



Forest Biomass for Bioenergy: European Perspectives

Incorporating Bioenergy into Sustainable Landscape Designs
Workshop

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Universiteit Utrecht

EU Policy context

- Renewable Energy Directive (RED) 2009:
 - 20% Renewable Energy in the EU in 2020
 - National targets for Member states
 - Based on starting point, potentials and GDP
 - e.g. 14% for the Netherlands
 - Sub target of at least 10% renewable energy transport
 - Every member state
- 20% less GHG in 2020 (Emission Trading Directive)
 - Proposed 30% if Non-EU countries contribute
 - National targets MS
 - E.g. Biomass in e.g. refining, steel, etc.
- European Fuel Quality Directive:
 - Fuel suppliers at least 6% less GHG in 2020
 - via: biofuels, efficiency refineries, or other energy carriers (gas, electricity, hydrogen, etc.).



EU Policy context

- June 2010 National Renewable Energy Action Plans (NREAP) for implementation RED.
 - How to achieve these goals
- Now: Horizon 2020 activities:
 - outlook to 2030
 - heavy emphasis on biobased economy
 - 30/30/30 targets?
 - 30% Renewables
 - 30% GHG emission reduction



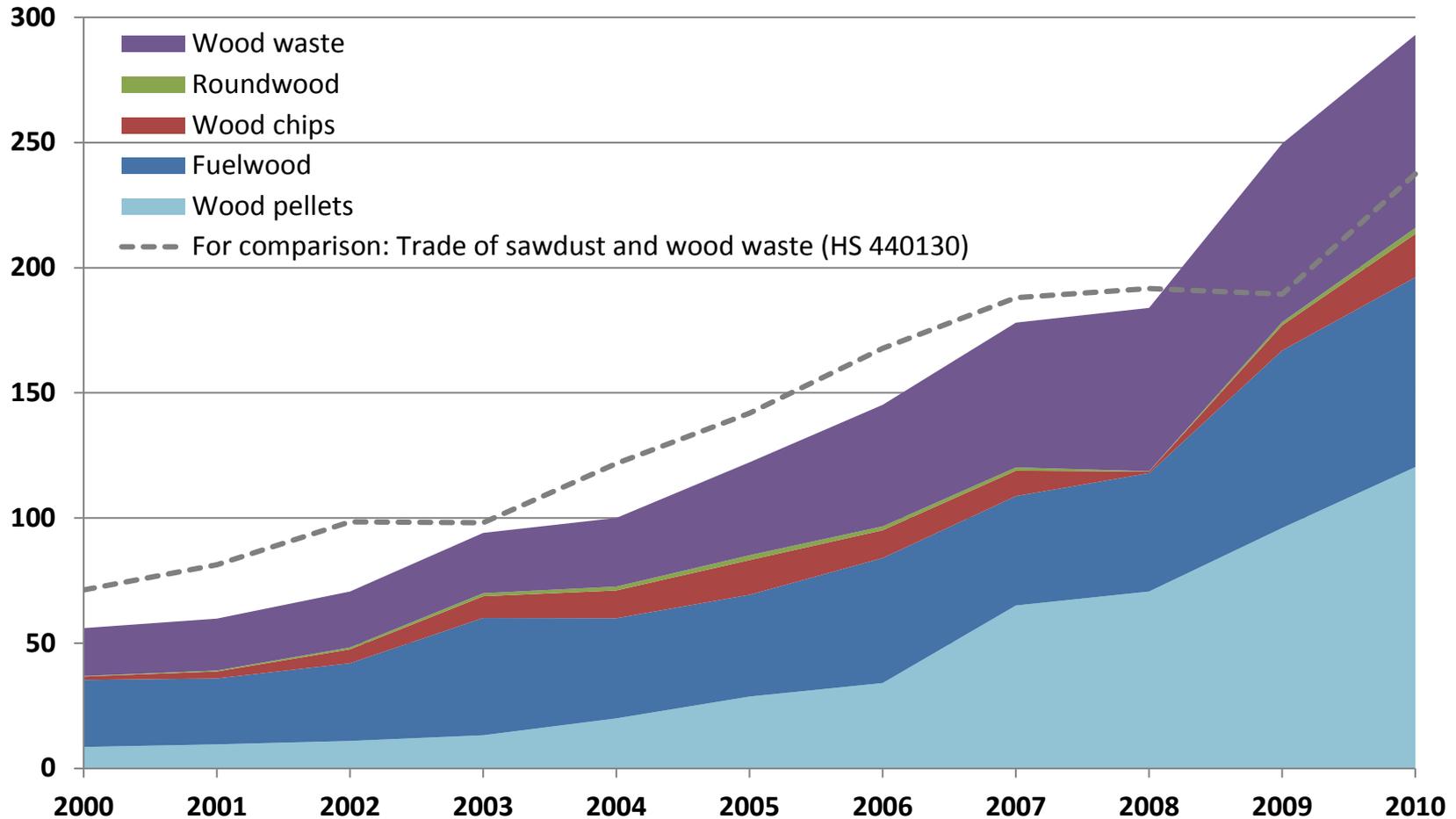
High demand for biomass resources

- Currently high demand for biomass resources
- High increase towards 2020
- Substantial supply in Europe
 - but probably not sufficient or cost effective
 - Increasing imports



