

## Bioenergy in the Energy Strategy of the European Union The Case of Germany

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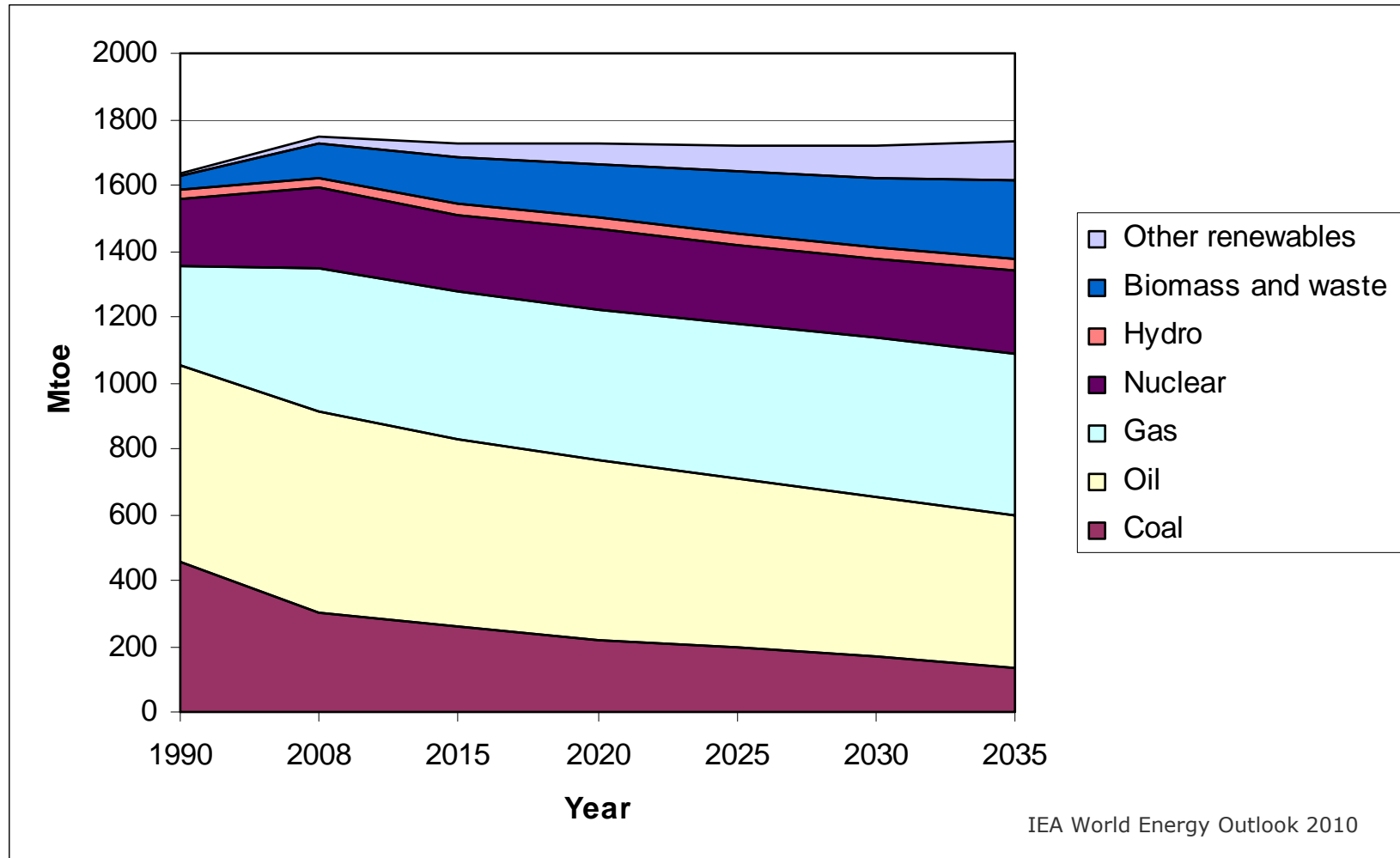
23. May 2011



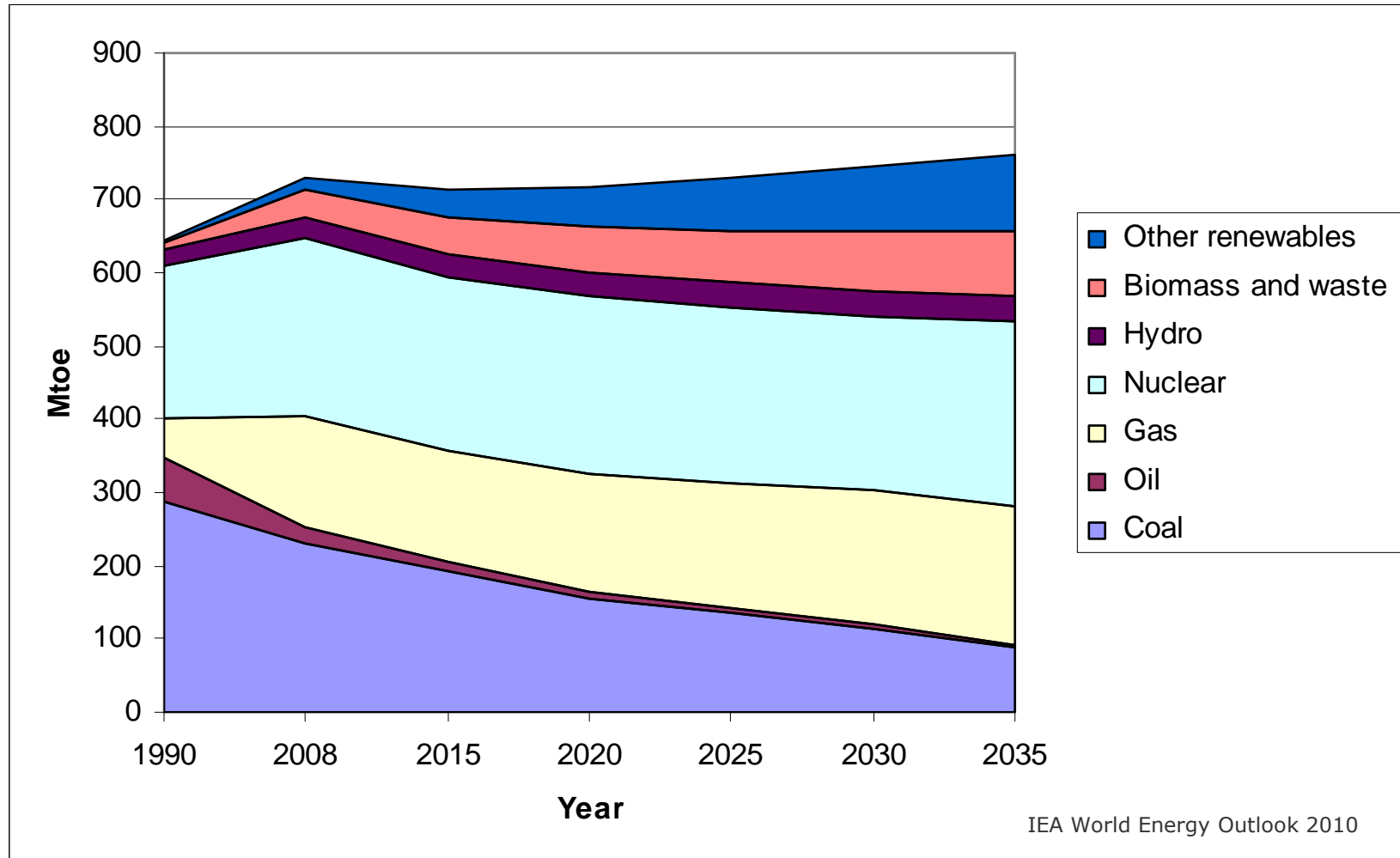
## Content

- EU-Energy Overview
- EU-Bio-Energy
- Germany-Energy Overview
- Bioenergy in Germany
- Conclusion

