

# Role of Bioenergy in the Kyoto Protocol, in the EU-ETS and in future Climate Agreements



*Andreas Türk*

*JOANNEUM RESEARCH*

*Austria*



*IEA Bioenergy ExCo58, 4<sup>th</sup> October 2006, Stockholm, Sweden*



# Bioenergy and Climate Change Mitigation (1)

- ❖ The Mitigation of Global Climate Change is one of the main drivers for a more intensive bioenergy use
- ❖ Kyoto Protocol entered into force in Feb. 2005
- ❖ Negotiation for a post-Kyoto Protocol and a dialogue on future climate mitigations have begun under the UN Climate Change Convention (since COP 11 in Montreal, 2005)
- ❖ Also new initiatives of non-Kyoto ratifying countries (Asia-Pacific Partnership on Clean Development and Climate)

## Bioenergy and Climate Change Mitigation (2)

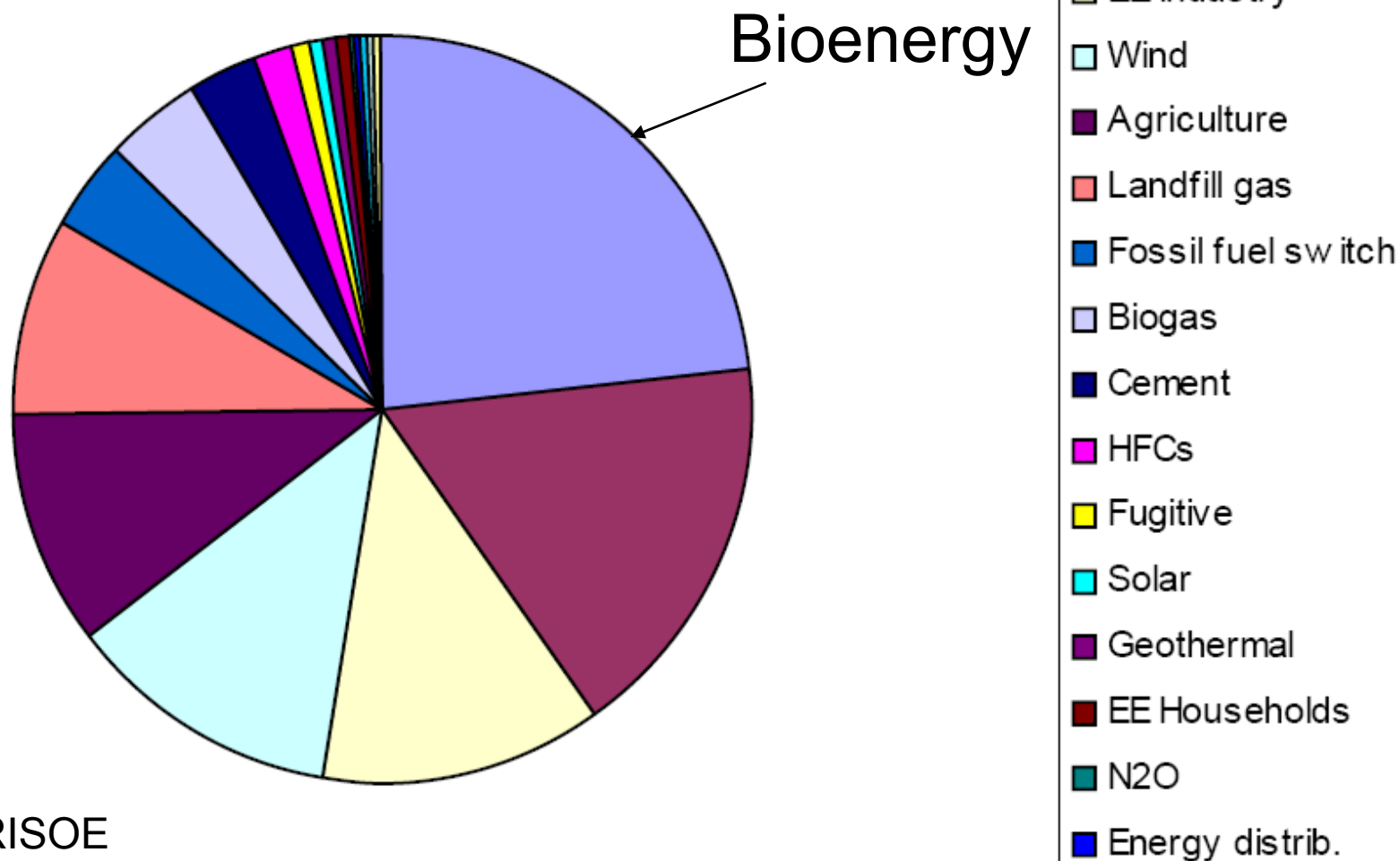
- ❖ Increase of bioenergy use through:
  - Internal emission reductions within the Greenhouse Gas capped sectors
  - Offsetting industrial emissions also with projects in the bioenergy sector

