PULP AND PAPER INDUSTRY – SETTING THE SCENE

Finance for Innovation: Towards the ETS Innovation Fund
Workshop 2: Chemicals & bio-based, Oil & refining, Pulp & paper

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Brussels, 23nd March 2017

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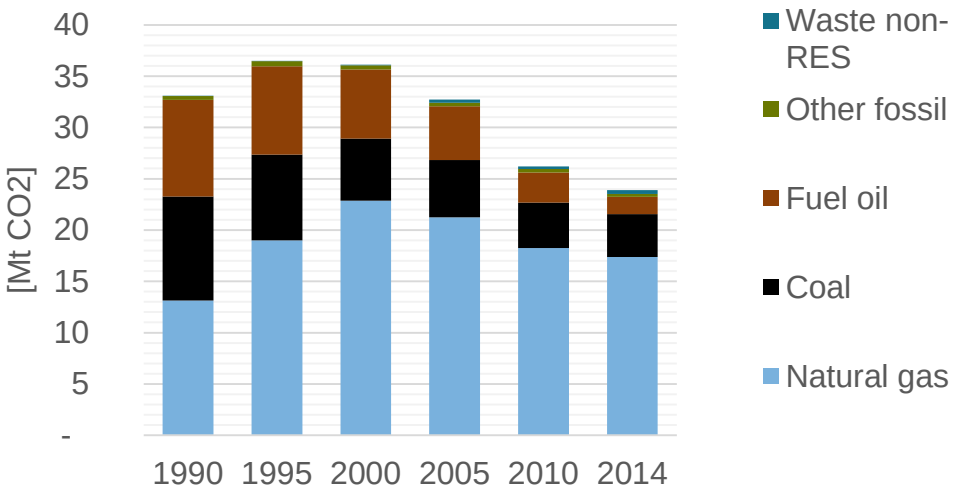
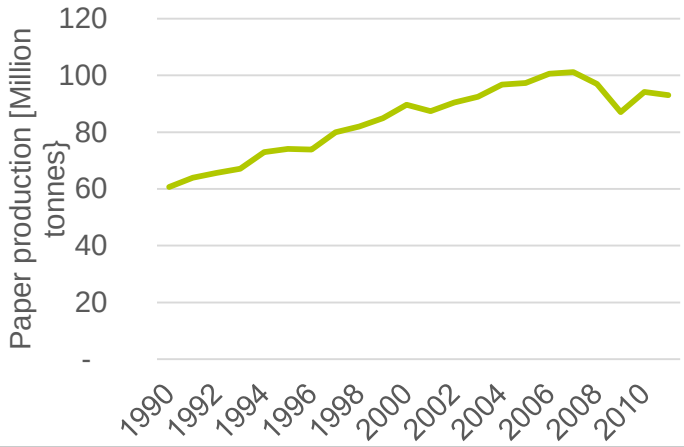
CO2 emissions in pulp and paper (EU28) (direct emissions, excl. electricity and DH)





CO2:

- Since 2000 falling emissions
- EU ETS 2015 verified emissions:
  - Paper: 22 Mt
  - Pulp: 5 Mt