## Total Primary Energy Demand in Mtoe (EU 27)



## Total Power Generation in Mtoe (EU 27)



## Import dependency in the European Union

Energy consumption by EU-member states, their net imports and dependence rate in 2008.

The most important suppliers of crude oil and natural gas were Russia (33% of oil imports and 40% of gas imports) and Norway (16% and 23% respectively).

	EU Member State	Gross Energy consumption <sup>1)</sup>	Net imports <sup>2)</sup>	Energy Dependency <sup>3)</sup>
1	Cyprus	2.6	3	100%
2	Malta	0.9	0.9	100%
3	Luxembourg	4.7	4.7	98.9%
4	Ireland	15.5	14.2	90.9%
5	Italy	186.1	164.6	86.8%
6	Portugal	25.3	21.6	83.1%
7	Spain	143.9	123.8	81.4%
8	Belgium	60.4	53.5	77.9%
9	Austria	34.1	24.9	72.9%
10	Greece	31.5	24.9	71.9%
11	Latvia	4.6	3.2	65.7%
12	Lithuania	8.4	5.5	64%
13	Slovakia	18.8	12	64%
14	Hungary	27.8	17.3	62.5%

	EU Member State	Gross Energy Consumption	Net imports	Energy Dependency
15	Germany	349	215.5	61.3%
16	Finland	37.8	20.9	54.6%
17	<b>EU27</b>	<b>1825.2</b>	<b>1010.1</b>	<b>53.8%</b>
18	Slovenia	7.3	3.8	52.1%
19	France	273.1	141.7	51.4%
20	Bulgaria	20.5	9.5	46.2%
21	Netherlands	80.5	37.2	38%
22	Sweden	50.8	19.8	37.4%
23	Estonia	5.4	1.9	33.5%
24	Romania	40.9	11.9	29.1%
25	Czech Republic	46.2	12.9	28%
26	United Kingdom	229.5	49.3	21.3%
27	Poland	98.3	19.6	19.9%
28	Denmark	20.9	-8.1	-36.8 <sup>4)</sup>

1) Gross energy consumption in Million tonnes oil equivalent (Mtoe). Defined as primary production plus imports, less exports.

2) Net imports means imports minus exports.

3) Imports divided by gross consumption.

4) Denmark is a net exporter of energy.

<http://www.energy.eu/#renewable>



## Relevant Directives: Renewable Energy

[com-2010-0639](#) Energy 2020 - A strategy for competitive, sustainable and secure energy  
[C\(2009\) 5174](#) National RE Action Plans under Directive 2009/28/EC of the European Parliament and of the Council.

[2009/28/EC](#) On the promotion of the use of energy from renewable sources.

[COM\(2008\) 30 final](#) 20 20 by 2020 Europe's climate change opportunity.

[COM\(2006\) 105 final](#) Green paper - A European Strategy for Sustainable, Competitive and Secure Energy.

[SEC\(2006\) 317/2](#) Green paper Annex - What is at stake, a background document.

[2006/32/EC](#) On energy end-use efficiency and energy services.

[COM\(2005\) 628 final](#) Biomass Action Plan

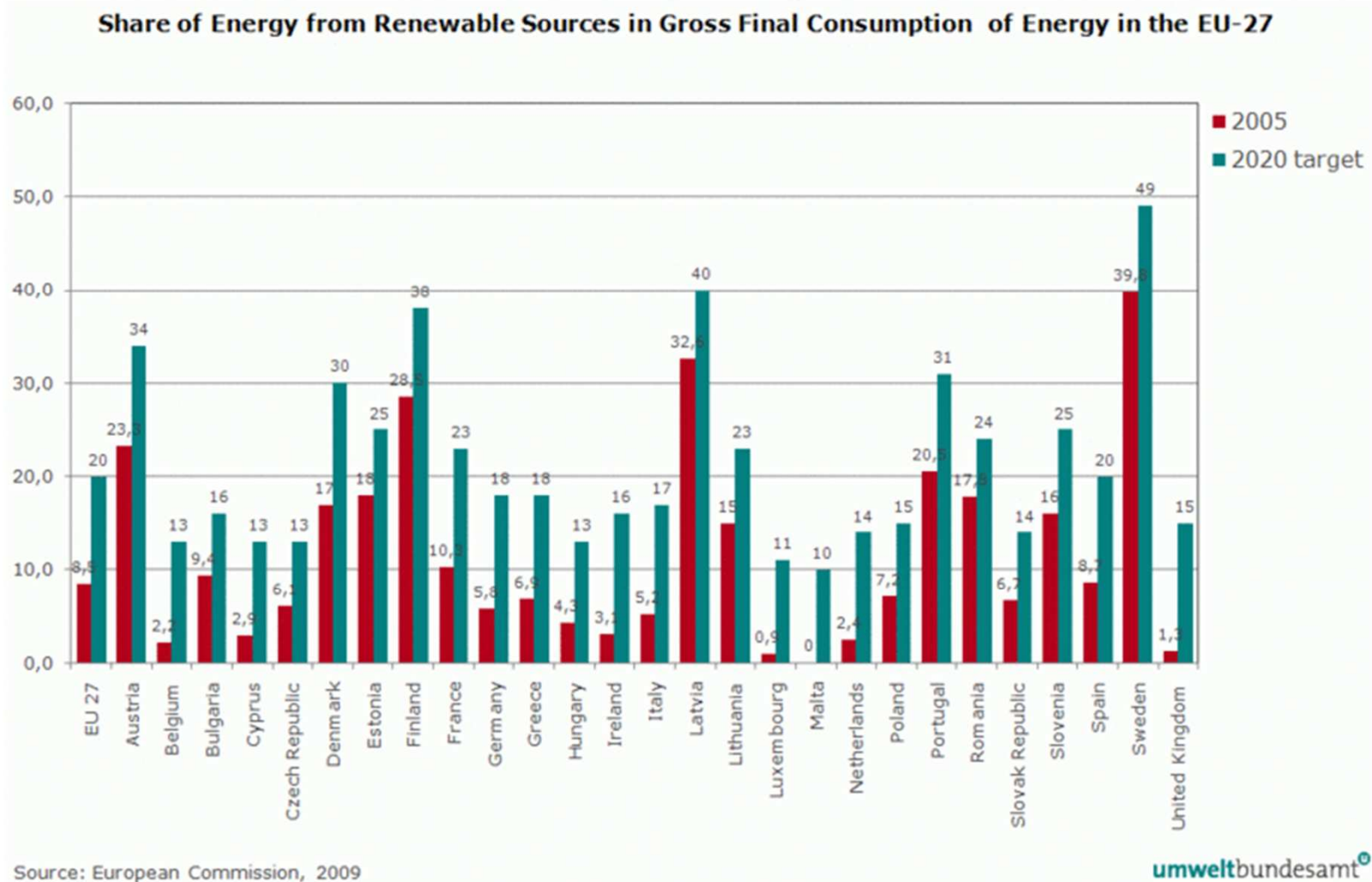
[2004/8/EC](#) On the promotion of cogeneration based on a useful heat demand in the internal energy market.

