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## Contribution of Increased Pellets Use for Climate Protection

Gerfried Jungmeier

JOANNEUM RESEARCH, Graz/Austria

*Discussion Workshop*

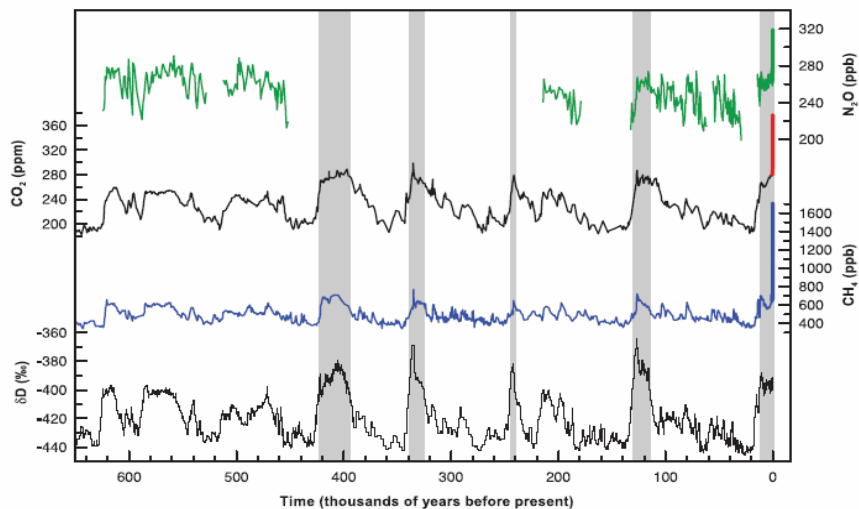
*„European Pellets Roadmap up to 2020“*

June 26, 2008

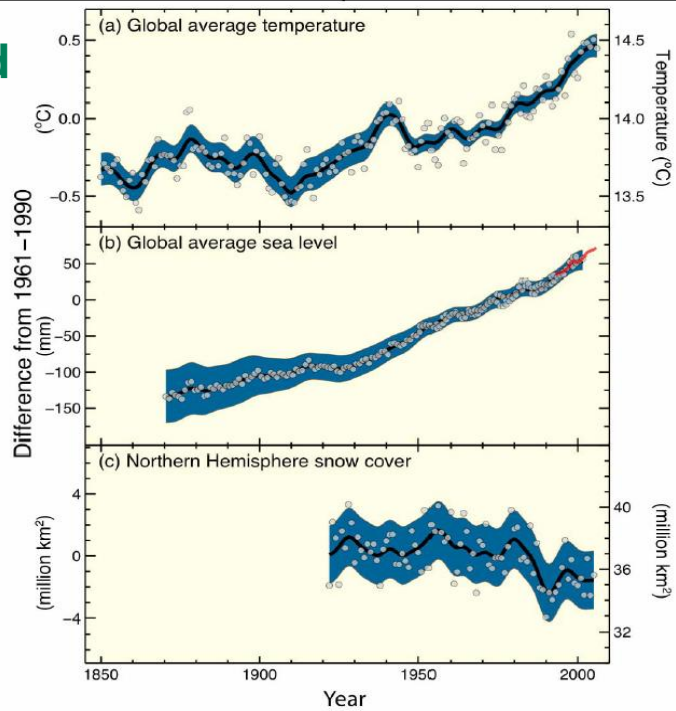
Bruxelles, Belgium

## Greenhouse Gas Concentration in Atmosphere

GLACIAL-INTERGLACIAL ICE CORE DATA

