

# **RENEWABLE ENERGY SOURCES IN ČR**

## **Dominant role of biomass**

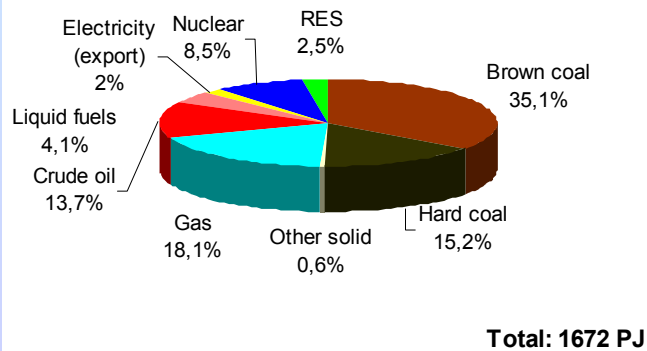
**Prepared by:**

**Jaroslav Knápek**

**April 2004**

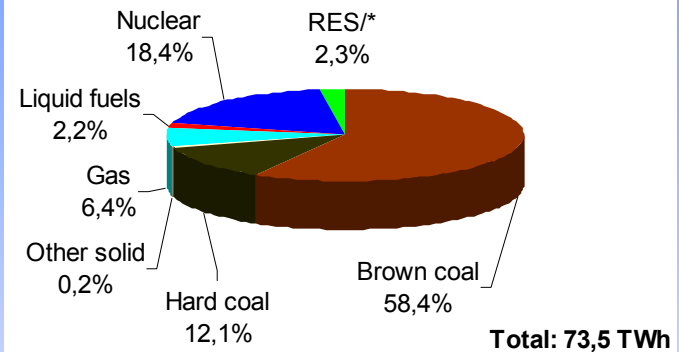
# CURRENT STATE OF RES UTILIZATION

**Structure of primary energy sources in ČR 2000**



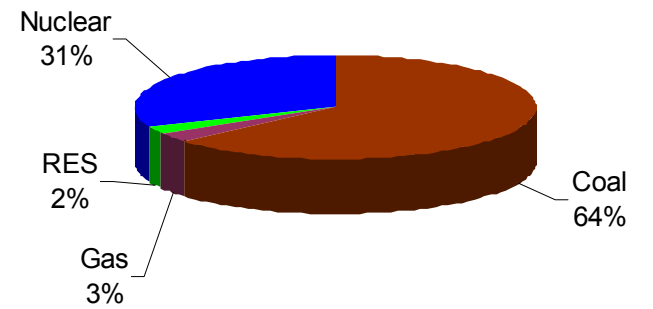
Source: State energy policy, 2004

**Structure of electricity generation in ČR, 2000 (gross)**



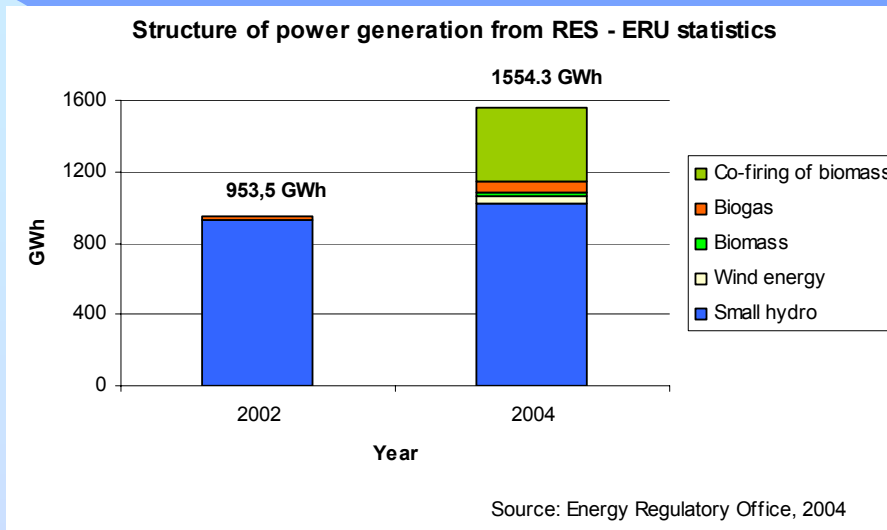
Source: Energy Regulatory Office, 2004

**Structure of electricity generation in ČR, 2003**



Source: Energy Regulatory Office, 2004

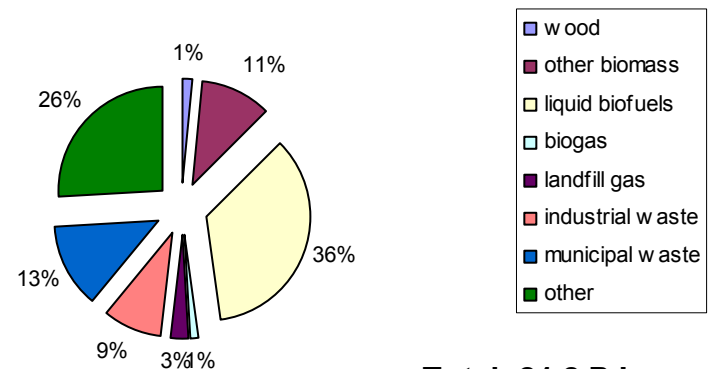