### Main goals till 2020:

- **Reduction Greenhousegas: 20%**
- **Energy Efficiency: +20%**
- **Renewable Energy: 20% of TPES**
- **Biofuel: 10% use in transportation sector**

<http://www.energy.eu/#renewable>

## Burden sharing in the EU 27 (renewable Energy)





## Progress in EU 27

- **Key data for the year 2009:**
- Renewable energy share of gross final energy consumption: 11.6%
- Renewable energy share in total electricity consumption: 18.2%
- Renewable energy employment: 912 thousand jobs
- Renewable energy turnover: 120 billion euro



## Burden sharing in the EU 27 (GHG-Emissions)

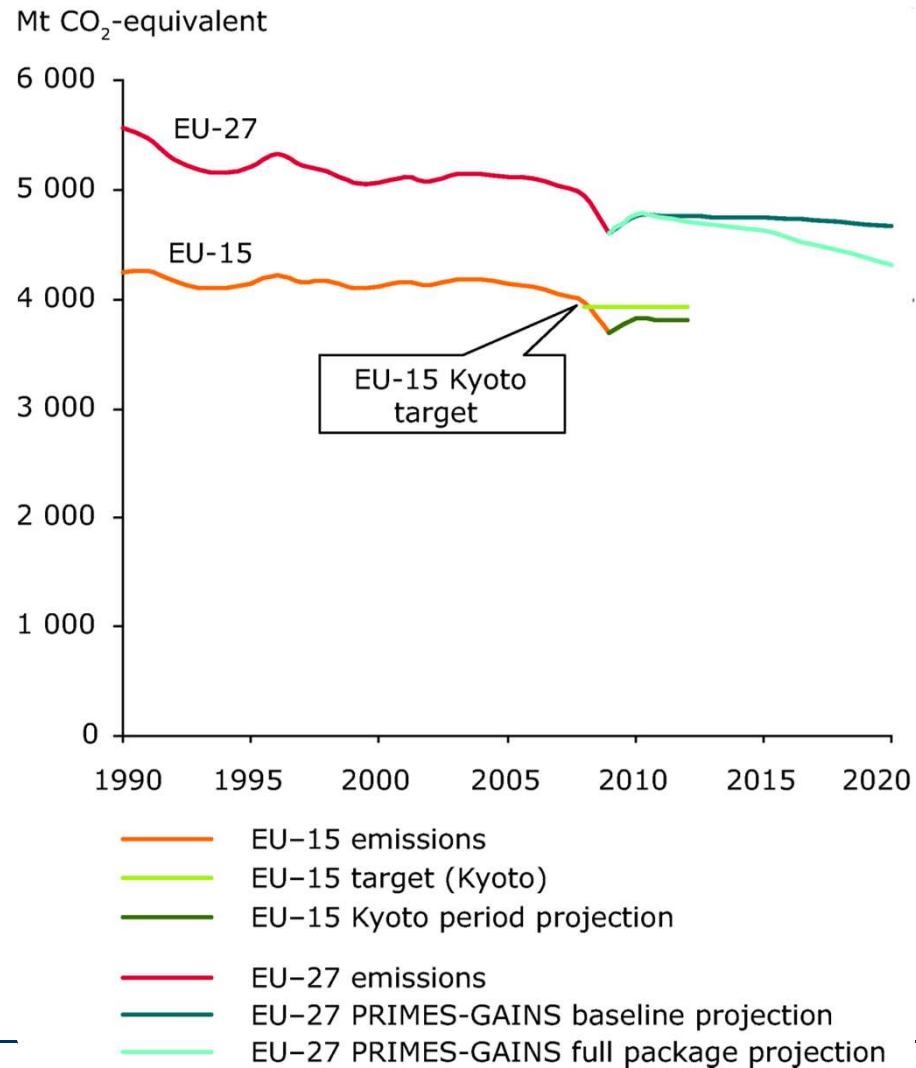
Are the European member states meeting their Kyoto 2012 carbon dioxide(CO<sub>2</sub>) emission targets?

Countries in the *green* do well and emit less than their 2012 target. The countries in the *red* emit more than their Kyoto target.

Figures are in Megaton (Mt CO<sub>2</sub>-eq).