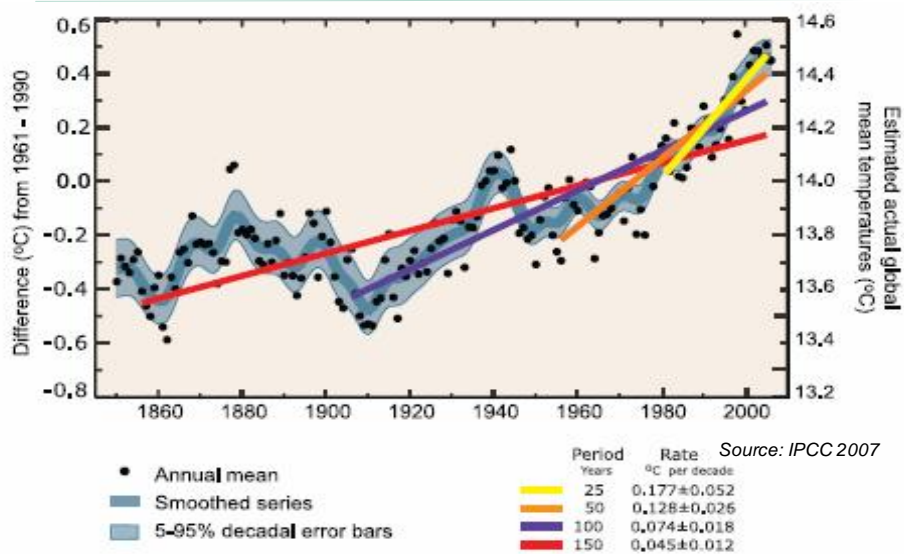


## Observed Changes

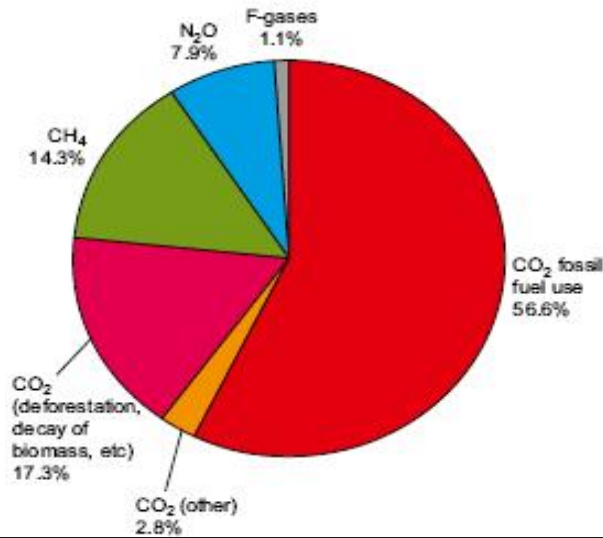


Source: IPCC 2007

## Trends of Global Temperatur Change

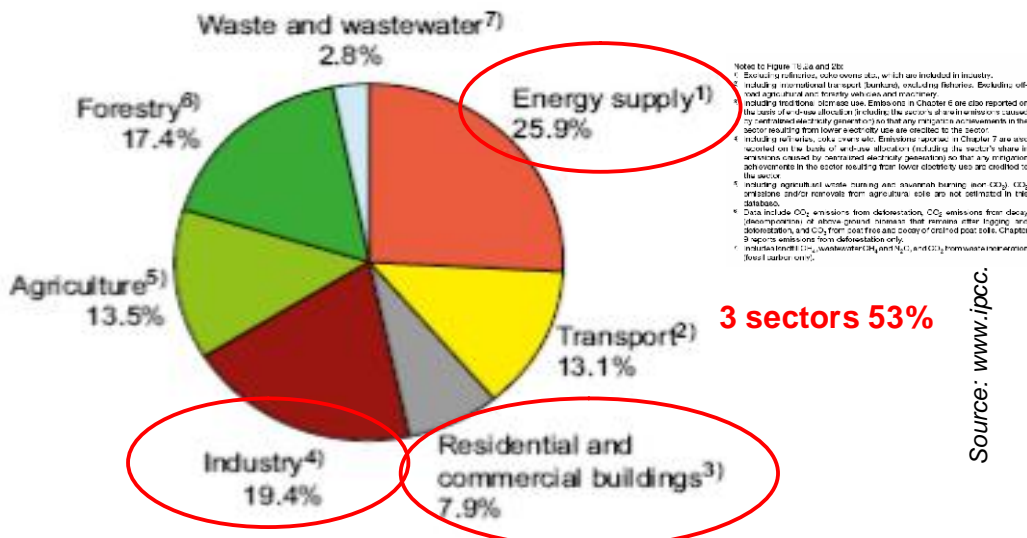


## Global Greenhouse Gas Emissions 2004



Source: www.ipcc.ch

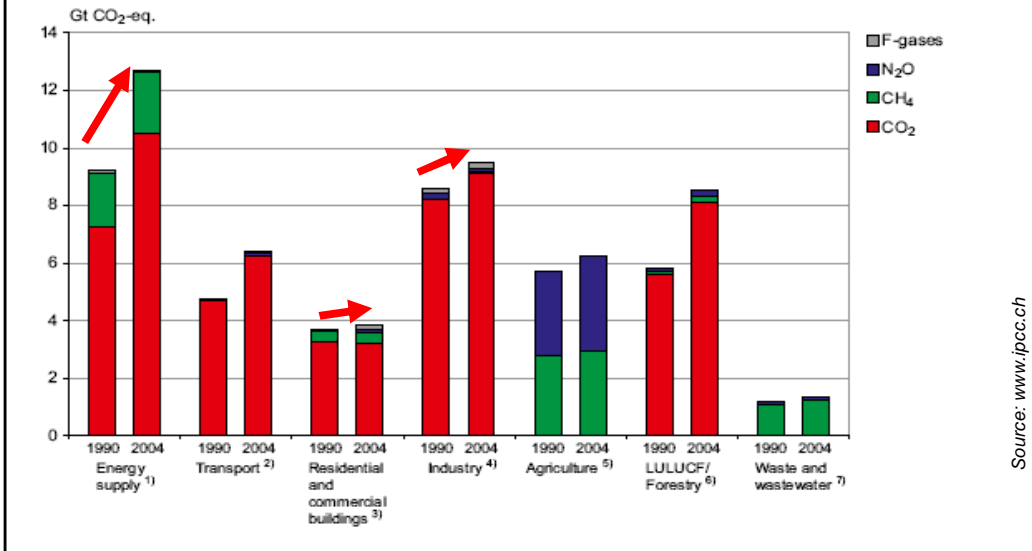
## Sectoral Greenhouse Gas Emissions Worldwide 2004