# Offsets under the Kyoto Protocol: JI/CDM

- CDM project pipeline: > 1000 projects of which:
  - Registered projects: 334
  - Expected CERs (from registered projects until the end of 2012): > 580,000,000
- There is a tendency towards large industrial projects ( $N_2O$ ,  $HFC_{23}$ ,  $CH_4$ )
- Bioenergy projects become increasingly uncompetitive
- Danger of crowding out bioenergy projects

# Bioenergy projects are the most popular among the registered projects

Distribution of projects



Source: UNEP RISOE



# The EU-ETS and biomass (1)

---

- In January 2005 the European Union implemented the European Emission Trading Scheme (EU-ETS)
- Some 12,000 large industrial plants covering about 46 % of the EU's total CO<sub>2</sub> Emission currently participate in the first 3 years phase of this trading system
- The scheme allows companies to buy and sell permits to release carbon dioxide into the atmosphere, so called “allowances”



## The EU-ETS and biomass (2)

---

- Aim of the system is that emissions reductions are carried out, where they are cheapest and that measures to reduce CO<sub>2</sub> emissions, such as switching to a low emission fuel mix and investments in new climate friendly technologies are encouraged
- In “National Allocation Plans” (NAPs), the number of allowances allocated to companies (caps) and the methods to allocate them is set on EU member state level

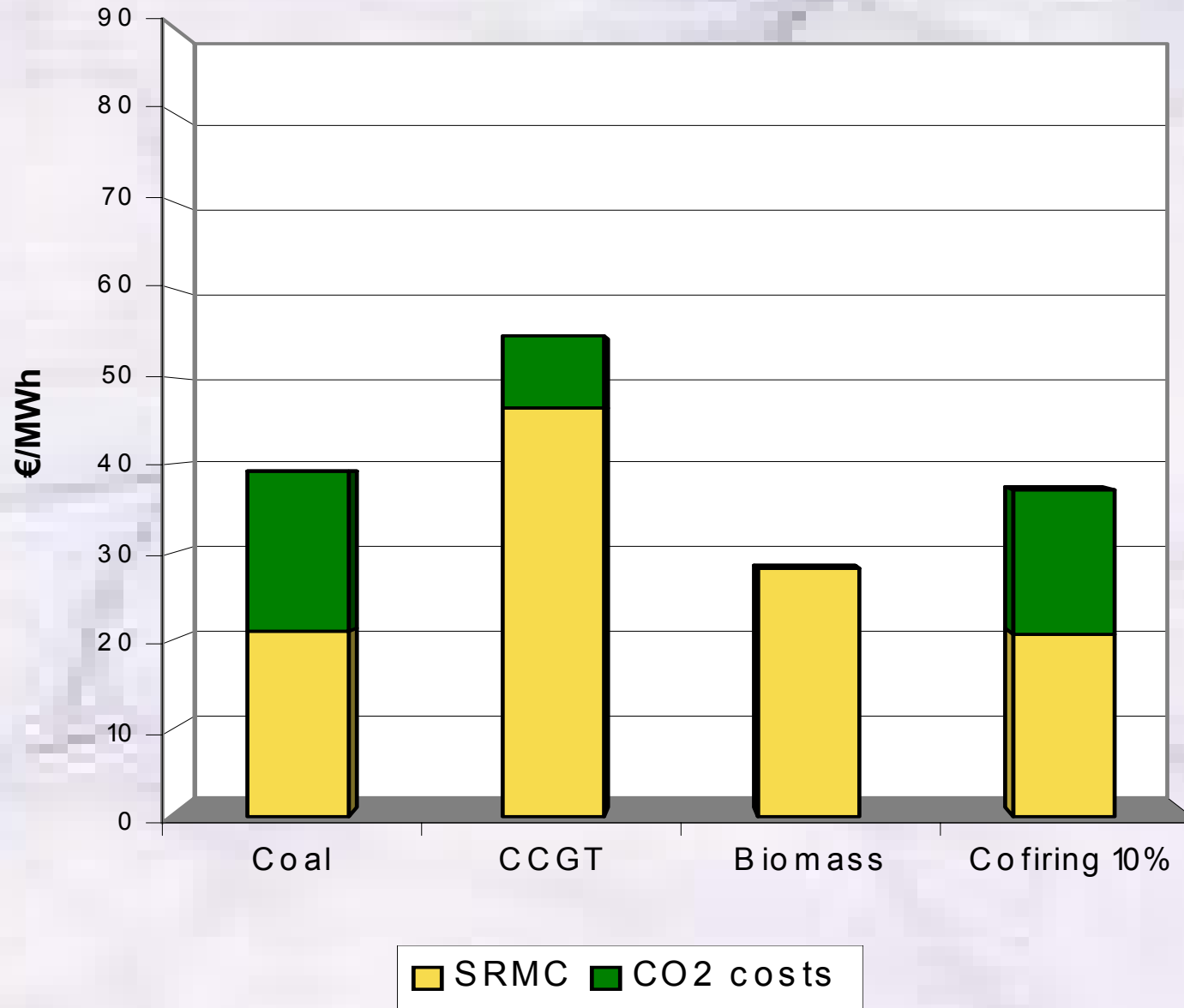
## The EU-ETS and biomass (3)

