Cascading Use: A Systematic Approach to Biomass beyond the Energy Sector

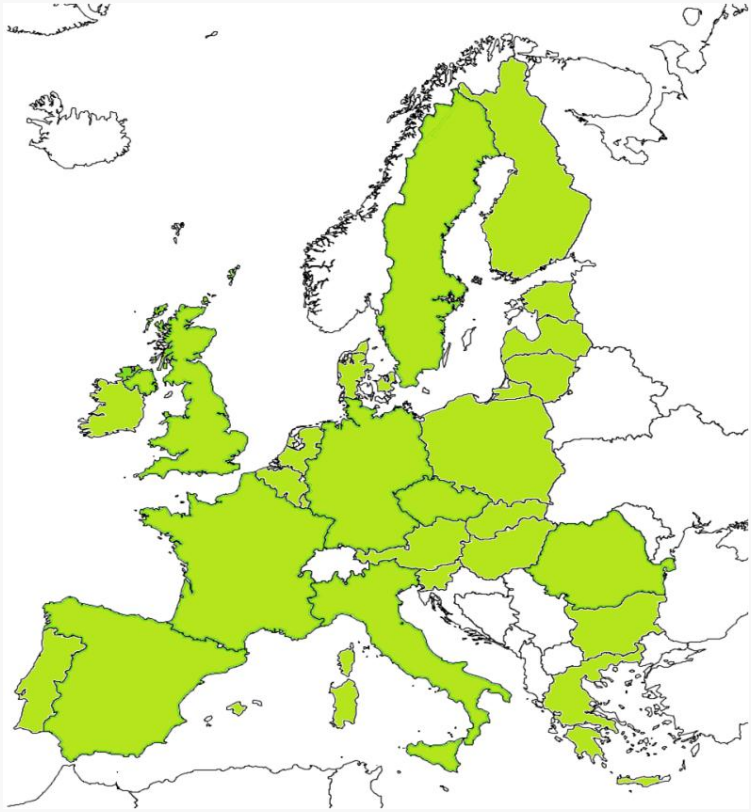
Biomass Futures Final Workshop, 20 March 2012, European Parliament, Brussels