Notes to Figure 1.2.a and 1.2c:  
<sup>1</sup> Excludes refineries, coke ovens etc., which are included in industry; includes non-fossil fuel sector, bunkers, excluding fisheries. Excludes off-road agriculture and forestry, water and machinery, industry and home storage use. Emissions in Chapter 6 are also reported on the basis of a 3-year average. <sup>2</sup> Includes the sector of air transport or sea transport (not land-based electricity generation) so that any net gains or losses in the sector resulting from lower sector use are credited to the sector.  
<sup>3</sup> Includes air travel, jets, other air. Emissions reported in Chapter 7 are also reported on the basis of a 3-year average. <sup>4</sup> Includes the sector of air transport or sea transport (not land-based electricity generation) so that any net gains or losses in the sector resulting from lower sector use are credited to the sector.  
<sup>5</sup> Includes agricultural waste burning and manure burning, and CH<sub>4</sub>, CO<sub>2</sub>, emissions and/or removals from agriculture, which are not included in the database.  
<sup>6</sup> Data include CO<sub>2</sub> emissions from deforestation, CO<sub>2</sub> emissions from decay (decomposition) of above-ground biomass that remains after logging, and deforestation, and CO<sub>2</sub> from coal-fired and peat or oil-fired power plants. Chapter 9 reports emissions from deforestation only.  
<sup>7</sup> Includes landfills, wastewater treatment, and CH<sub>4</sub>, and CO<sub>2</sub> emissions from manure management, food and other waste.