# STRUCTURE OF RES UTILISATION IN ČR



- **30-40 PJ, app. 2-2,5% of PES**
- **app. 4,5% of gross electricity consumption (2004)**
- **Directive 2001/77 target: 8%**

- **Biomass app. 2/3 of RES**
- **Mainly local application (wood waste, etc.)**
- **App. 20 heating stations in small town (from 1 TJ to max. 60 TJ)**

## Consumption of RES and non-conventional sources for heat production

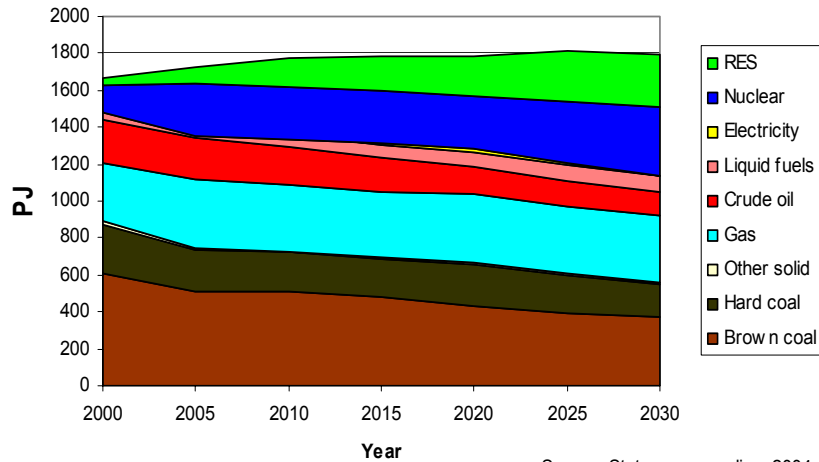


**Total: 21,2 PJ**

2002: Source CZSO

# STATE ENERGY POLICY AND RES

Structure of primary energy sources

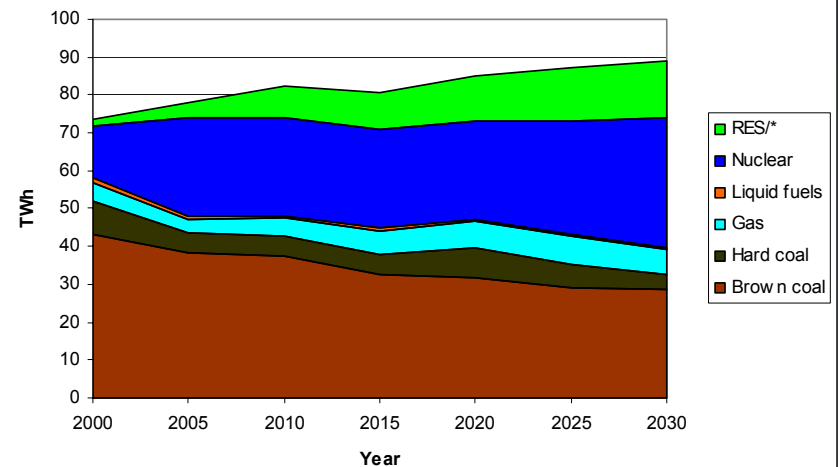


Share of RES	2000	2005	2010	2015
	2,63%	5,38%	8,96%	10,49%
	2020	2025	2030	
	12,03%	14,86%	15,75%	