---

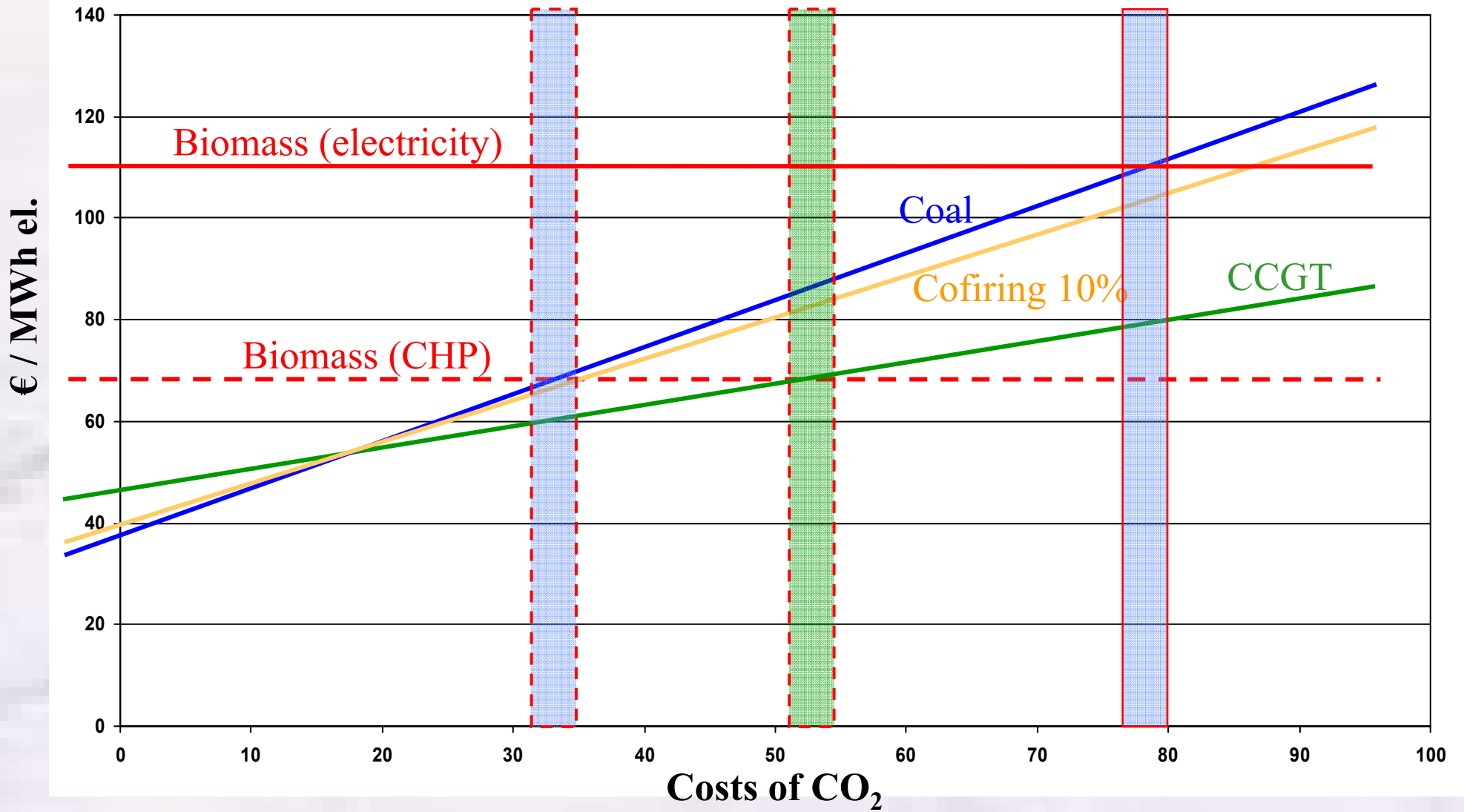
- As the EU-ETS sets a price on CO<sub>2</sub> emissions it increases the competitiveness of low carbon fuels
- Biomass is regarded as carbon neutral in the scheme causing no additional CO<sub>2</sub> costs
- The scheme thus has big potential to increase the use of biomass especially in the energy sector