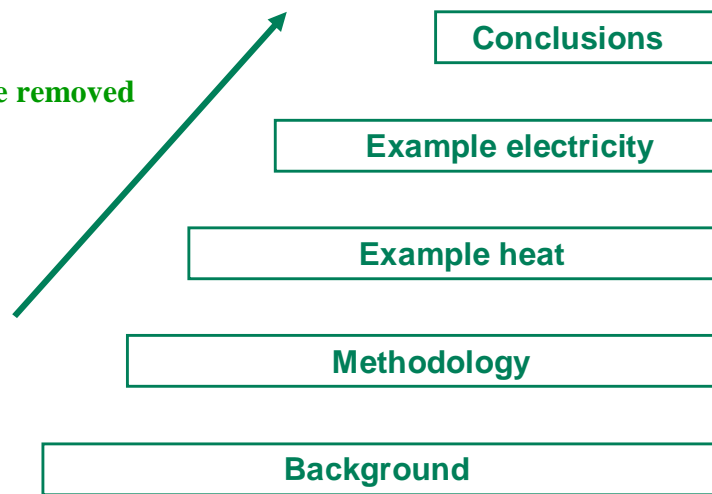
Source: www.ipcc.ch

## Development of Global Greenhouse Gas Emissions (1990 – 2004)



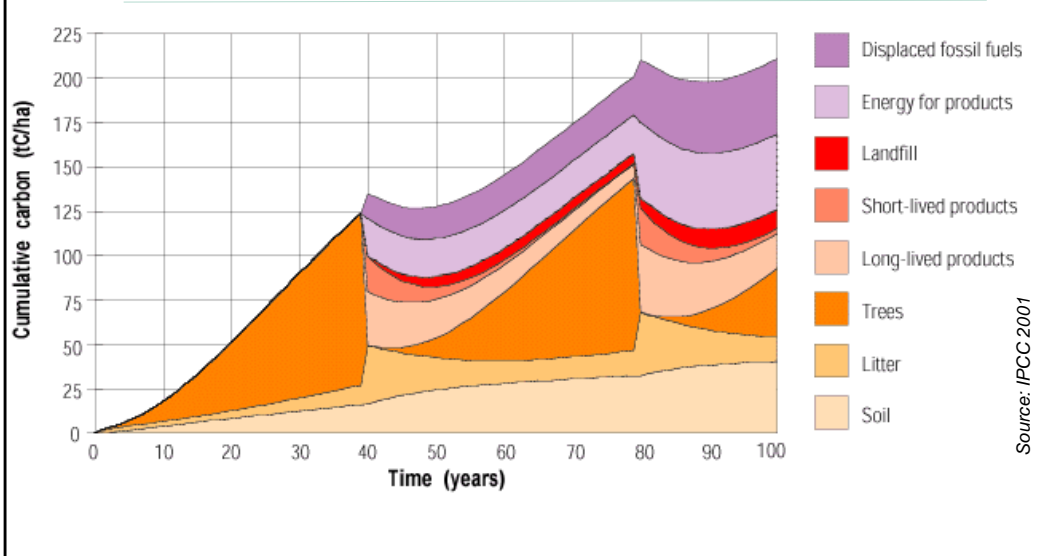
## Overview

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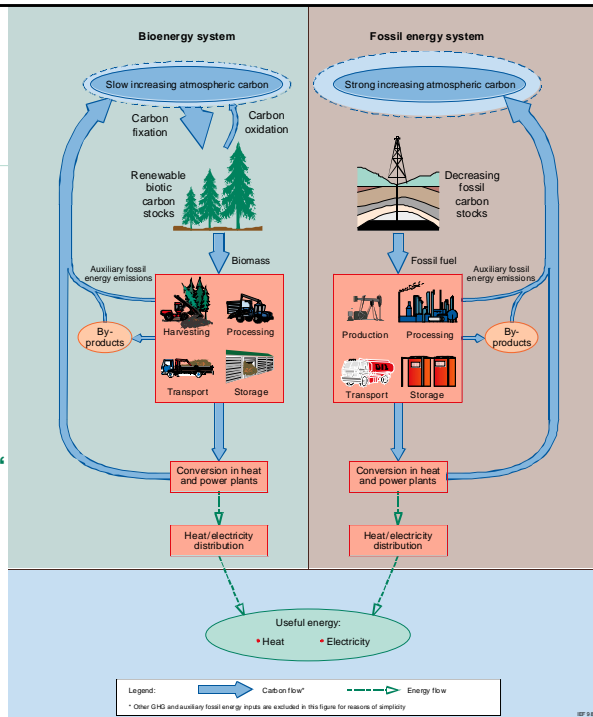
## Cumulated CO<sub>2</sub>-Reduction Potential of material and Energy Use of Biomass