Global woody biomass trade for energy

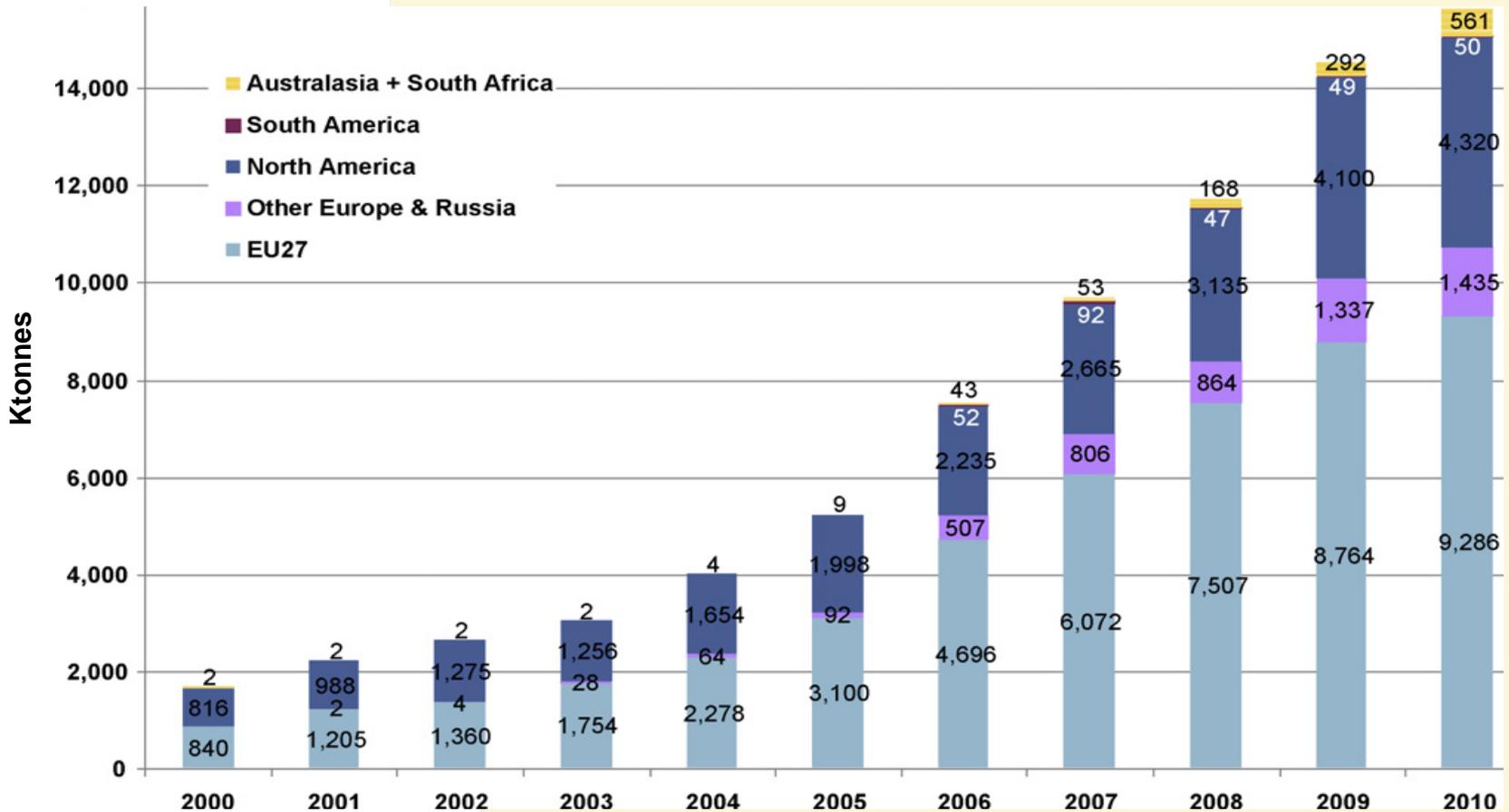
Trade flows in PJ



Source: Patrick Lamers, 2013, chapter 3, to be published in Junginger, Goh & Faaij