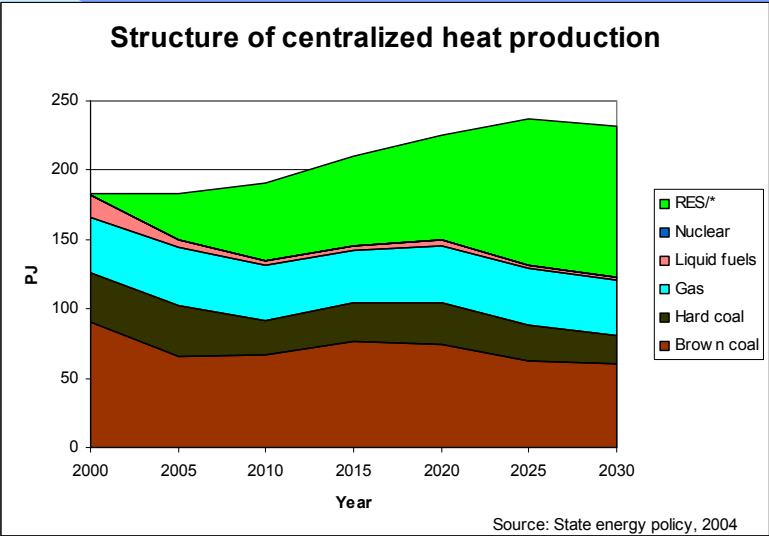
## Dominant role of biomass in RES mix

Share of RES	2000	2005	2010	2015
	2,32%	5,32%	9,92%	12,17%
	2020	2025	2030	
	13,63%	16,23%	16,89%	