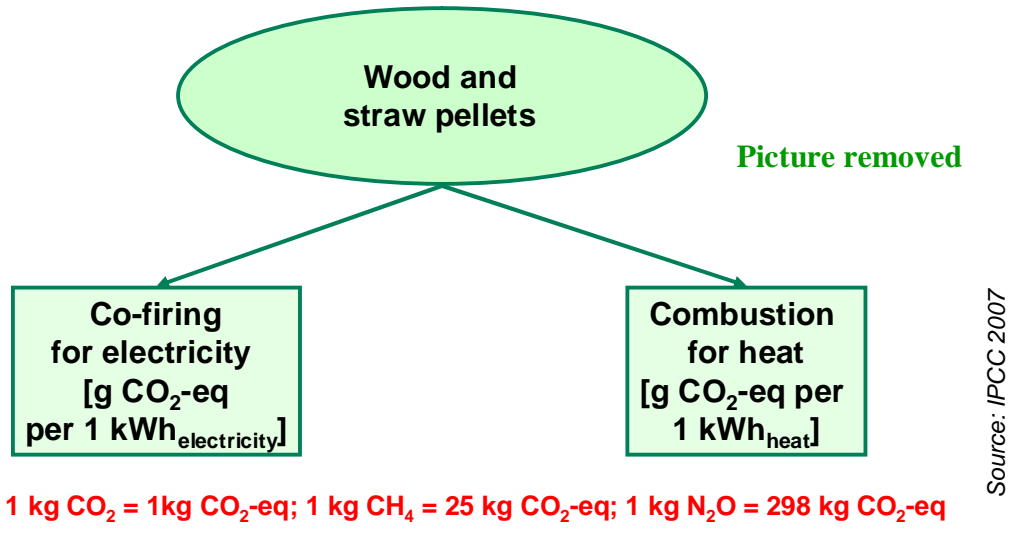
## LCA-Methodology

According to

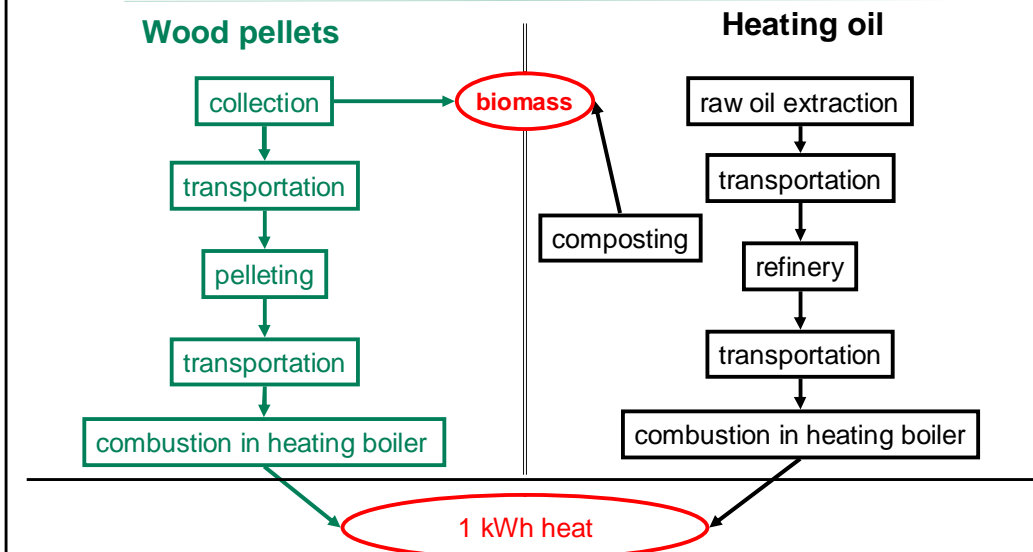
- ISO 14 040 „Life Cycle Assessment“
- Standard Methodology of IEA Bioenergy Task 38 „Greenhouse Gas Balances of Bioenergy systems“
- Recommendations of COST Action E9 „Life Cycle Assessment of Forestry and Forest Products“

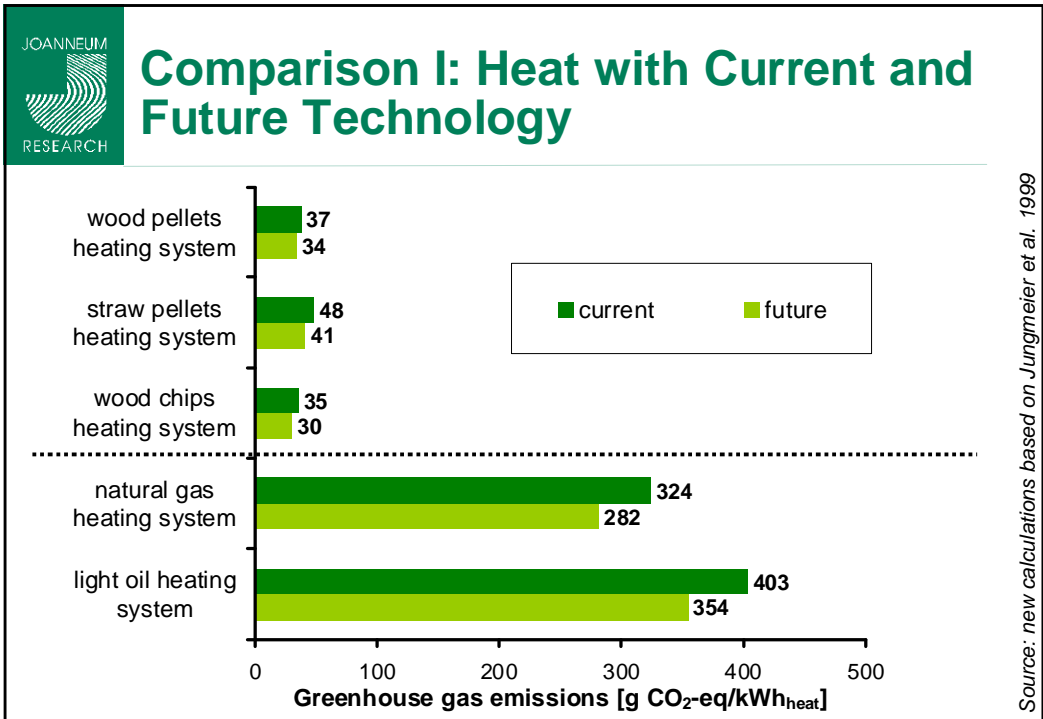
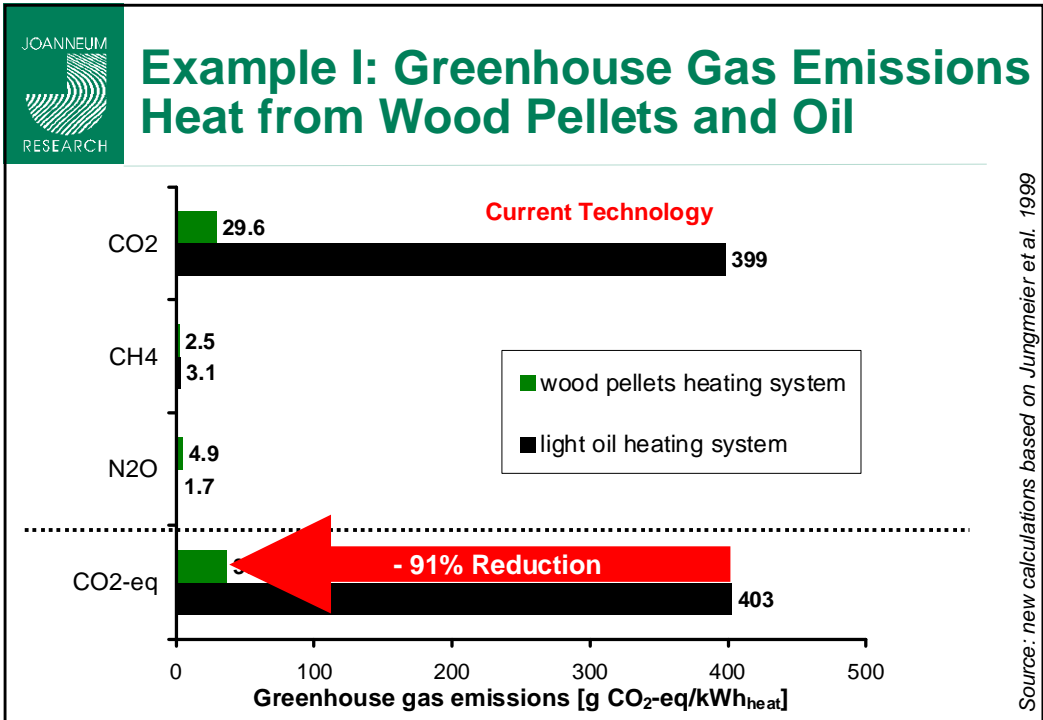