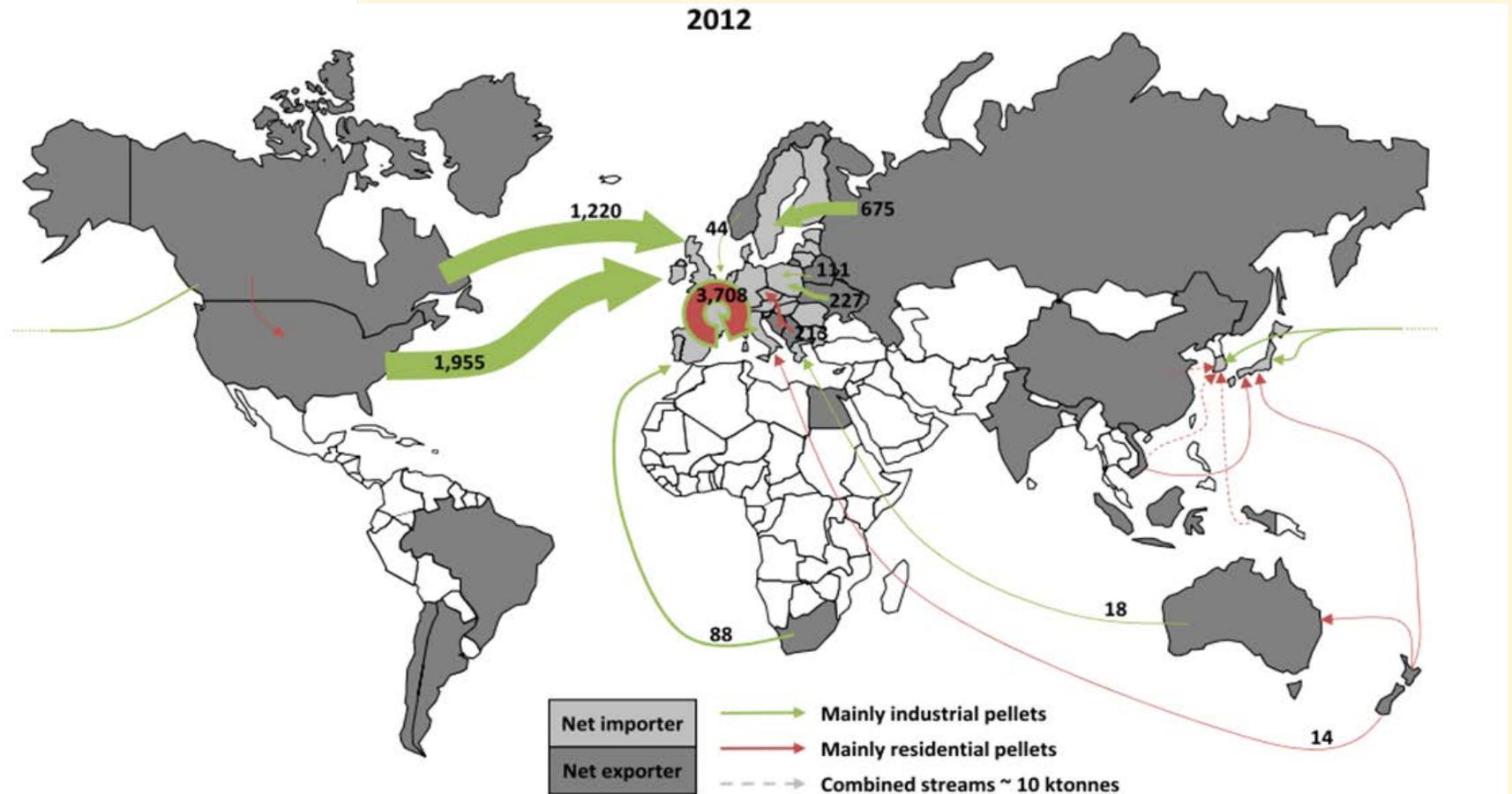


Global wood pellet production 2000 - 2010



Global wood pellet trade flows 2010-2012

1000 tonnes
2012

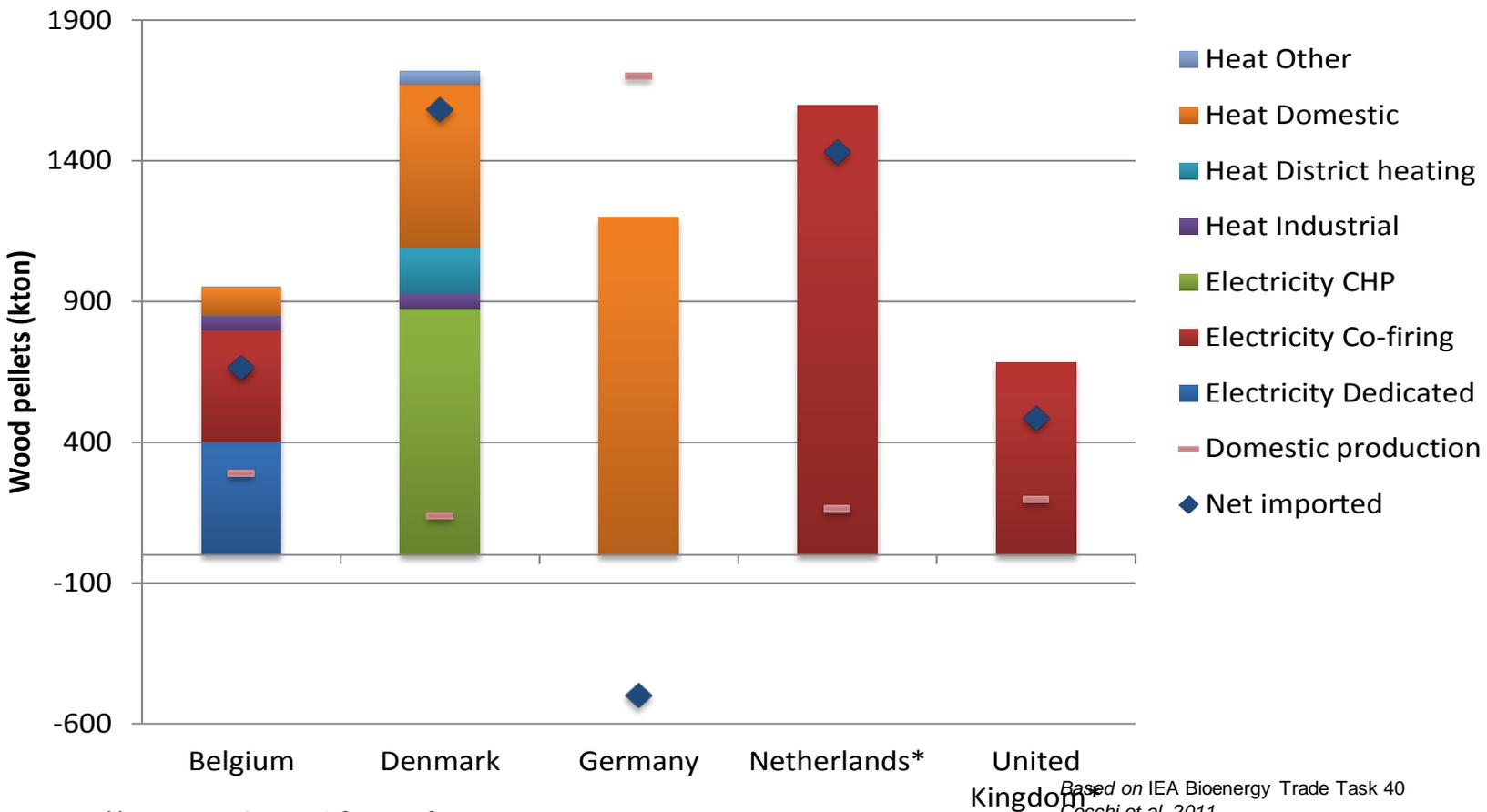


Source: Patrick Lamers, 2013, chapter 3, published in Junginger, Goh & Faaij 2013
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Current use of wood pellets in the EU: examples of 5 different markets