Production

- Continous increase since 1990
- Drop in 2009

Sources

CO2: own calculations based on Eurostat

Production: VDP and FAO

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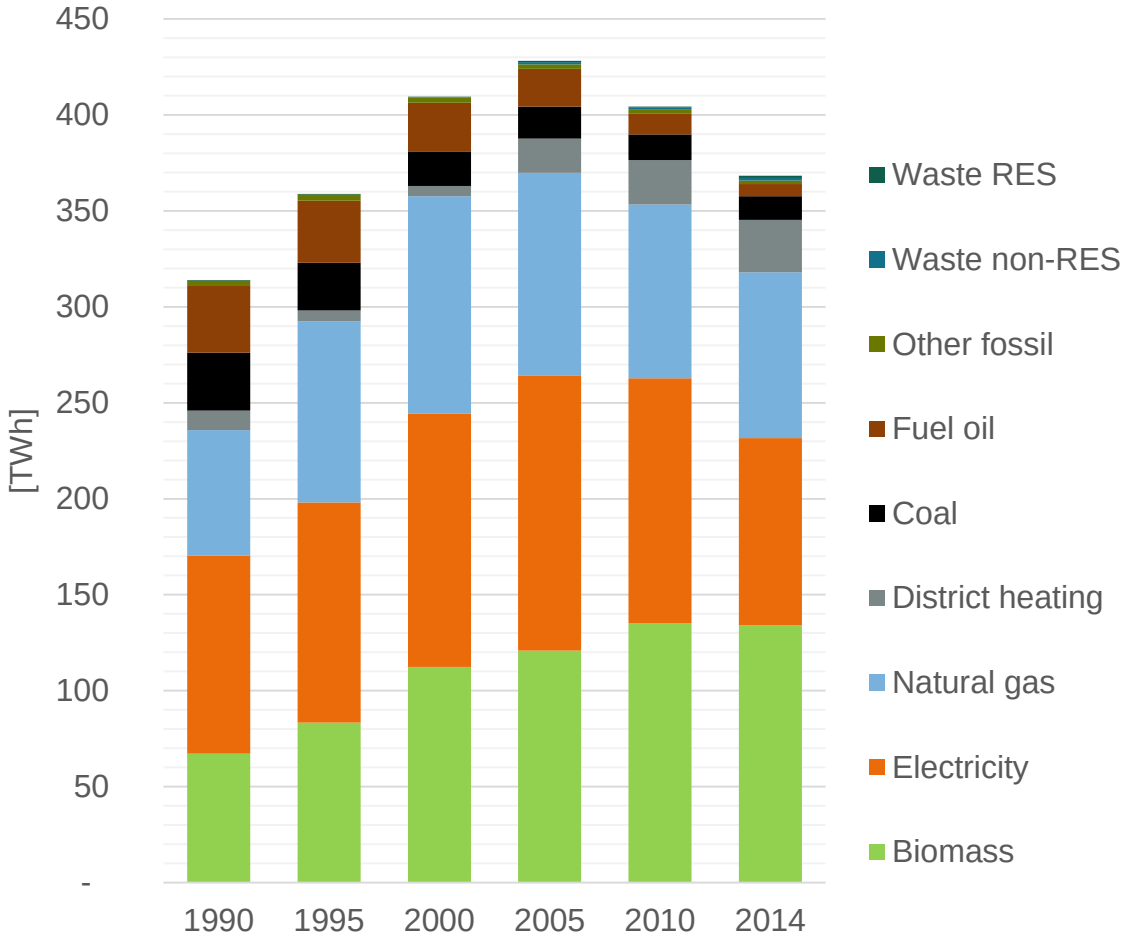
Final energy demand in pulp, paper and printing (EU28), Eurostat



- Biomass increased substantially to about 36% in 2014
- Fuel oil decreased
- Biomass, electricity and natural gas together ~85% in 2014