## LCA based Greenhouse Gas Analyses of Pellets for Heat and Electricity



## Example I: Heat from Wood Pellets and Heating Oil





## Greenhouse Gas Reduction with Heat from Pellets

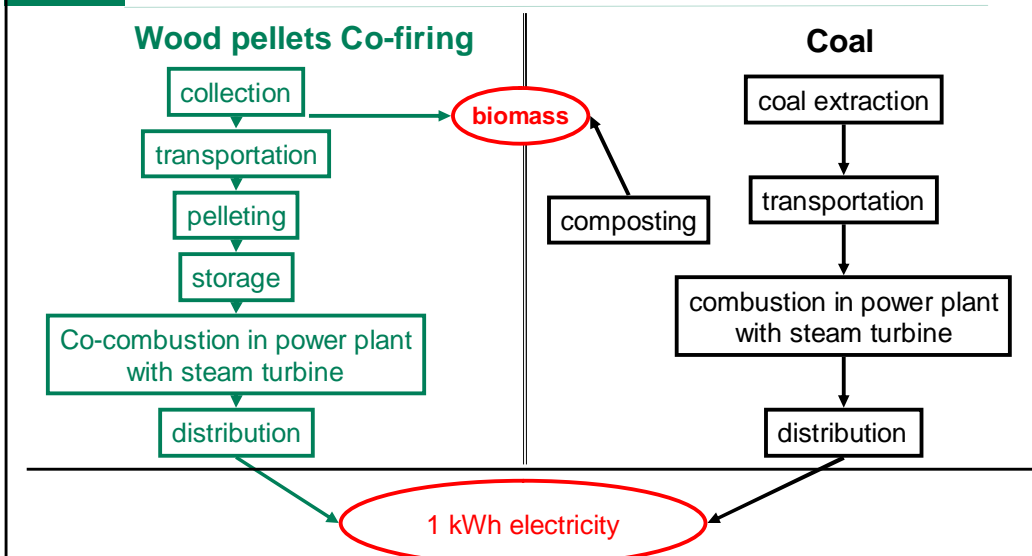
Current Technology [g CO <sub>2</sub> -eq/kWh <sub>heat</sub> ]		light oil heating system	natural gas heating system
wood pellets heating system	37	-91%	-89%
straw pellets heating system	48	-88%	-85%
wood chips heating system	35	-91%	-89%
Future Technology [g CO <sub>2</sub> -eq/kWh <sub>heat</sub> ]		light oil heating system	natural gas heating system
wood pellets heating system	34	-90%	-88%
straw pellets heating system	41	-88%	-85%
wood chips heating system	30	-91%	-89%