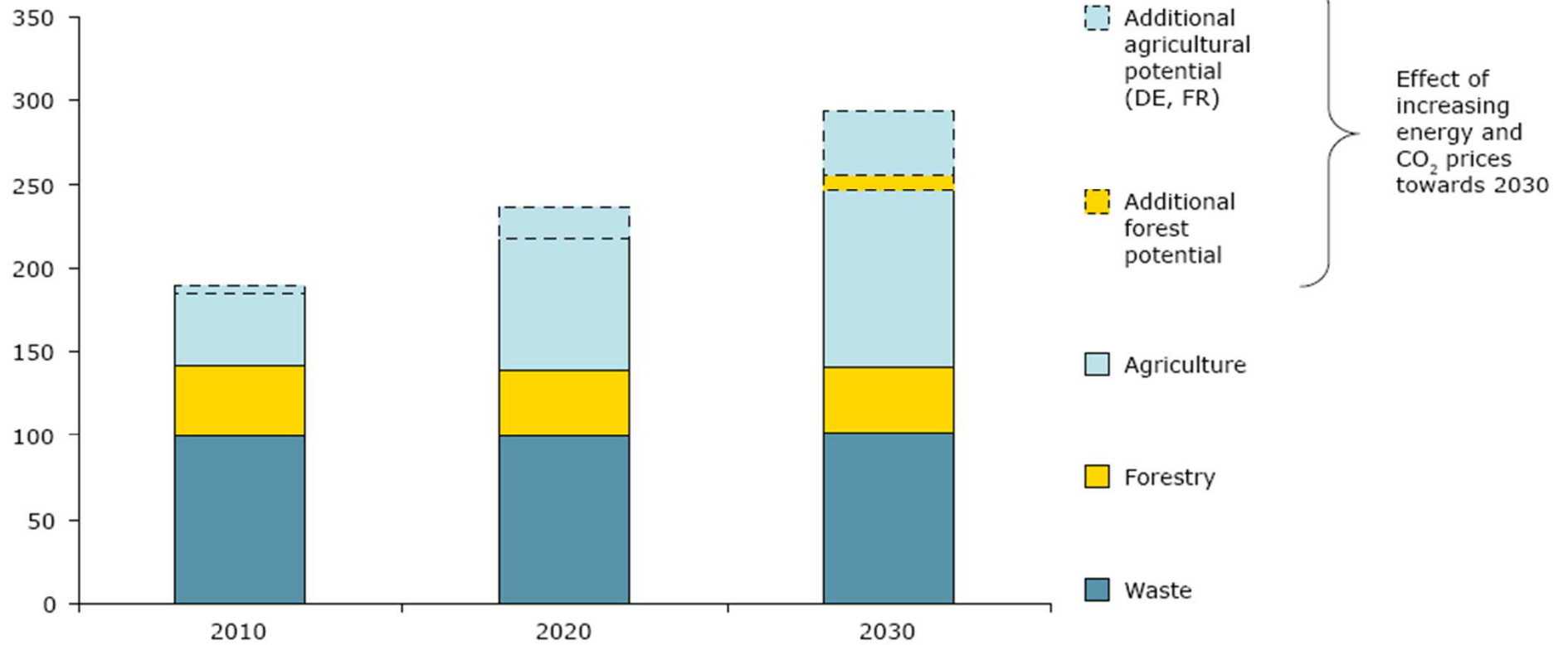
EU MEMBER STATE	2003	2004	2005	2006	2007	2008	KYOTO TARGET 2012	% UNDER KYOTO TARGET
ESTONIA	21.2	21.2	20.7	19.2	22.0	20.3	40	49.25 %
LATVIA	10.7	10.7	10.9	11.7	12.1	11.9	23.3	48.93 %
LITHUANIA	16.7	21.1	22.6	22.8	24.7	24.3	44.1	44.90 %
ROMANIA	-	160.1	153.7	153.9	152.3	145.9	259.9	43.86 %
BULGARIA	-	68.9	69.8	71.5	75.7	73.5	127.3	42.26 %
HUNGARY	83.3	79.5	80.5	78.8	75.9	73.1	114.9	36.38 %
POLAND	382.5	396.7	399	399.3	398.9	395.6	551.7	28.29 %
SLOVAKIA	51.1	49.5	48.7	49.0	47.0	48.8	67.2	27.38 %
CZECH REPUBLIC	147.5	147.1	145.6	149.1	150.8	141.4	180.6	21.71 %
SWEDEN	70.9	69.7	67	66.9	65.4	64.0	75.2	14.89 %
GREECE	137.2	137.6	139.2	128.1	131.9	126.9	139.6	9.10 %
UNITED KINGDOM	658	660.4	657.4	647.9	636.7	628.2	678.3	7.39 %
FRANCE	560.9	556.1	553.4	541.7	531.1	527.0	564	6.56 %
BELGIUM	147.6	147.6	143.8	136.6	131.3	133.3	135.9	1.91 %
GERMANY	1024.4	1025	1001.5	980.0	956.1	958.1	972.9	1.52 %
FINLAND	85.4	81.2	69.3	79.9	78.3	70.1	71.1	1.41 %
								<b>% ABOVE KYOTO TARGET</b>
PORTUGAL	83.7	84.6	85.5	84.7	81.8	78.4	77.4	1.29 %
NETHERLANDS	215.4	218.4	212.1	208.5	207.5	206.9	200.4	3.24 %
IRELAND	68.4	68.6	69.9	69.7	69.2	67.4	63	6.98 %
ITALY	577.3	580.5	582.2	563.0	552.8	541.5	485.7	11.49 %
SLOVENIA	19.7	19.9	20.3	20.5	20.7	21.3	18.6	14.52 %
DENMARK	73.6	68.2	63.9	71.0	66.6	63.8	54.8	16.42 %
SPAIN	407.4	425.2	440.6	433.0	442.3	405.7	331.6	22.35 %
AUSTRIA	92.5	91.2	93.3	91.6	88.0	86.6	68.7	26.06 %
LUXEMBOURG	11.3	12.8	12.7	13.3	12.9	12.5	9.1	37.36 %
MALTA	3.1	3.2	3.4	2.9	3.0	3.0	NO TARGET	
CYPRUS	9.2	9.9	9.9	9.9	10.1	10.2	NO TARGET	

## Burdens sharing in the EU 27



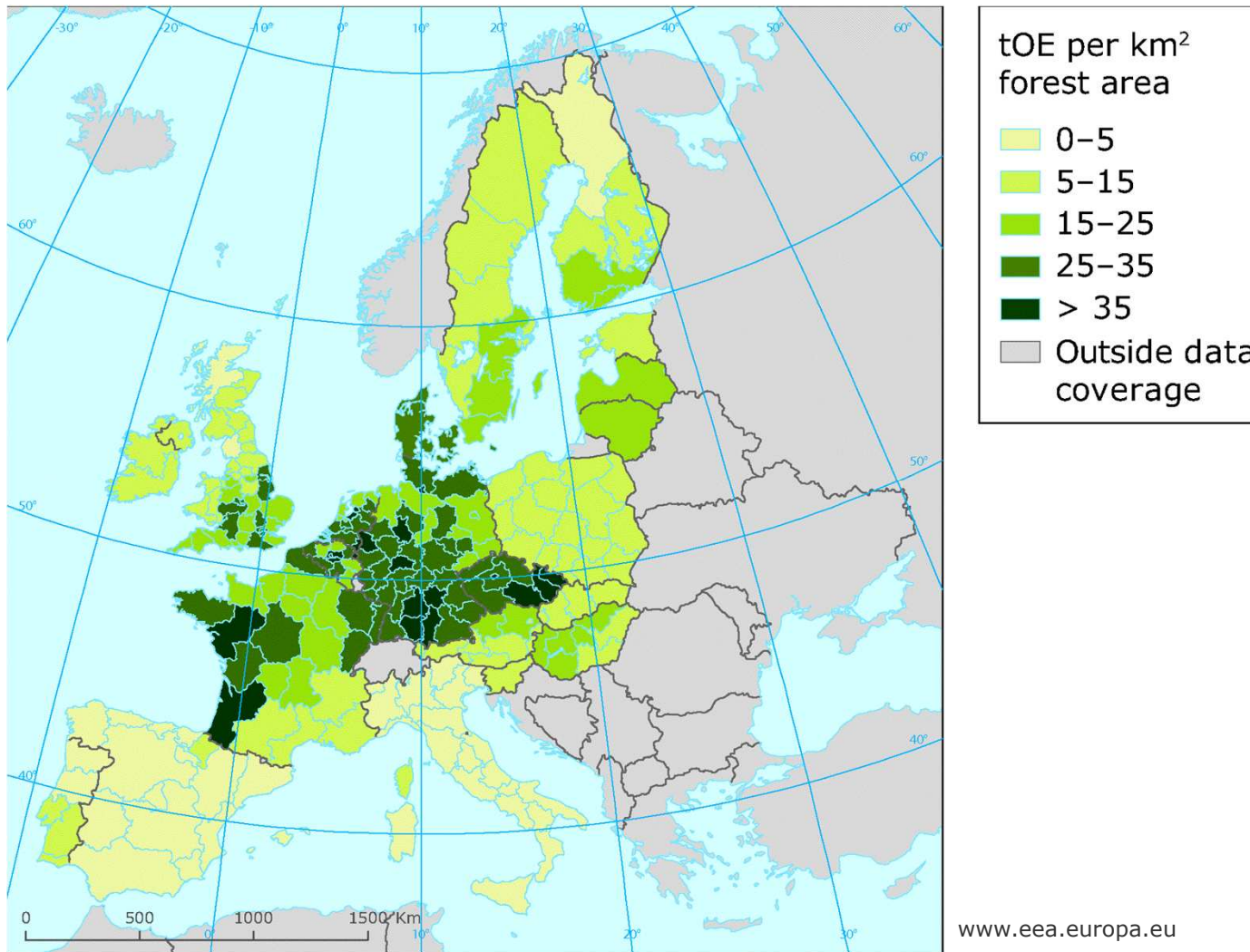
## Environmentally-compatible primary bioenergy potential in the EU