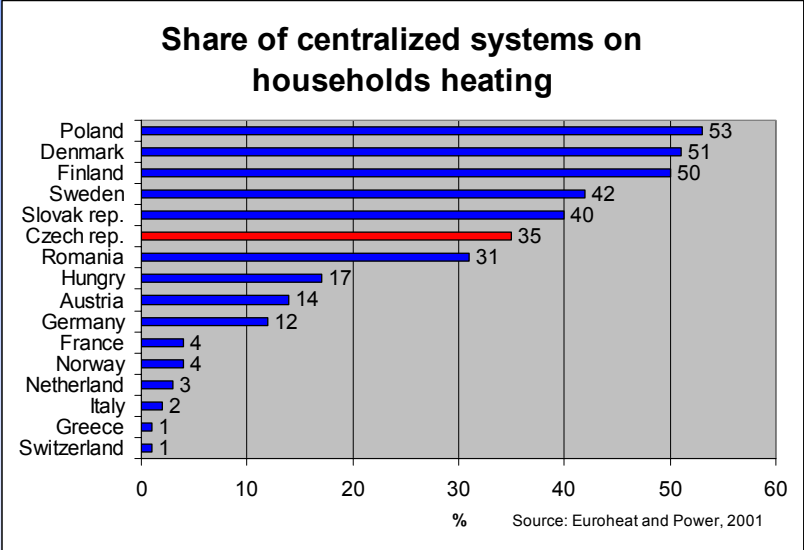
Structure of electricity production



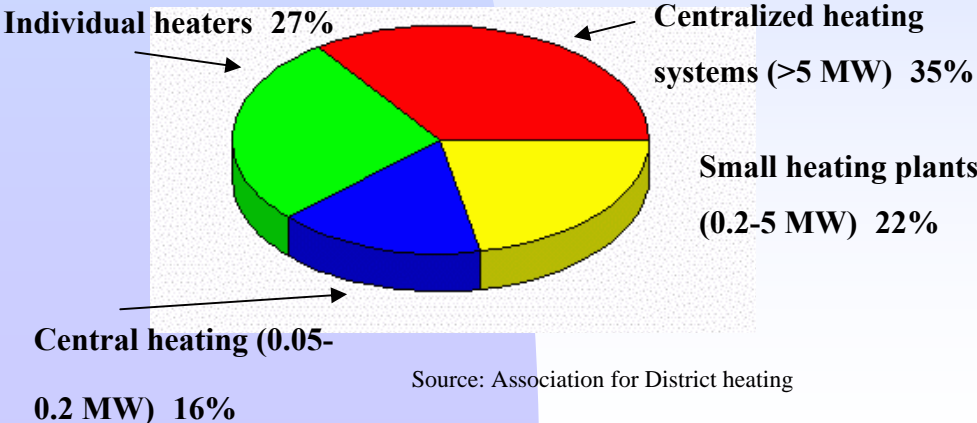
# STATE ENERGY POLICY AND RES



## Increase of energy efficiency

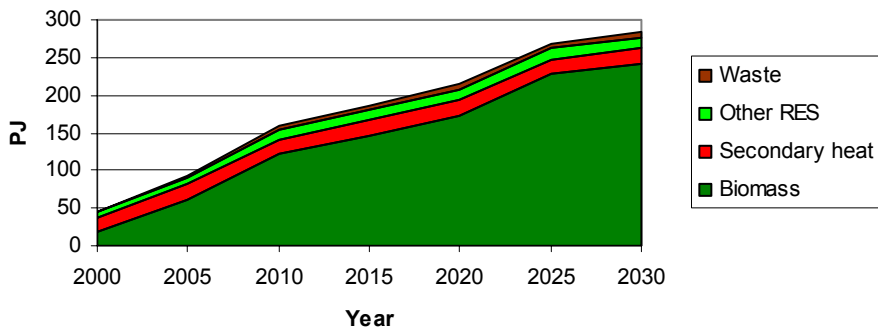


## Structure of heating systems in +CR, 1997



# STATE ENERGY POLICY - ROLE OF BIOMASS

**Structure of used RES and "non-traditional sources"**



Source: State energy policy, 2004

**Share of biomass**

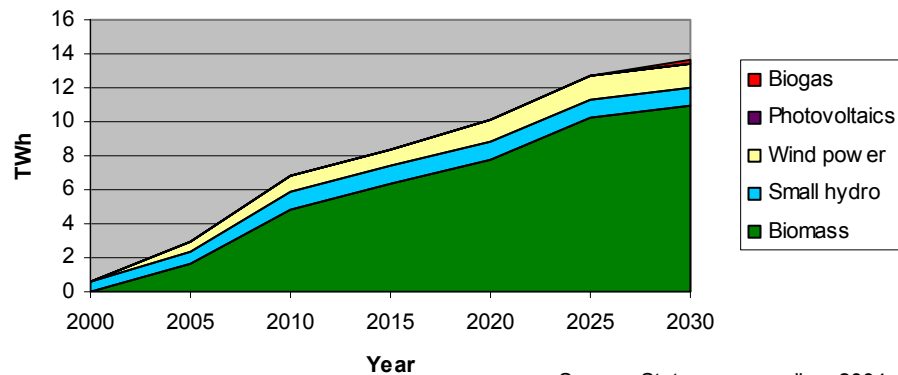
	2000	2005	2010	2015
	40,91%	66,67%	76,10%	78,07%
	2020	2025	2030	
	80,47%	84,76%	85,51%	

**Limited potentials of other RES**

**Share of biomass**

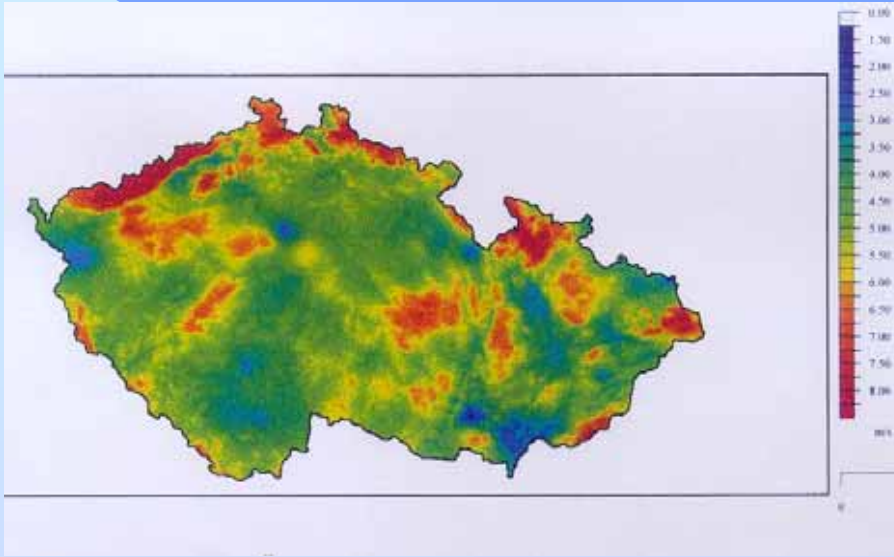
	2000	2005	2010	2015
	1,82%	53,69%	70,95%	75,33%
	2020	2025	2030	
	77,17%	80,33%	80,47%	