Wood pellet production, import/export and consumption in 2010



*) assumed 100% for co-firing

Based on IEA Bioenergy Trade Task 40
Cocchi et al. 2011



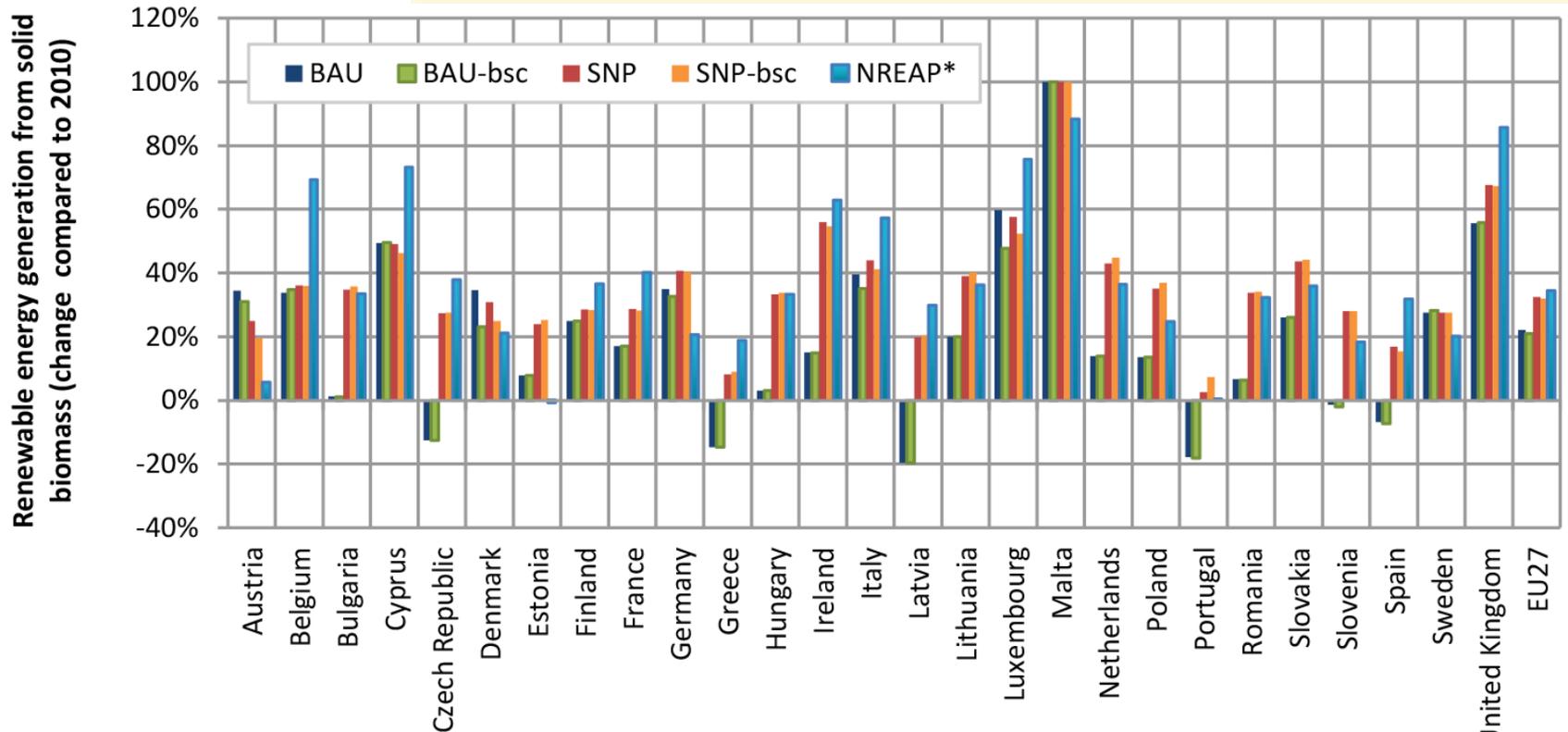
EU RE energy from solid biomass

BAU = Business as usual

SNP = Strengthened national support

bsc = with sustainability criteria

NREAP = National RE action plans



Projected changes in renewable energy generation form solid biomass (electricity, heat, 2nd gen biofuels) in 2020, relative to 2010.

Source: Hoefnagels et al. 2014



Simulated Biomass trade flows 2020

	2009 (pellets)	2015		2020	
		Low Import	High Import	Low Import	High Import
Total trade (Mtoe)	1.6	5.4	6.2	12.6	17.4
Total trade (Mt wood pellet eq.)*	3.8	12	14	29	40
Of which Intra-EU	55%	38%	32%	52%	32%
Of which Inter-EU	45%	62%	68%	48%	68%

*) Mt eq. = million metric tonne pellet equivalent (18 MJ/kg)