# Short run marginal costs at a CO<sub>2</sub> Price of 20 Euro



# Long run Marginal Costs



## First model results

---

- Biomass use in existing plants (co-firing) is already competitive with other fuels at a CO<sub>2</sub> price of about 20 Euros
- Regarding new plants the EU-ETS alone will not make biomass as competitive as other fuels
- Other biomass related incentives such as guaranteed feed-in tariffs have to be added

# First experiences with the EU-ETS (1)

## Pilot phase (2005-1007) shows deficits:

- The national emission caps set by EU member states were in many cases rather loose
- Within the framework defined by the European Commission, member states were allowed to set their own methods how to allocate allowances to the companies, which in some cases lead to ongoing privileges for CO<sub>2</sub> intense fuel sources
- „Allocation methods“ leave much to be improved for setting the appropriate incentives to a stronger renewable energy use

## First experiences with the EU-ETS (2)

- EU wide survey among companies covered by the scheme shows that since it's introduction almost half of the companies started to investigate their internal emissions reduction options.
- Big power companies announced to strongly increase their biomass use and amongst other factors name the EU-ETS as one of the main drivers.
- The scheme thus succeeded to give a clear signal towards a carbon constrained future within the European Union

# Proposed Australian cap- and trade scheme

Table 6-4: Top ten expanding and contracting industries at 2020 relative to the Business as Usual scenario

Top ten expanding industries	Scenario 1		Scenario 1a			Scenario 2		
	% change in output	Absolute change (\$m)		% change in output	Absolute change (\$m)		% change in output	Absolute change (\$m)
1 Renewables (biogas,biomass, wind)	439.3	\$798	Renewables (biogas, biomass, wind)	309.8	\$553	Renewables (biogas, biomass, wind)	424.9	\$779
2 Electricity - gas	21.4	\$124	Forestry	16.8	\$122	Electricity - gas	29.0	\$171
3 Forestry	12.1	\$87	Alumina and aluminium	1.5	\$117	Forestry	24.1	\$175
4 Other mineral ore	0.9	\$92	Other mineral ore	0.9	\$93	Other mineral ore	0.9	\$90
5 Alumina and aluminium	0.7	\$59	Wood products	0.7	\$25	Alumina and aluminium	0.7	\$56
6 Iron ore	0.5	\$16	Manufacturing nec	0.4	\$32	Wood products	0.5	\$18
7 Iron and steel	0.4	\$21	Iron and steel	0.3	\$16	Iron ore	0.4	\$14

# Other Emissions Trading Schemes and biomass offsets (1)

---

- In the second phase of the scheme (2008-2012) the EU-ETS allows the use of JI/CDM offsets, member states can define the percentage (of the total allocation)
- All other Emission Trading Schemes such as the Chicago Climate Exchange (CCX) and the emerging US Northeast System Regional Greenhouse Gas Initiative (RGGI) or the New South Wales allow for bioenergy offsets

## Other Emissions Trading Schemes and biomass offsets (2)

---

- RGGI set to start in 2009, involving 8 US State in the North East U.S.

Strong focus on agricultural offsets (biogas) but also on sequestration of carbon through afforestation

- Importance of bioenergy offsets even bigger within proposals for federal cap – and trade schemes in the US





# Post Kyoto

---

## **Developments that are already beginning since the Climate Conference in Montreal in 2005**

- Expanding the current CDM mechanism towards sectoral and programmatic CDM
  
- Linking of different market mechanisms. This would require common standard e.g. for the use of bioenergy and carbon sequestration offsets

# Post Kyoto

---

## But...

- Simply increasing the use of biomass may lead to net depletion of C stocks (“non-renewable biomass”)
- This requires an active enhancement of removals and building the resources for increased use of modern biomass energy
- What about sustainability and “non-renewable biomass”?

# Conclusions

---

- ✓ The importance of bioenergy increases due to carbon constraints
- ✓ In the short term renewable energy CDM offsets are out-competed by reduction of industrial gases
- ✓ The EU-ETS as well as other schemes have a great potential to increase bioenergy use if well designed
- ✓ Common standards for offsets required to link different schemes
- ✓ Climate Mitigation requires active enhancement of removals
- ✓ Standards to ensure the sustainable production of biomass will be required