**Structure of electricity generation from RES**



Source: State energy policy, 2004

# ROLE OF OTHER RES



## Wind power

Wind speed	4,8 - 4,9 m/s	5,0 - 5,9 m/s	> 6 m/s
Area (km <sup>2</sup> )	4 612	4 298	1 269
Available area (km <sup>2</sup> )	1 420	766	112

## Potential:

- **1-1,5 TWh (in 2010-2020)**
- **Major projects planned in Krušné hory**

## Hydro power plant

	2000	2001	2002	2003
Total gross production	2313	2467	2845	1794
therein pumped storage	555	413	353	408

- **limited potential in small hydro (400-800 GWh at maximum)**
- **many restrictions for new construction**

# BIOMASS

## **Current situation: 2/3 of RES**

- **residual biomass and waste from wood processing**
- **straw and residuals from agriculture**
- **biodiesel production from rape (2003: 250 th. ha, 387 th. t, 2002: 313 th. ha, 709 th. t, 230 th. T processed to biodiesel )**
- **planted biomass (energy plants + short rotation coppices)**

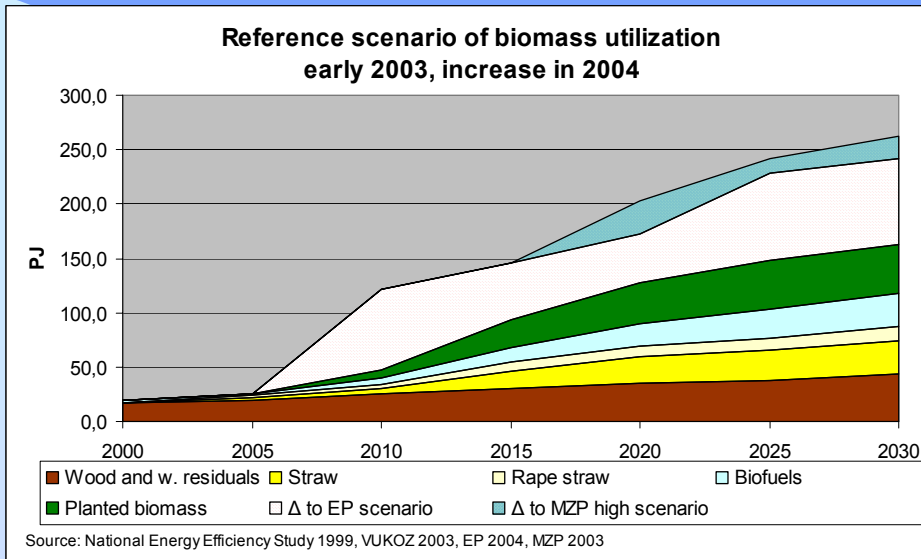
## **Major part used in local applications**

- **market with biomass is not developed**
- **price of fuel in wide range <0.92;3.7> Eur/GJ**

## **2004:**

- **co-firing of biomass (coal and biomass mixture, 5-10% of biomass in bigger power plants and co-generation plants)**
- **increase price of biomass of market (wooden chips) by 1/3 in last 2 years)**

