- New support scheme for renewable energy sources will be presented end of 2012

- Subsidy mechanism: Subsidy process is being assessed by the EU (permission is expected shortly)
- Quota regulation with green certificates
- Defined highest and lowest prices for certificates
- Subsidies are from the Romanian environmental fund

- Current law sets out a Feed-in tariff
- Currently there is the framework for subsidy system in place

- Feed-in tariffs
- Guaranteed for 20 years
  - Small hydro plants (less than 10MW);
  - Wind plants
  - Bio-mass power stations
  - Solar photovoltaic systems

Source: EU-Commission, RES-Legal, TJP Analysis



# Potential investment areas

## Hydro energy

- The most attractive investment areas in the hydro energy are: Germany, Italy, Poland, Romania, Czech Republic, Latvia and Croatia.

## Solar energy (PV)

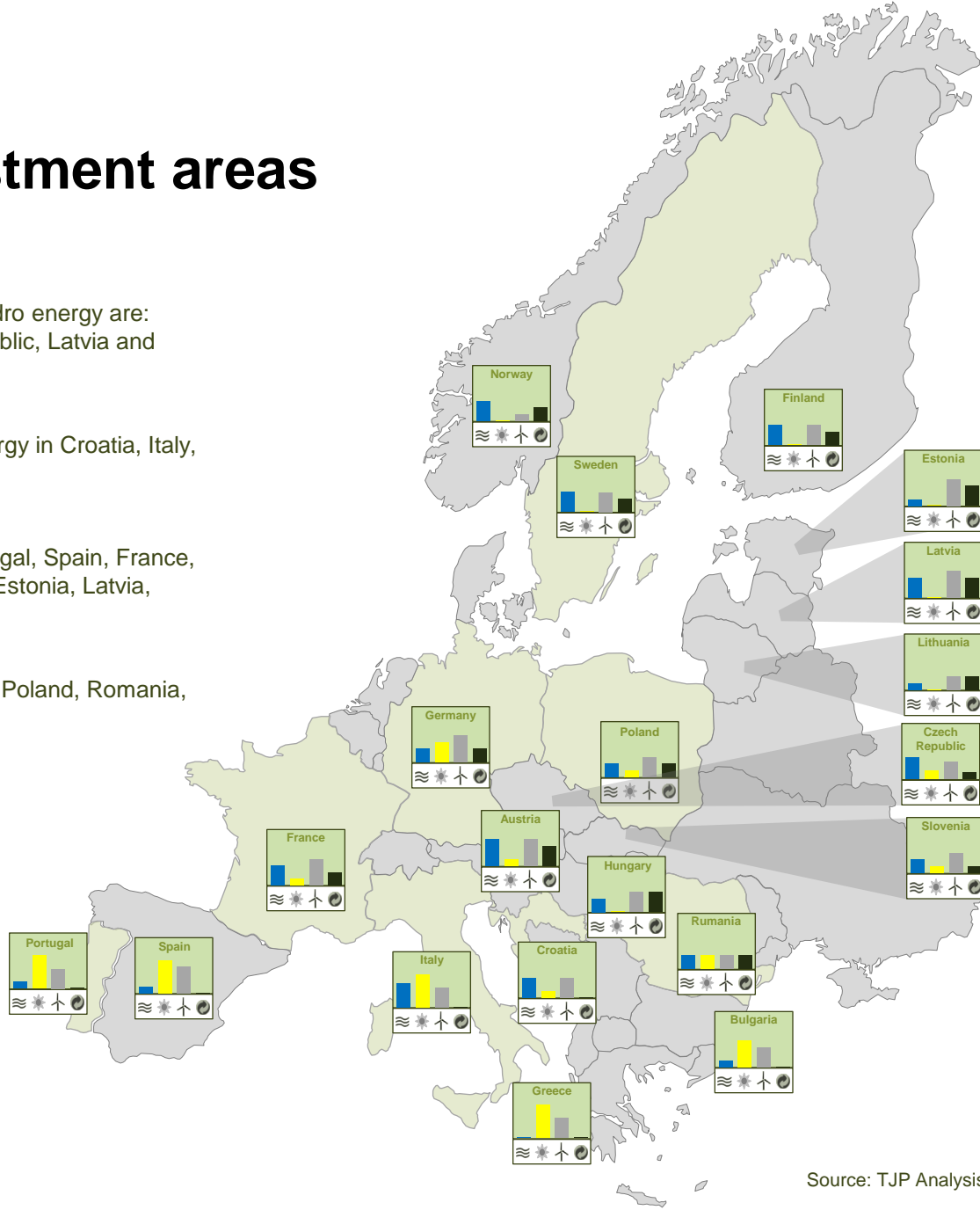
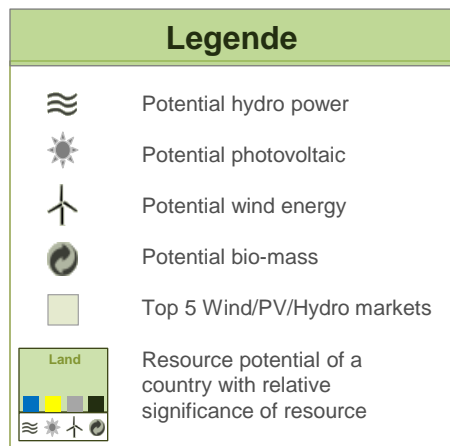
- Good possibilities exist in the area of solar energy in Croatia, Italy, Romania, Portugal and Germany.