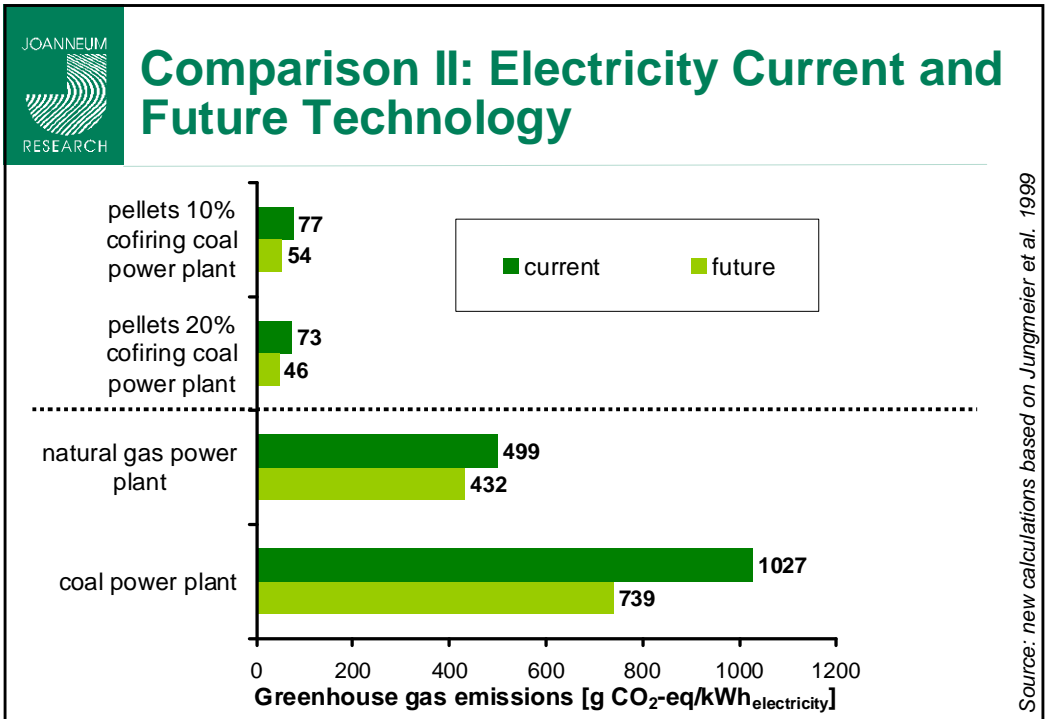
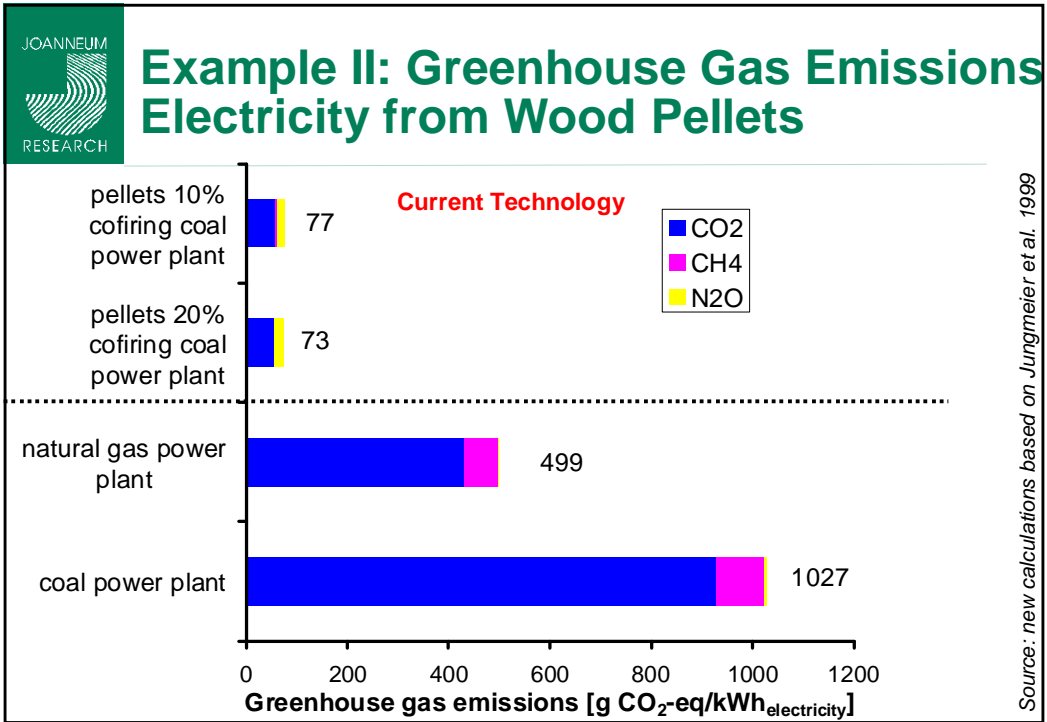