# BIOMASS - projection

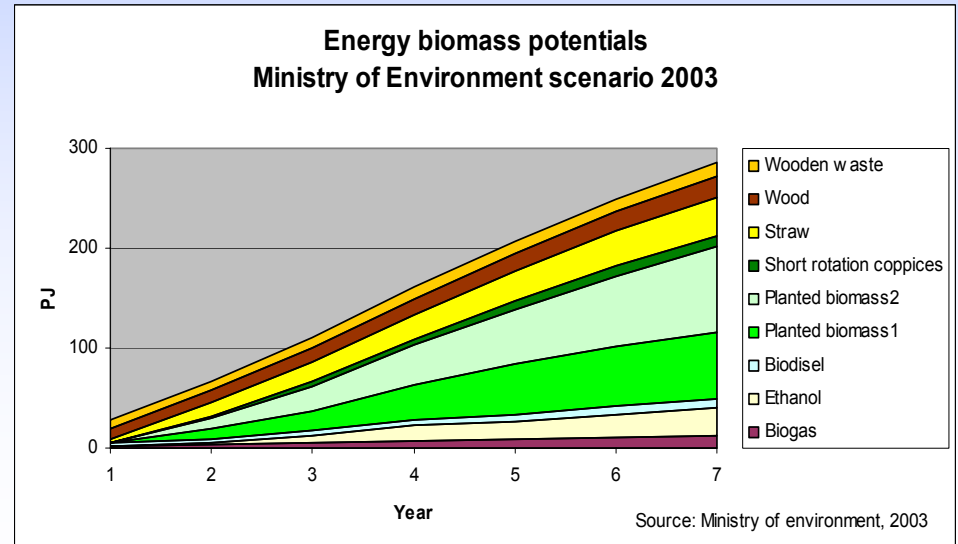


## ME scenario:

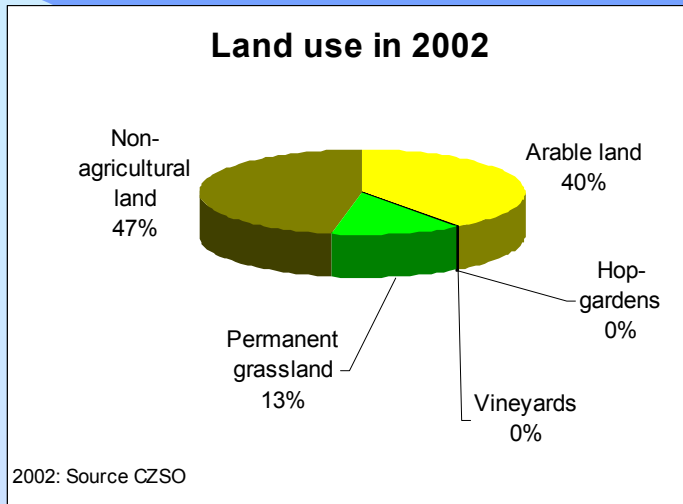
- up to 30% of agricultural land used for energy biomass
- in 2020 113 PJ in planted biomass

## Crucial importance of planted biomass

- covers major part of increase
- needs creation of effective market



# BIOMASS - AVAILABLE LAND



**High share of arable land in agricultural land (54,2% of total land):**

- **EU15 average: 60,1%**
- **ČR: 71,8%**

## Available land for energy biomass

Land type	(th. ha)	Comment
Land in mountain regions	481	Prone lands, over 7 %, above 600 m sea level.; $\varnothing t < 6^{\circ}\text{C}$ ; $\Sigma P \geq 700$ mm)
Land in near mountain regions	1 482	Prone lands often over 7 %; 300-600 m. sea level; $\varnothing t = 6-8^{\circ}\text{C}$ ; $\Sigma P = 650-800$ mm)
Flooded land	832	Land near watercourse, casual floods,
Industrial land	11	Mine dumps
	30	Landfill
	6	Highway corridors
Land in protected areas	136	4. zone CHKO
	49	Protective zone of natural parks

Source (MZe,1999; Urban,1996)