Source: Eurostat

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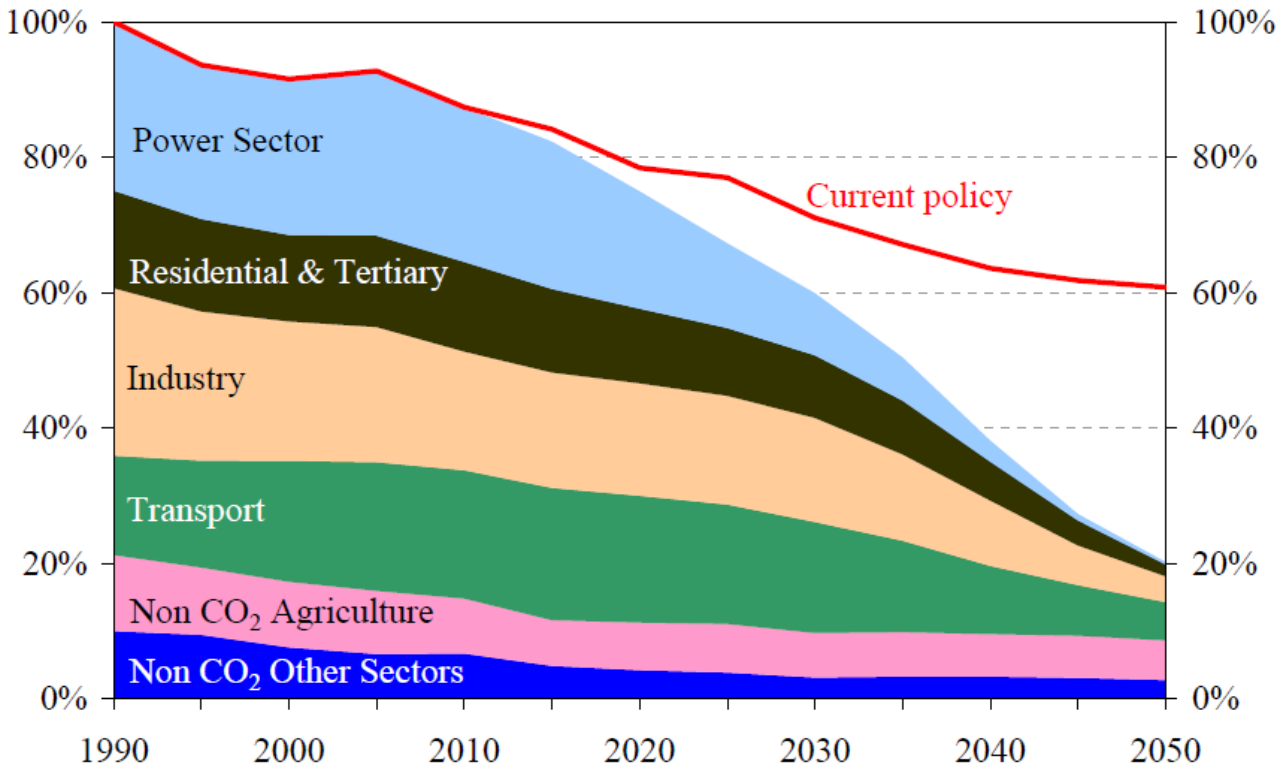
Ambition needed – the EU low-carbon roadmap 2011

Figure 1: EU GHG emissions towards an 80% domestic reduction (100% =1990)



- Industry (CO2): -83 to -87%
- Ambition from Paris? „Well below 2°C“

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Ambition for the pulp and paper industry in a "well below 2° transition"?

Advantages in decarbonisation for pulp and paper:

- Direct access to bio-based materials
- no „process related emissions"
- steam demand relatively flexible in terms of energy carriers

What is needed for decarbonisation?

- CEPI Roadmap:
  - Best available technologies and fuel switch can achieve -50 to -60% CO2 reduction (with the right policy framework)
  - CEPI Roadmap: "To achieve a minus 80% reduction, however, the sector will need breakthrough technologies."
- Pulp and paper sector can enable the transition in other sectors:
  - Bio-based materials
  - RES-based electricity via biomass-CHP and demand response
  - Excess heat to district heating

Break through technologies in development/discussion

IEA (2009): Energy transitions industry

- Black liquor gasification
- Lignin production from black liquor
- Biorefinery concepts
- Carbon capture and storage and use
- Innovative paper-drying technologies

CEPI: Two teams project

- Deep eutectic solvents
- Flash condensing with steam
- Supercritical CO2
- 100% electricity
- Steam
- Dry pulp for cure formed paper
- Functiuonal surface

EC (2013): Best practice in pulp and paper

- Enzymes
- High consistency forming methods
- Gasification of black liquor
- Many more....

Clustering mitigation options

	Clusters of mitigation options	Technology Readiness Levels TRL
Materials industry	**Integrated process improvement** - Energy Efficiency (modernization and replacement) - Reduction in process-related emissions	
	Fuel switch - towards renewable energy sources (e.g. based on hydrogen) - towards decarbonized electricity (indirect emissions)	
	End-of-pipe (Carbon Capture and Storage CCS/ Carbon Capture and Use CCU)	
downstream	**Recycling and re-use** (innovative recycling processes)	
	Material efficiency (in production and downstream)	
	Material substitution (downstream)	

Thank you for your attention!