**GHG-Reduction: 85 – 91%**

Source: new calculations based on Jungmeier et al. 1999

## Example II: Electricity from Wood Pellets and Coal





## Greenhouse Gas Reduction with Electricity from Pellets

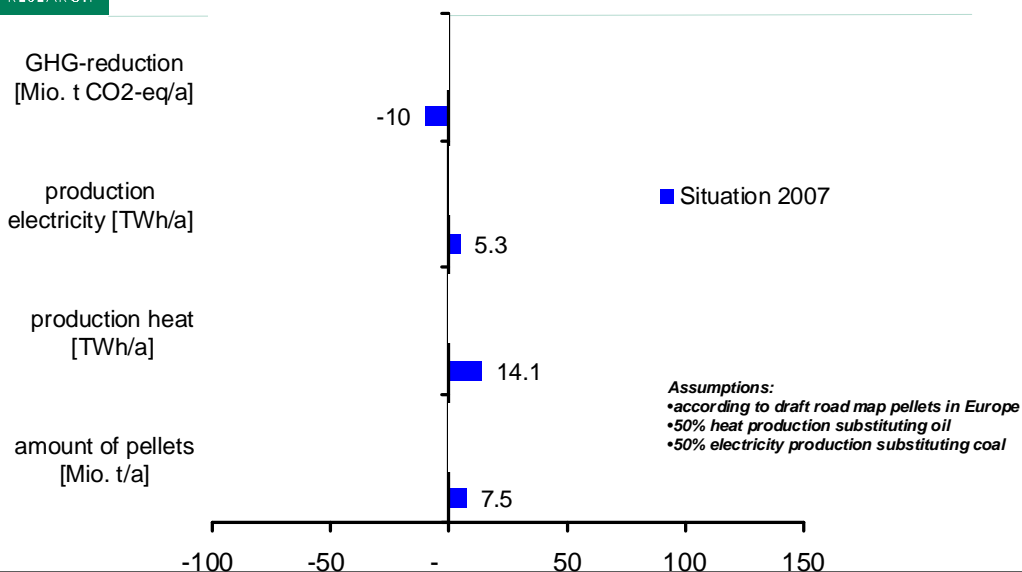
Current Technology [g CO <sub>2</sub> -eq/kWh <sub>electricity</sub> ]		coal power plant	natural gas power plant
			1027
pellets 10% cofiring coal power plant	77	-93%	-85%
pellets 20% cofiring coal power plant	73	-93%	-85%
Future Technology [g CO <sub>2</sub> -eq/kWh <sub>electricity</sub> ]		coal power plant	natural gas power plant
		739	432
pellets 10% cofiring coal power plant	54	-93%	-88%
pellets 20% cofiring coal power plant	46	-94%	-89%

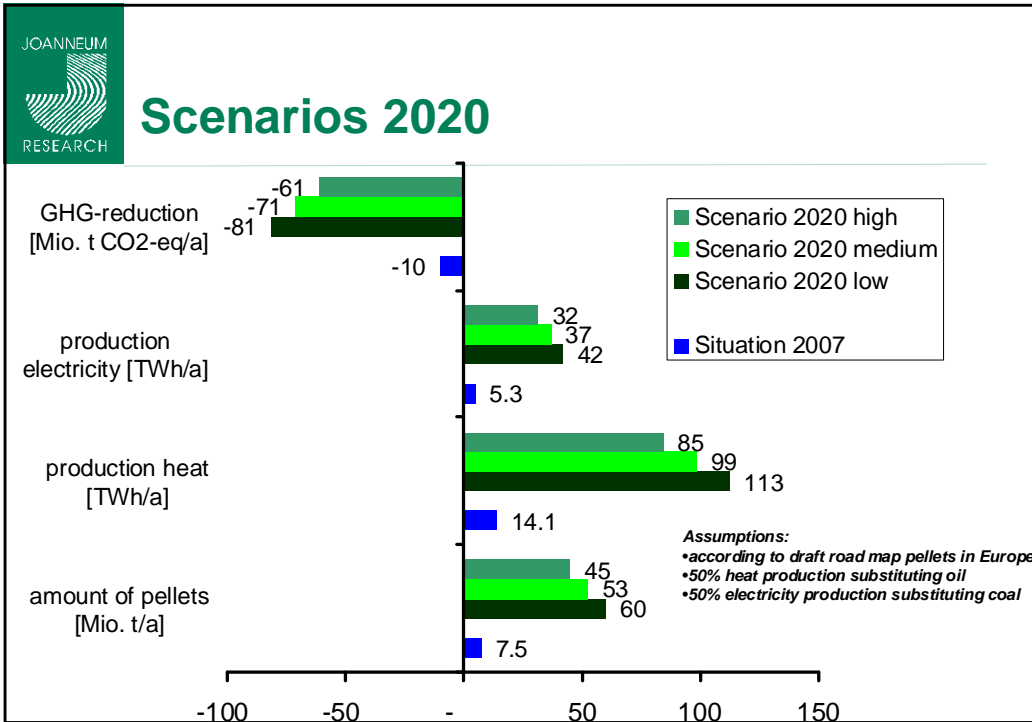


**GHG-Reduction: 85 – 94%**

Source: new calculations based on Jungmeier et al. 1999

## Scenarios 2020





**JOANNEUM RESEARCH**

## Conclusions

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**Scenario 2020: Greenhouse gas reduction up to 80 Mio. t CO<sub>2</sub>-eq/a in Europe**

**Reduction by substitution of coal > oil > natural gas**

**Significant Reduction minus 85 to 95%**

**Pellets for heat and electricity reduce greenhouse gas emissions**

# Outlook