# BIOMASS IN CONTEXT

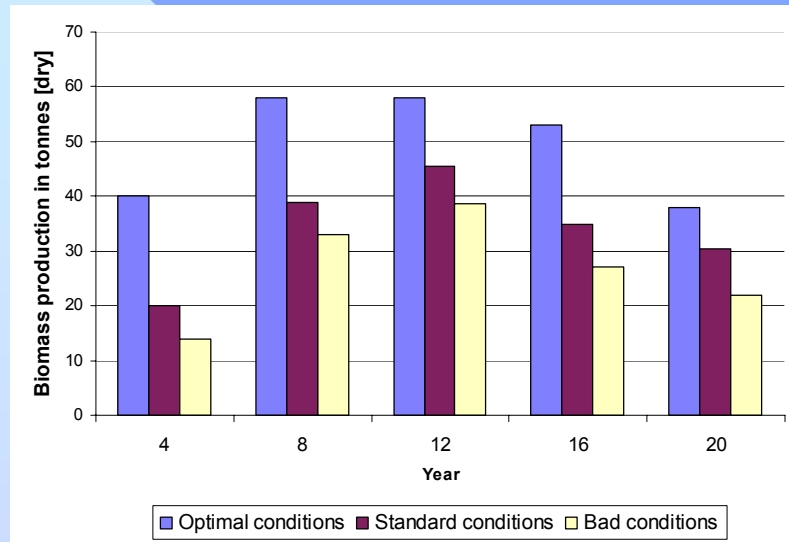
- **Planted energy biomass is major part: after 2015 more than 50% of total biomass**

## **Current state:**

- **short rotations coppices**
  - **research and experimental stage only**
  - **app. 30 ha of plantations (poplar and willow mix mostly)**
  - **missing mechanisation**
- **energy plants**
  - **Sorrel (SauerAmpfer) Rumex OK2 - Uteuša**
  - **app. 100-200 ha**
  - **experimental stage**

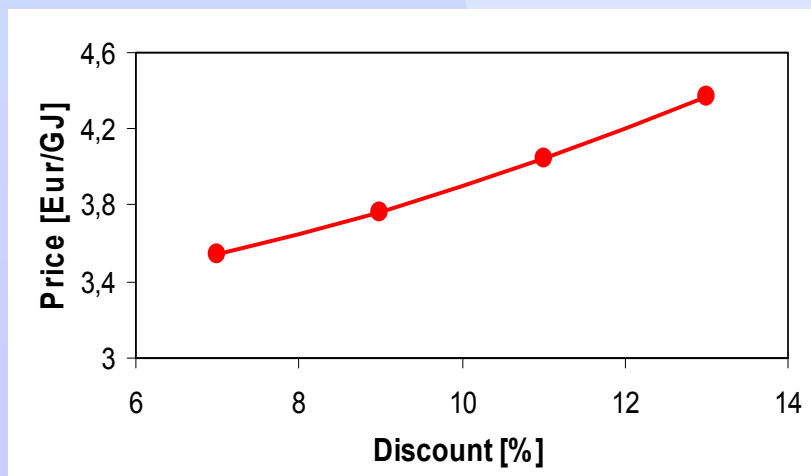
# FAST ROTATION COPPICES

**Plantations: mostly suitable clones of poplar and willow, wooden chips**

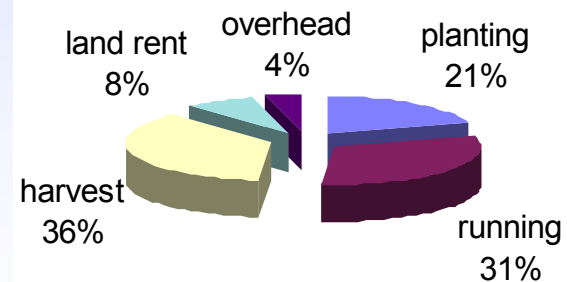


## ENERGY YIELD

- 30 360 GJ during plantation lifetime
- Energy equivalent of 4,8 kW/ha of thermal power (utilisation 8760 h/year)
- 151 GJ/year (average)



## Biomass cost structure



# ENERGY PLANTS

- **Still not fully clear policy**
- **Opened questions:**
  - **Biodiversity**
  - **Biocorridor**
  - **Biomass processing and utilisation (available technologies)**
- **Discussed issue: Sorrel Rumex - Uteuša**
  - **7-12 t of dry matter/ha**
  - **biomass price: app. 2,5-3 Eur/GJ**
  - **needs relatively intensive care, low resistance against pests**
  - **sensitive to dry weather**
  - **easy harvest and processing**
  - **harvest in 2nd year, one year rotation**

# BIOMASS IN LARGE SCALE

- **Potential yield: 150-170 GJ/ha in real conditions**
- **Absence on experience with planting in large scale**
- **Landscape function**
- **Threat of intensive land utilisation**
- **Needs to be solved in relation to agricultural policy and other policies**
- **Necessity to find effective (economic) way**

**Very ambitious targets in State Energy Policy**