## Wind power

- The most attractive investment areas are Portugal, Spain, France, Germany, Poland, Romania, Czech Republic, Estonia, Latvia, Hungary, Bulgaria, UK and Croatia.

## Bio-mass

- Attractive bio-mass investments are in Austria, Poland, Romania, Hungary, Latvia and Estonia



Source: TJP Analysis

# Estimation of investment potential in western Europe

This table shows an estimation of the attractiveness of the investment potential in western Europe. The estimation is based above all on the previously mentioned investment factors and is divided by the differing energy forms.

	Size of electricity market		Gap to EU Targets			Resource potential			Attractiveness of subsidy environment		
						Wind	PV	Hydro	Wind	PV	Hydro
Belgium	★	★	★	★	★	★	★	★	★	★	★
Denmark	★		★	★	★	★	★	★	★	★	★
Germany	★	★	★	★		★	★	★	★	★	★
UK	★	★	★	★	★	★	★	★	★	★	★
Finland	★	★	★	★		★	★	★	★	★	★
France	★	★	★	★	★	★	★	★	★	★	★
Ireland	★		★	★		★	★	★	★	★	★
Italy	★	★	★	★		★	★	★	★	★	★
Luxemburg	★		★	★		★	★	★	★	★	★
Malta	★		★	★	★	★		★	n/a	n/a	n/a
Netherlands	★	★	★	★		★	★	★	★	★	★
Norway	★	★	★	★		★	★	★	★	★	★
Austria	★	★	★	★		★	★	★	★	★	★
Portugal	★	★	★	★	★	★	★	★	★	★	★
Sweden	★	★	★	★	★	★	★	★	★	★	★
Switzerland	★	★			n/a	n/a	n/a	n/a	★	★	★
Spain	★	★	★	★	★	★	★	★	★	★	★
Evaluation											
	Large market (Electricity end use of over 50 TWh / year)	Far from away from target (12+% required)	Relatively good potential			High probability of profitability (sale prices are higher than the maximum production costs)					
	Medium market (Electricity end use of between 25 and 50 TWh / year)	Additional measures required (6-12 % increase to reach target)	Moderate potential			Medium probability of profitability (sale prices are above the production cost of the most efficient producer)					
	Small market (Electricity end use of over 25 TWh / year)	"On track" (max.6% required to reach target)	Relatively low potential			Probably not profitable (no guarantee that the sale prices are above the minimum production costs)					

# Estimation of investment potential in south and eastern Europe

This table shows an estimation of the attractiveness of the investment potential in eastern Europe. The estimation is based above all on the previously mentioned investment factors and is divided by the differing energy forms.

	Size of electricity market	Gap to EU Targets	Resource potential			Attractiveness of subsidy environment		
			Wind	PV	Hydro	Wind	PV	Hydro
Albania	★	n/a	★	★	★	★	★	★
Bosnia	★	n/a	★	★	★	★	★	★
Bulgaria	★ ★	★ ★	★ ★ ★	★ ★ ★	★ ★	★ ★	★ ★	★ ★
Croatia	★	★ ★	★ ★	★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★
Czech Rep	★ ★ ★	★ ★	★ ★	★ ★	★ ★	★ ★ ★	★ ★ ★	★ ★ ★
Estonia	★	★ ★ ★	★ ★ ★	★	★	★ ★ ★	★	★ ★ ★
Greece	★ ★ ★	★ ★ ★	★ ★	★ ★	★ ★	★ ★	★ ★	★ ★ ★
Hungary	★ ★	★ ★	★ ★	★ ★	★	★ ★ ★	★	★ ★ ★
Kosovo	★	n/a	★	★ ★	★ ★	★	★	★
Latvia	★	★ ★	★ ★	★	★ ★	★ ★	★	★ ★ ★
Lithuania	★	★ ★ ★	★ ★	★	★ ★	★ ★ ★	★ ★	★ ★ ★
Macedonia	★	n/a	★ ★	★ ★	★ ★	★ ★	★	★ ★ ★
Montenegro	★	n/a	★	★ ★	★ ★	★	★	★
Poland	★ ★ ★	★ ★	★ ★ ★	★	★ ★	★ ★ ★	★	★ ★ ★
Romania	★ ★ ★	★ ★	★ ★ ★	★ ★	★ ★	★ ★ ★	★ ★	★ ★ ★
Serbia	★ ★	n/a	★ ★	★ ★	★ ★	n/a	n/a	n/a
Slovakia	★ ★	★ ★	★ ★	★	★ ★	★ ★	★	★ ★
Slovenia	★	★ ★ ★	★	★	★	★ ★ ★	★ ★	★ ★ ★
Evaluation	Large market (Electricity end use of over 50 TWh / year)	Far from away from target (12+% required)	Relatively good potential			High probability of profitability (sale prices are higher than the maximum production costs)		
	Medium market (Electricity end use of between 25 and 50 TWh / year)	Additional measures required (6-12 % increase to reach target)	Moderate potential			Medium probability of profitability (sale prices are above the production cost of the most efficient producer)		
	Small market (Electricity end use of over 25 TWh / year)	"On track" (max.6% required to reach target)	Relatively low potential			Probably not profitable (no guarantee that the sale prices are above the minimum production costs)		