Primary bioenergy potential, MtOE



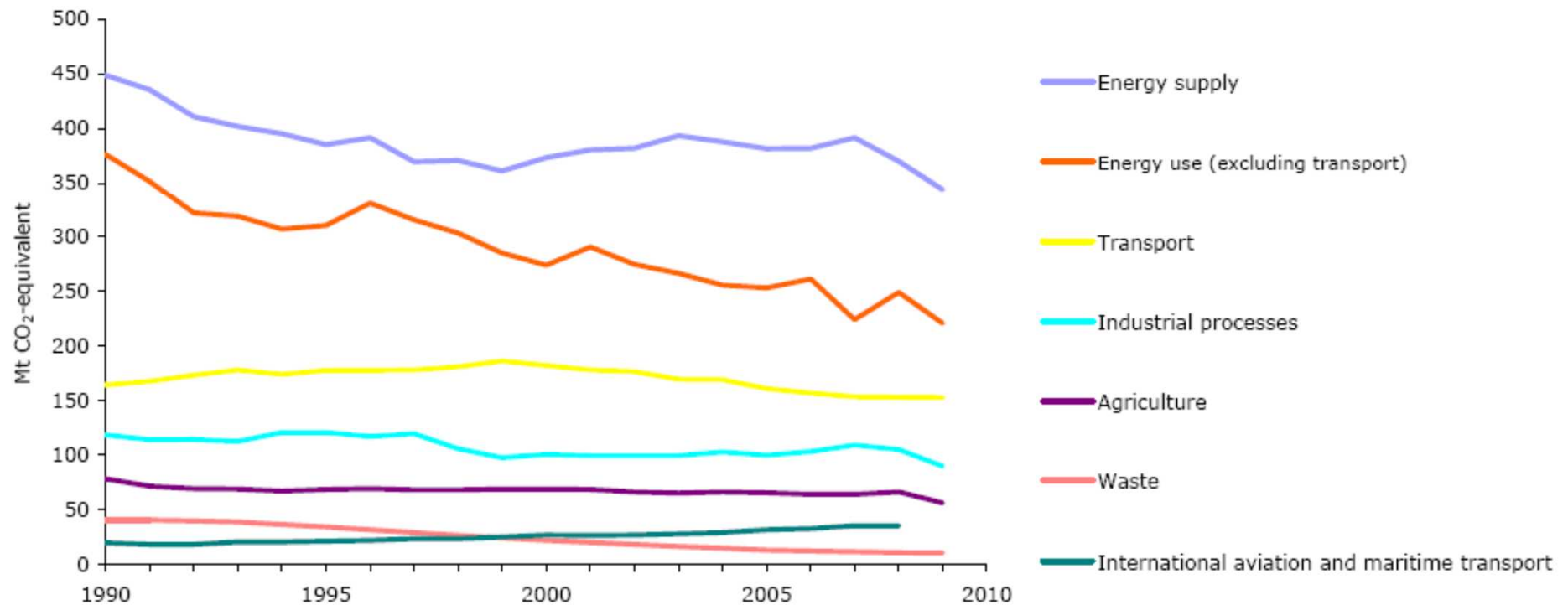
[www.eea.europa.eu](http://www.eea.europa.eu)

## Environmentally-compatible primary bioenergy potential in the EU



## GHG-Emissions in Germany

GHG trends 1990–2008 - emissions by sector



Note: updated sectoral projections, taking the effects of the economic crisis, will be presented in 2011



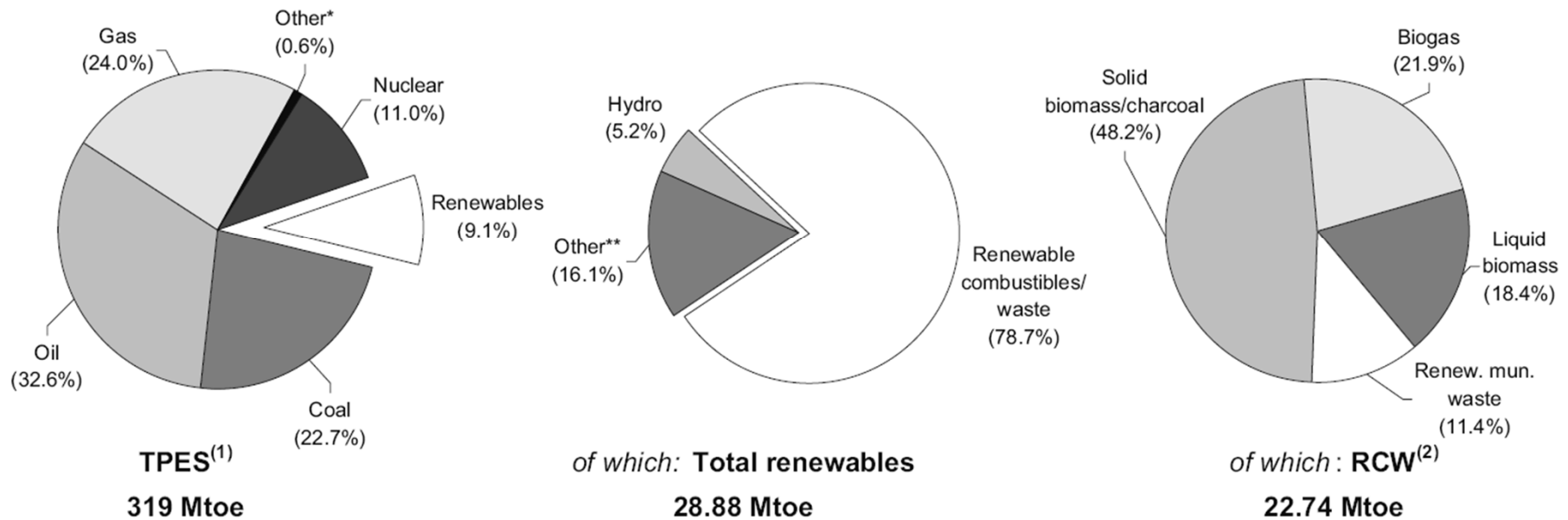
## National Goals in Germany

National Biomass Actionplan 2010:

- 16% renewables in TPES till 2020 (Bioenergy 11%)
- 30% renewables in electricity consumption till 2020 (Bioenergy 8%)
- 18% renewables in endenergy (electricity, heat, fuel) till 2020 (Bioenergy 10.8%)
  
- 12% Biofuel in fuel consumption till 2020 (all sectors)
- 10% Biofuel in fuel consumption till 2020 (traffic)
- 14% renewables in heat production till 2020
  
- > 4.5 million hectares of land for energy-plants needed
- > total agricultural area about 17 million hectars

# Bioenergy in Germany

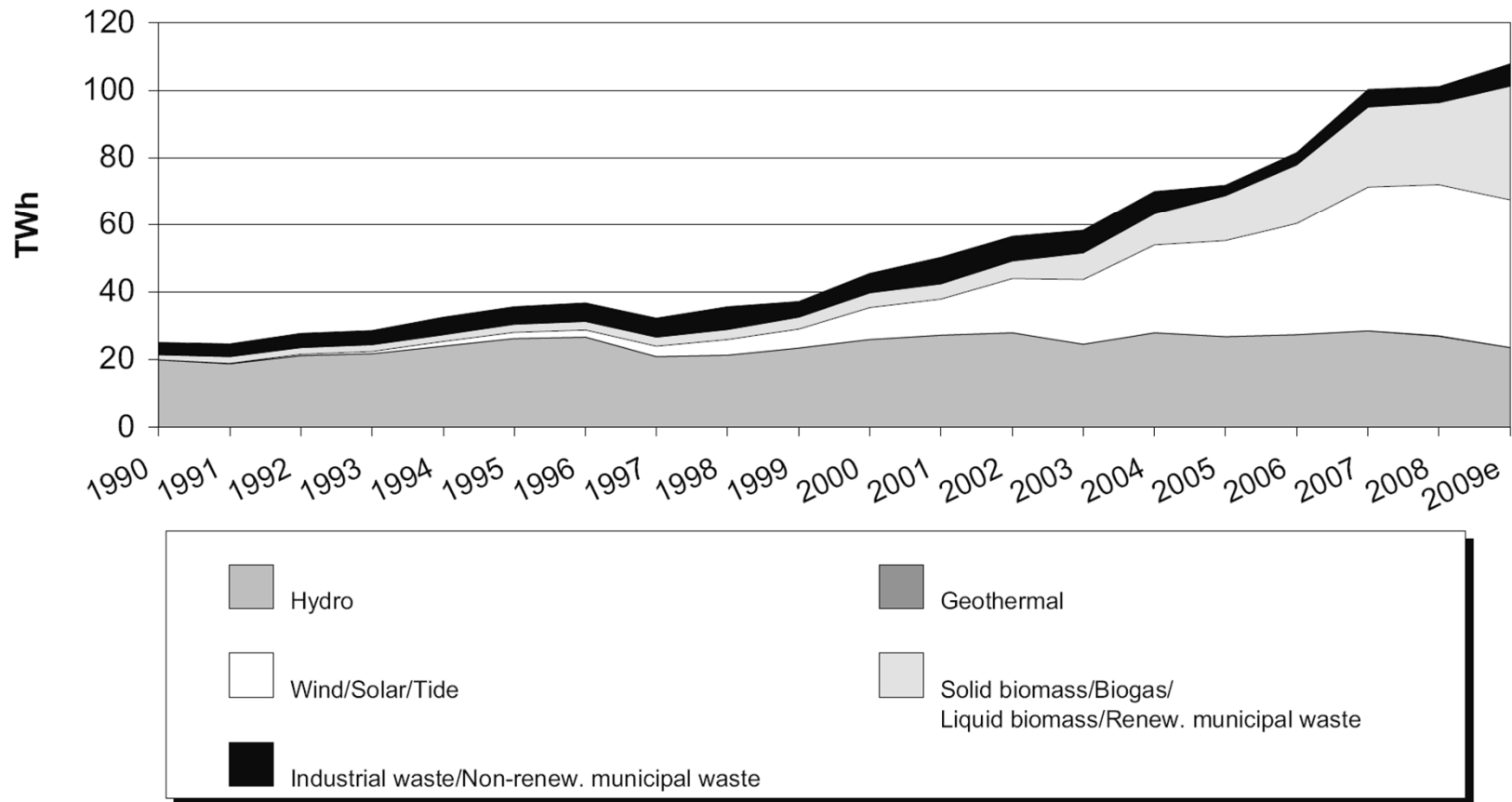
**Figure 2. Contribution of renewables in 2009 estimated**



\* Includes non-renewable municipal waste, industrial waste, peat, electricity trade, and other sources of primary energy.  
 \*\* Includes geothermal, solar, wind and tide.  
 (1) TPES includes electricity trade.  
 (2) Renewable combustibles/waste (RCW) include solid biomass, liquid biomass, biogas, and renewable municipal waste.  
**Note:** Totals may not sum due to rounding  
**Source:** IEA/OECD Renewables Statistics, IEA/OECD Energy Balances of OECD Countries