Bettina Kretschmer, IEEP

EIE/08/ 653/ June 2009- March 2012

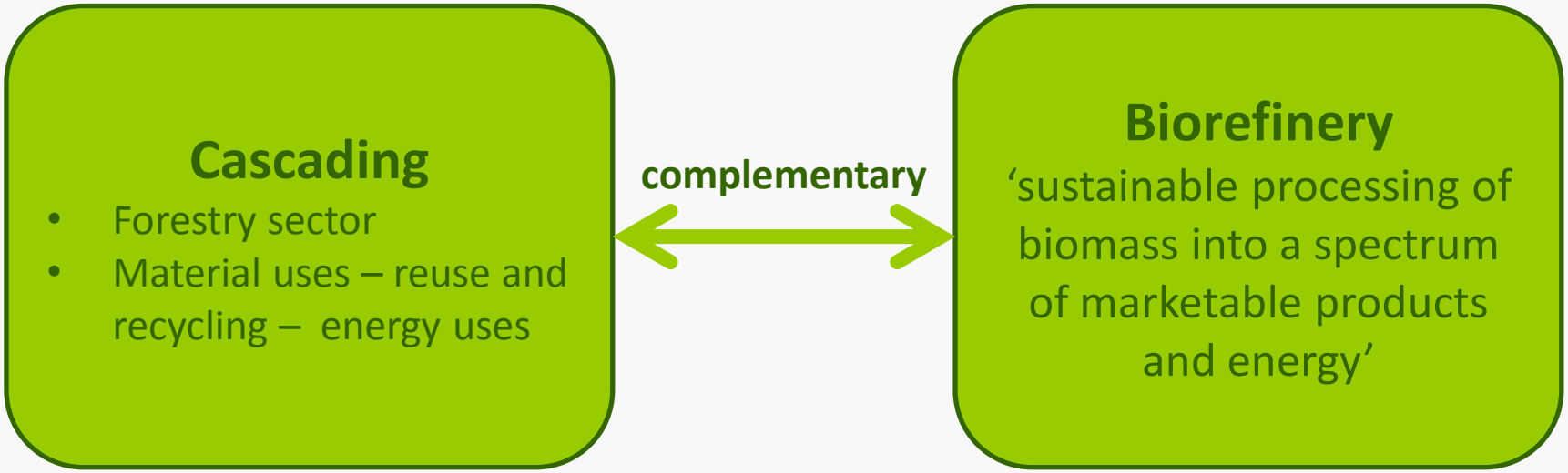
Outline

- Introduction
- Biomass: multiple purposes
- Cascading biomass use
- Barriers to cascading use
- Potential policy response
- Conclusions



Introduction

- Growing demand for biomass for energy, alongside existing and novel uses of biomass to produce a range of materials → broadened perspective
- Climate change perspective: key importance underlying the use of biomass resources in economic sectors beyond food and feed production: reduce carbon emissions and increase resource efficiency



Biomass: multiple purposes

- **Bioenergy**: rapid scale up in recent years in response to EU legislation
- **Traditional biomaterials**: wood in furniture and construction dominant use
- **Novel biomaterials**: bio-plastics from biomass, wood-plastic composites and chemicals synthesised from biomass rather than fossil sources
  - Bio-plastics: currently very small proportion of the European plastics market (less than 0.5% by weight), but rapid growth
  - Bio-chemicals: currently about 2% of chemicals (including biofuels, excluding pharmaceuticals) are derived from renewable biomass (by value) in the OECD

Biomass: multiple purposes

- **Why biomaterials?**
  - Reduced GHG emissions from displacing fossil inputs → knowledge gaps
  - Some bio-chemicals exhibit reduced toxicity and energy demand in their production and disposal compared to their petroleum-based counterparts
  - Desire of relevant industries to diversify their product lines and revenue sources
  - Bio-chemicals: attractive when they offer technological advantage or financial savings over their petrochemical counterparts

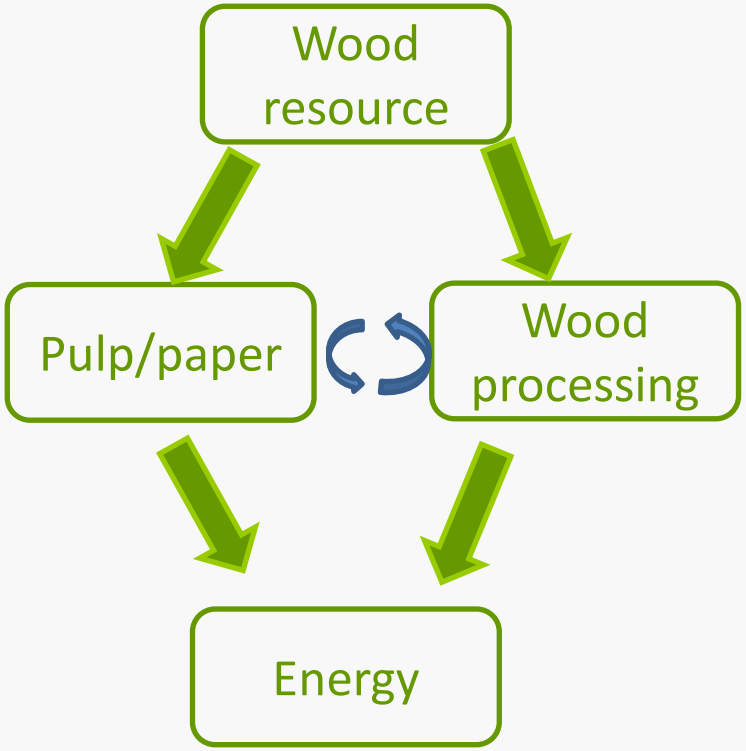
Environmental considerations

Industry considerations

Biomass: multiple purposes

- **Simultaneously growing demand** for biomass for both energy and material use: little knowledge or studies on the combined effects
  - CEPI: wood supply gap for material use between 2015 and 2020
  - EUwood study medium-mobilisation scenario: insufficient wood from domestic sources to satisfy the combined needs from the forest based industries and the wood energy producers in 2030
- **Merits of cascading biomass use**: meet increasing demands without proportionately increasing pressures on natural resources, most notably land and related services for biodiversity and ecosystems