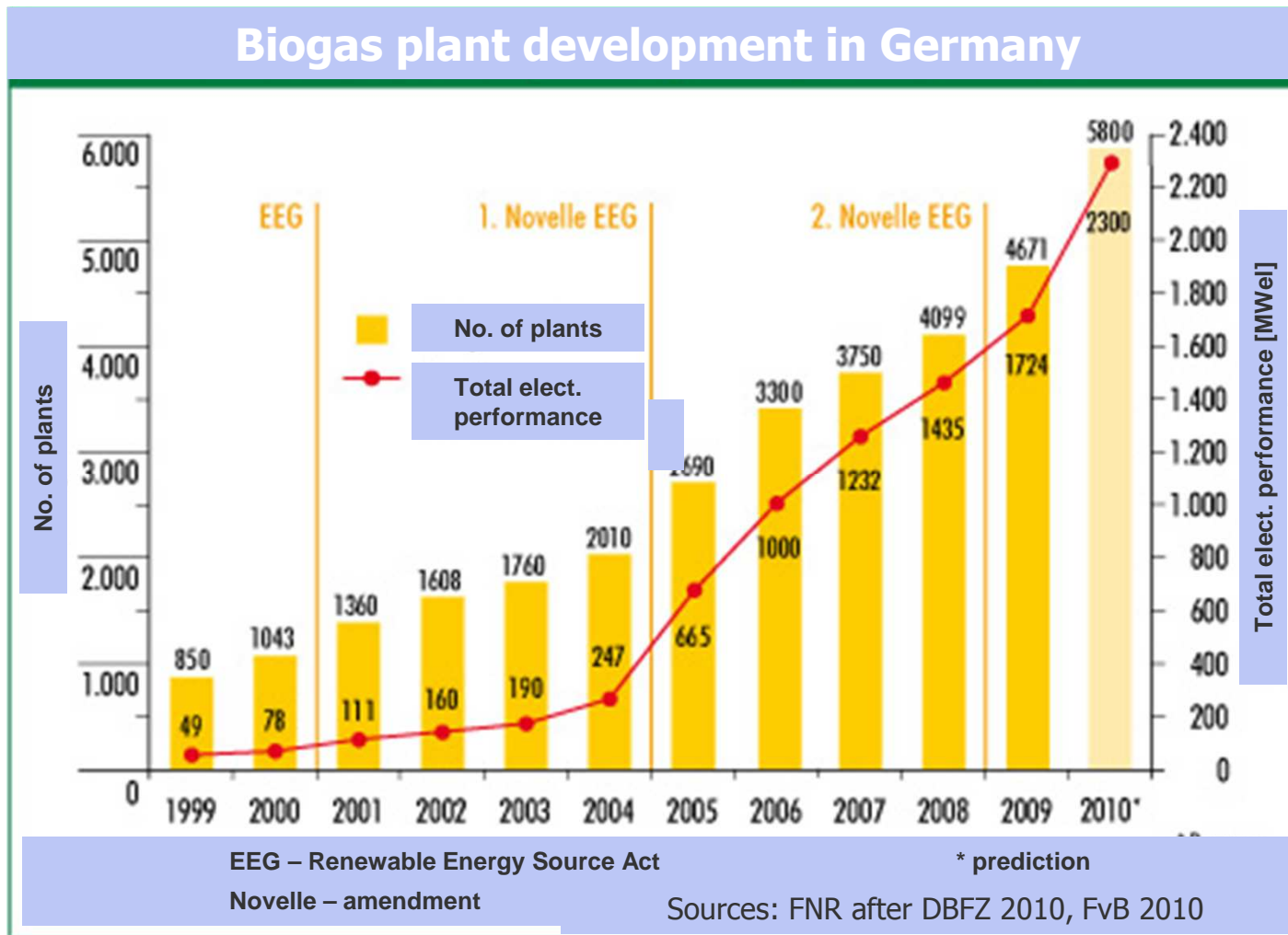
## Bioenergy in Germany

**Figure 3. Electricity production by renewables and waste energy source**

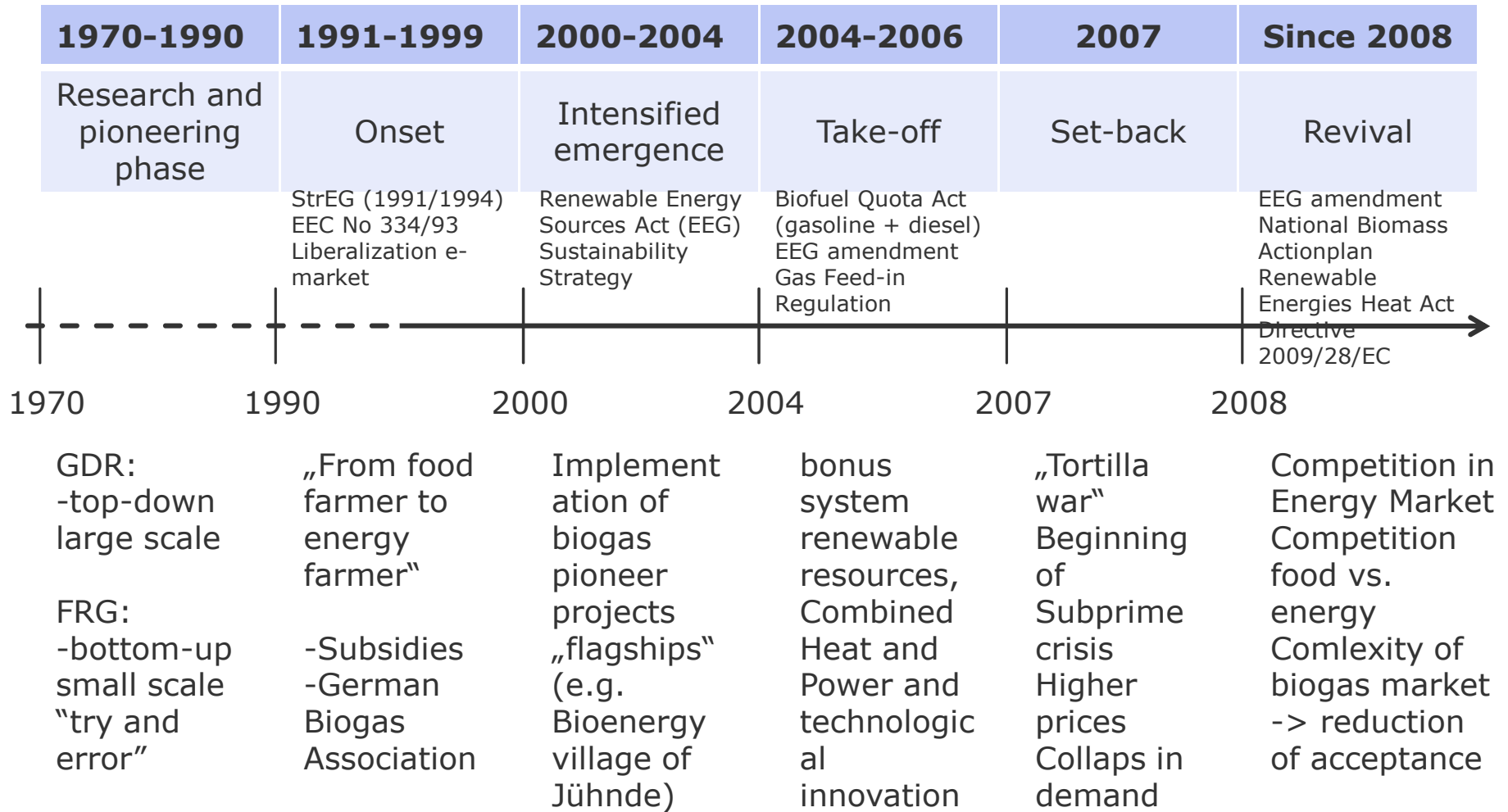




## Bioenergy in Germany



## Development of Biogas Use in Germany





Conclusion -> to find a balance

- **Nature vs. energy:**
- -> land for agriculture and forestry is running out (high population density); 4.5 million hectares of land for energy-plants needed, scarcity of areas for cultivation
- **Change in Energymix vs. Nimby-effect:**
- -> e.g. odor, pollution, monoculture, noise pollution (transport); involvement of bottom-up is necessary
- **Bottom-up vs. Top-down or Producer vs. Consumer market or Centralization vs. Decentralization:**
- -> Centralization versus decentralization -> Biogs Injection into the grid + centralized CHP-plants -> interest of national power companies



Conclusion -> to find a balance

- **EU-interests vs. Vital national interests:**
- -> food and energy security: Multilevel-organization of EU can hinder or be an advantage for diffusion of renewable energies
  
- **National interest vs. Farmer interest:**
- -> energy production presented an increasingly attractive alternative in comparison with fodder and food production -> raise of prices: feed, food, leases for farmland,
  
- **Conventional vs. Ecological farming:**
- Criticisms because of rising use of fertilizers, pesticides and herbicides which cause a net release of CO<sub>2</sub> during production and constraints that more energy crops means less biodiversity -> „good professional practice“
  
- **Subsidies steering farmers decision for food, feed or energy**



Conclusion -> to find a balance

- **Higher prices through:**
  - -> Competition energy sector (internal)
  - -> Competition food and energy sector
  - -> Speculation at international stock exchange (eg. NYMEX)
- **Complexity of bioenergy sector:**
  - -> criticism of bioenergy in the media and public
  - -> reduction of acceptance



Conclusion -> to find a balance

- **In comparison with other renewables:**
- -> bioenergy is no front-runner
- -> Production of electricity by biomass: double price than wind turbines, second highest price after photovoltaic
  
- **Can only be used in regional market :**
- -> transportation of biomass over larger distances is not ecological usefull.
- -> 25 – Bioenergy Regions in Germany



## Conclusion

### **Key elements for success in Germany (Biogas sector):**

#### **Transparency:**

- Location selection with agreement of the authorities and civil society
- Location selection after an evaluation of several possibilities
- -> Early involvement of the authorities and civil society in informal discussions prior to the application and in the location finding process

Gaining of trust and therefore a constructive role of stakeholders

-> bottom up hand in hand with top down?

#### **Coordination:**

- Responsible contact person remained, making communication easier and more effective (coordinator)

**•This is true for Germany but is it transferable to other countries?**



Berlin Centre for Caspian Region Studies

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Thank you  
for your attention.

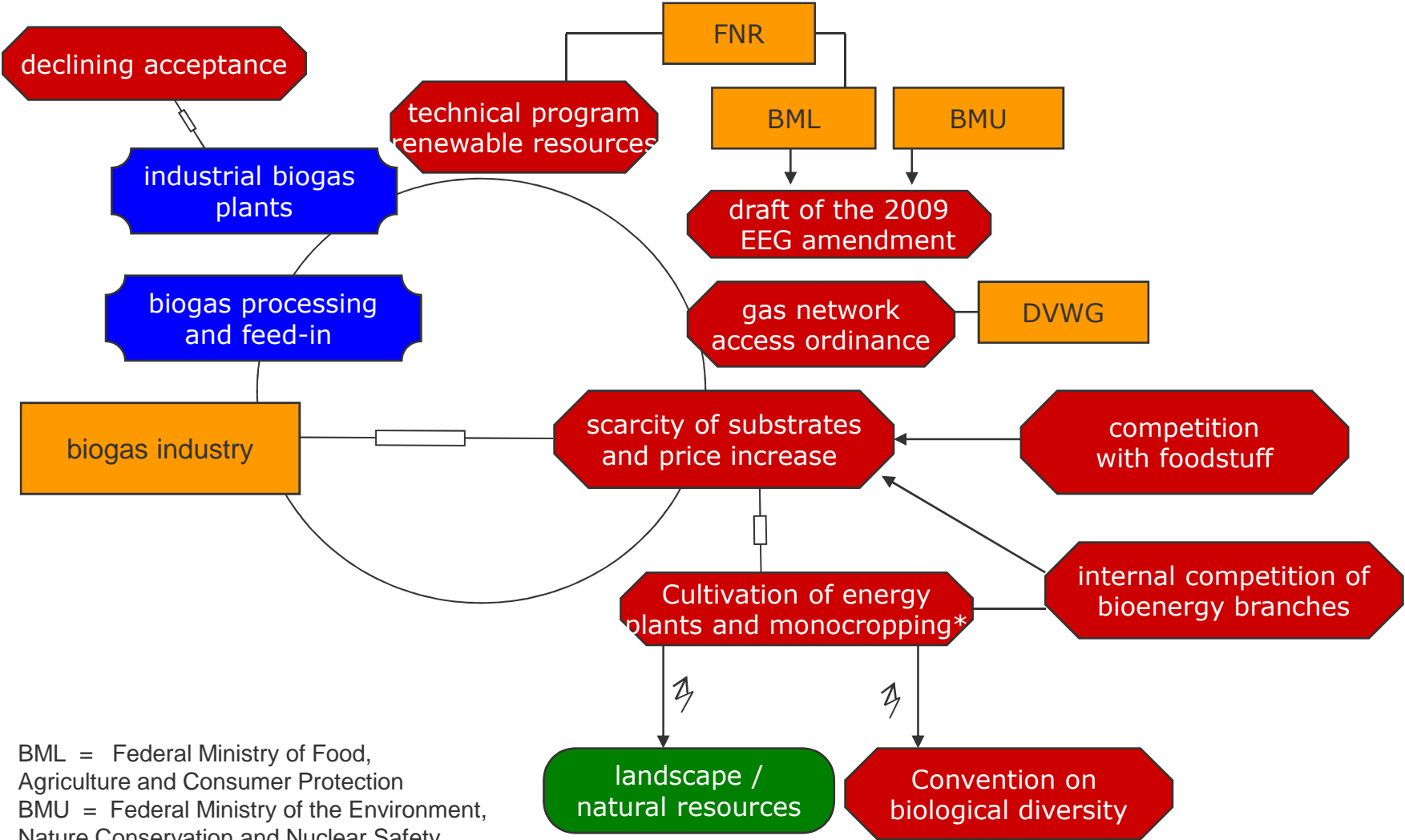


IEKP

food crisis

bioenergy reputation declines

rise in oil prices



BML = Federal Ministry of Food, Agriculture and Consumer Protection  
 BMU = Federal Ministry of the Environment, Nature Conservation and Nuclear Safety  
 DVWG = German Technical and Scientific Association for Gas and Water  
 EEG = Renewable Energy Sources Act  
 FNR = Agency for Renewable Resources  
 IEKP = Integrated Energy and Climate Programme

\* = the German term „Vermassung“ refers to a monoculture based on maize



## Best practice example: Biogas plant in Germany

Production capacity 500 kWe electricity and 500 kWth heat, based on energy crops.  
Integrated Permit.

Scale of the project under the threshold for public participation and EIA.

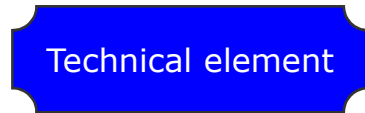
Plant was granted a permit in 6 months.

A premature start of construction was requested and granted, as no major constraints were expected by the authority.

Keys for success:

- Location was selected with agreement of the authorities,
- after an evaluation of four possible locations
- Early involvement of the authorities in informal discussions prior to the application and in the location finding process
- Gaining of trust and therefore a constructive role of stakeholders
- Responsible contact person remained, making communication easier and more effective
- Permit advisor already had experience in permitting procedures

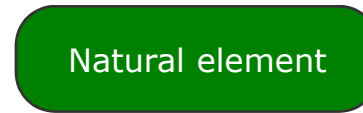
## Legende



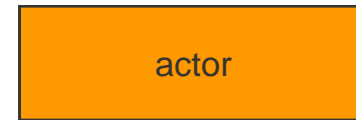
Technical element



Signs/symbols



Natural element



actor



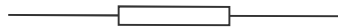
Simple Relation



Targeted Relation



Conflicting Relation



Resistive Relation

# Technology Roadmap of the EU 27