Cascading biomass uses



- Increase resource efficiency → maximise the value extracted from a given amount of biomass by fulfilling both material and energy needs from the same feedstock
- Implications for bioenergy sector: restructuring of the resource base towards increased use of waste products and advanced conversion technologies
- Needed: strong connections between different sectors, to allow for a transfer of biomass by-products, wastes and residues between sectors

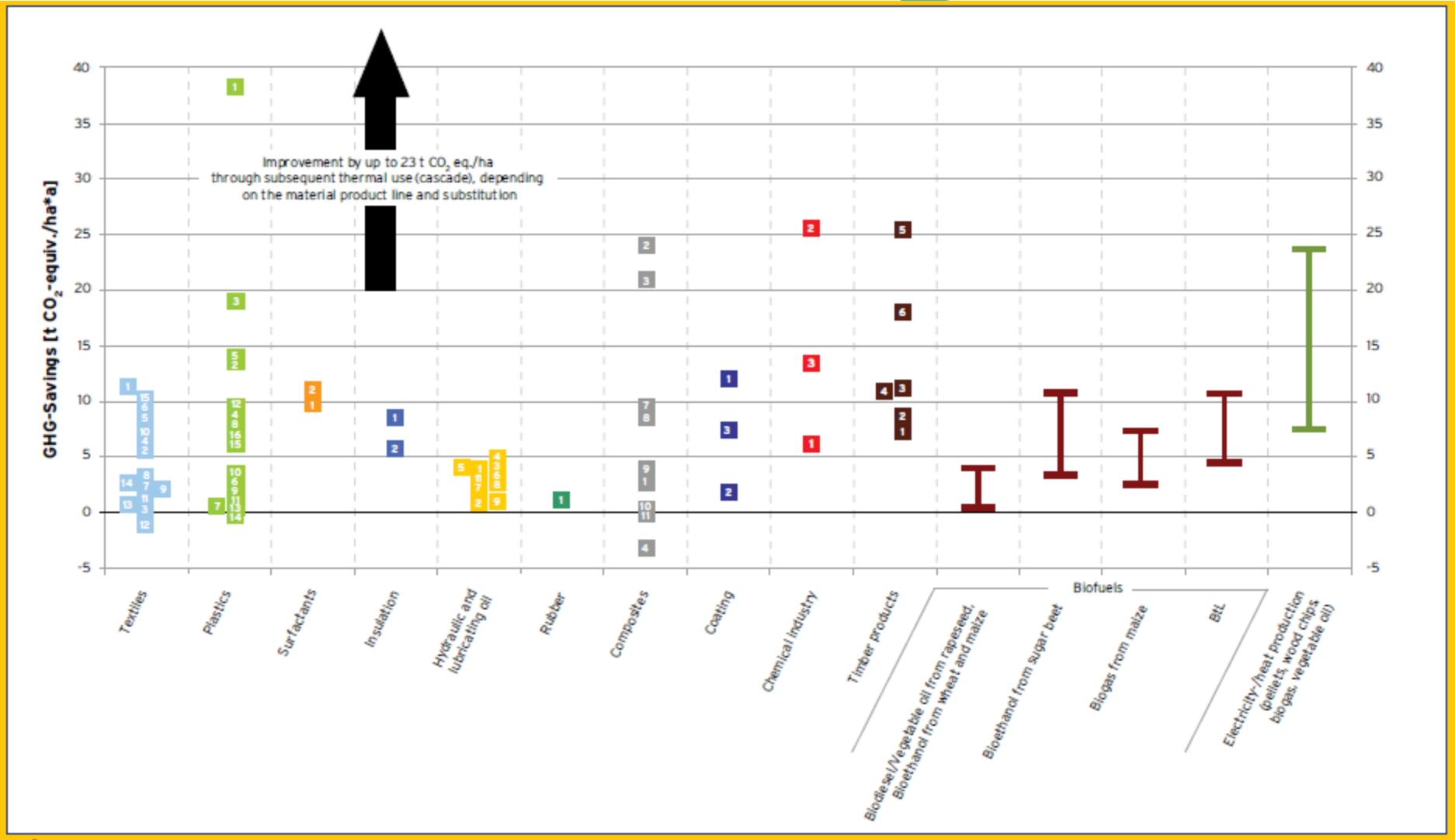


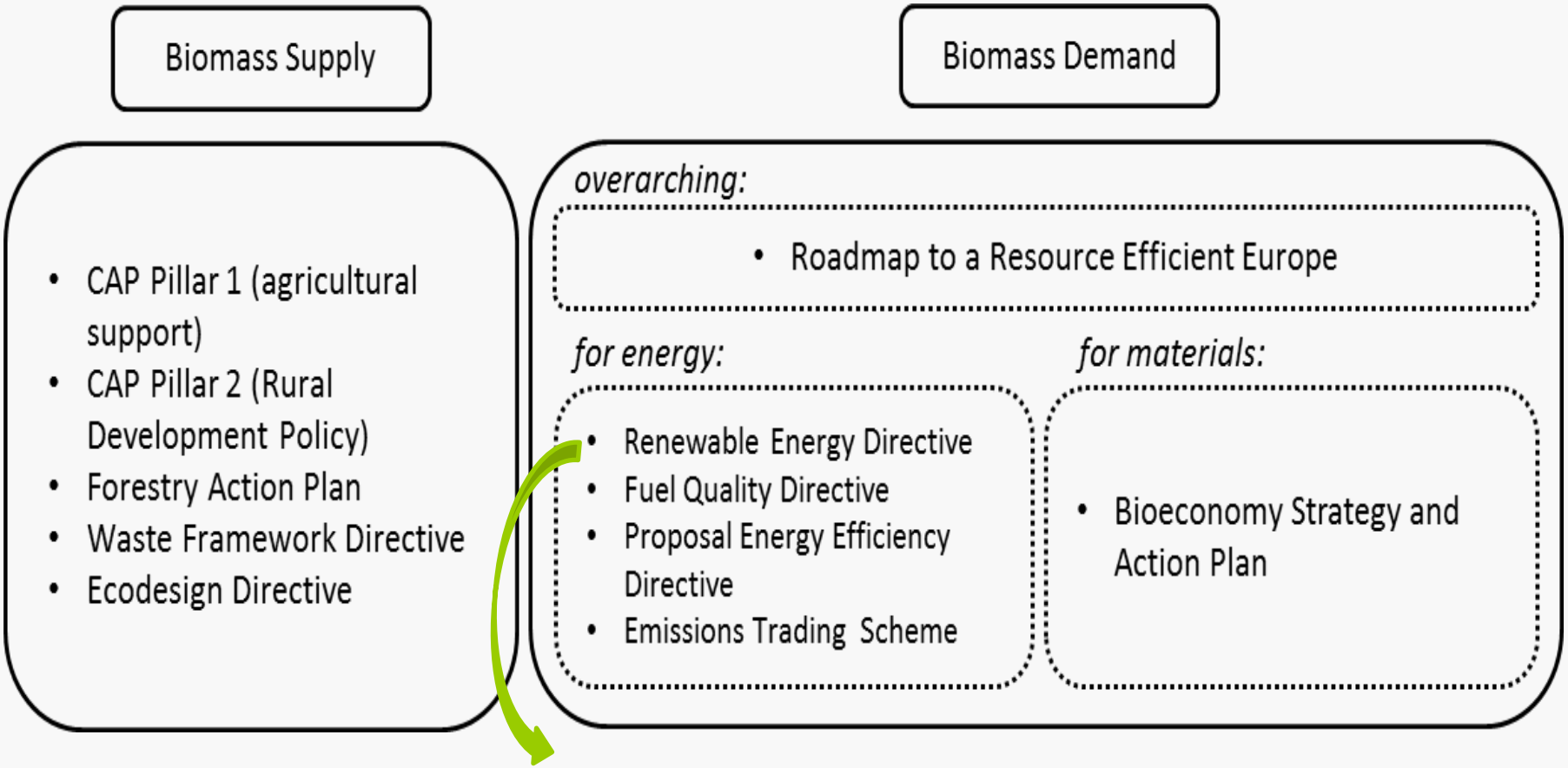
*Figure III: GHG savings in t CO_2 eq./(ha*a) based on life cycle assessments of material and energy uses. The black arrow indicates the maximum additional GHG mitigation effect of energy recovery in cascading utilization.*

Barriers to cascading – literature and stakeholders

- Biggest challenge: necessary changes in the structure and behaviour patterns in a range of sectors
- Energy and material uses of biomass dealt with separately in policy making → missing potential for synergies?
- Policy support focusing on bioenergy → prioritising biomass for energy purposes means mitigation of GHG emissions often below optimum
- Weak supply chains for residues, logistical challenges related to the transport of secondary residues

Policy framework

- Few policies are designed to manage the supply or steer the demand to bring it into line with defined sustainable levels



Some NREAPs: monitoring of the impact of bioenergy development on other sectors

Potential policy responses

- To promote bio-materials:
  - Measures to promote a level playing field between fossil and biomass resources, including regulatory measures to remove existing advantages favouring fossil fuel based products
  - Measures to increase the demand for biomaterials by tying benefits to their use: eg production subsidies linked to CO2 savings achieved; reducing the level of taxes for sustainable bio-based product categories
  - Steering public procurement towards biomaterials
- Pre-condition: Better understand mitigation potential and other environmental impacts

Potential policy responses – cascading

- *Define the cascade*: How to define the different 'steps' of the cascade and distinguish between the merits of different biomass uses?
  - Relative contribution of various biomass use pathways to reducing CO2 emissions taking entire lifecycles into account
  - But also: wider resource efficiency considerations taking into account other criteria: water use efficiency and impacts on other natural resources, including biodiversity
  - Social considerations, such as supply security and economic viability
- *Ecodesign* to ensure technical feasibility of cascading use: R&D funding to design bio-materials that are optimised for energy recovery
- Strengthening the operation of *waste collection and separation* systems; in order to ensure energy recovery from bio-waste, these resources need to be extracted from the waste stream
- Cross-sectoral policies → Coordinated policies across government ministries

Policy conclusions

- Policy support for biomaterials must be conditional on evidence that they deliver GHG emission reductions and/or other defined benefits

→ Need for LCA studies of biomaterials / economic-ecological modelling of combined demand for materials and energy

- Extend the debate and eventually sustainability criteria to biomaterials

Conclusions

- Measures under current RED framework:
  - Sustainability criteria for solid biomass with stringent minimum GHG mitigation: would make end-of-life biomass use more competitive by allocating the lifecycle emissions over the cascade
  - Introduce incentives to use end-of-life biomass eg by allowing for enhanced support under renewable energy policy for feedstocks that have gone through cascading use
  - Address the pitfalls of the carbon neutrality assumption for biomass burning; correcting it would deliver a strong case for favouring material use over bioenergy use

Thank you!

bkretschmer@ieep.eu

www.biomassfutures.eu

www.ieep.eu

IEEP is an independent not for profit institute dedicated to advancing an environmentally sustainable Europe through policy analysis, development and dissemination.