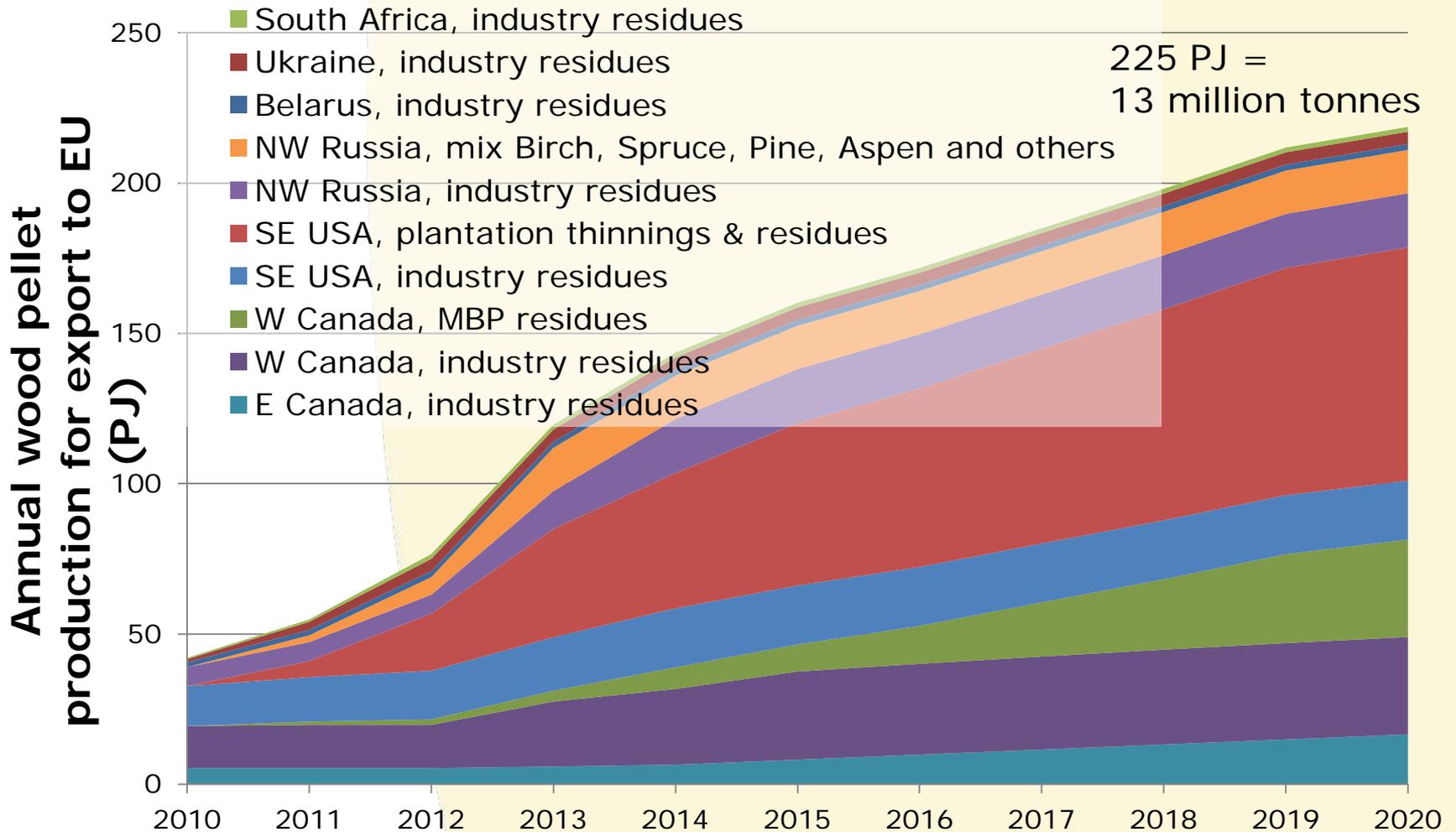
Low Import scenario

High Import scenario



BaU scenario for wood pellet exports to the EU

(update October 2013)



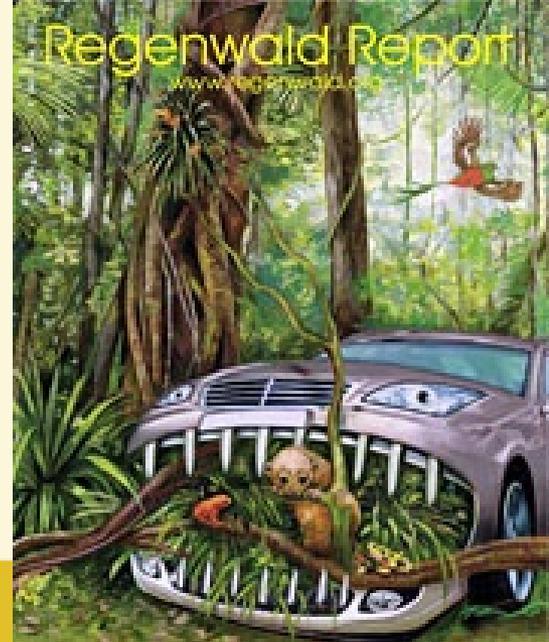
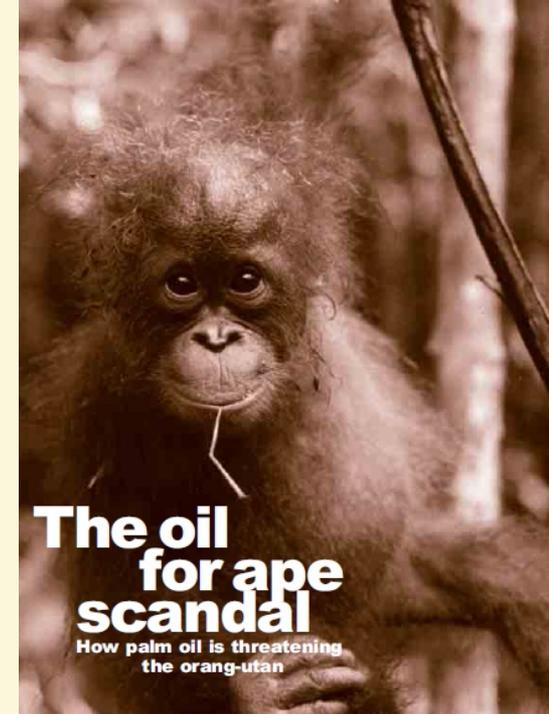
High demand for biomass imports

- The US SE has become the most important exporter of wood pellets to the EU, and is bound to increase exports further until 2020
- Probably even more towards 2030 due to Advancing markets...pushed by technological progress and pulled by high oil prices
 - 2nd generation biofuels...
 - Biorefining, biochemicals, biomaterials...
 - Aviation and shipping...

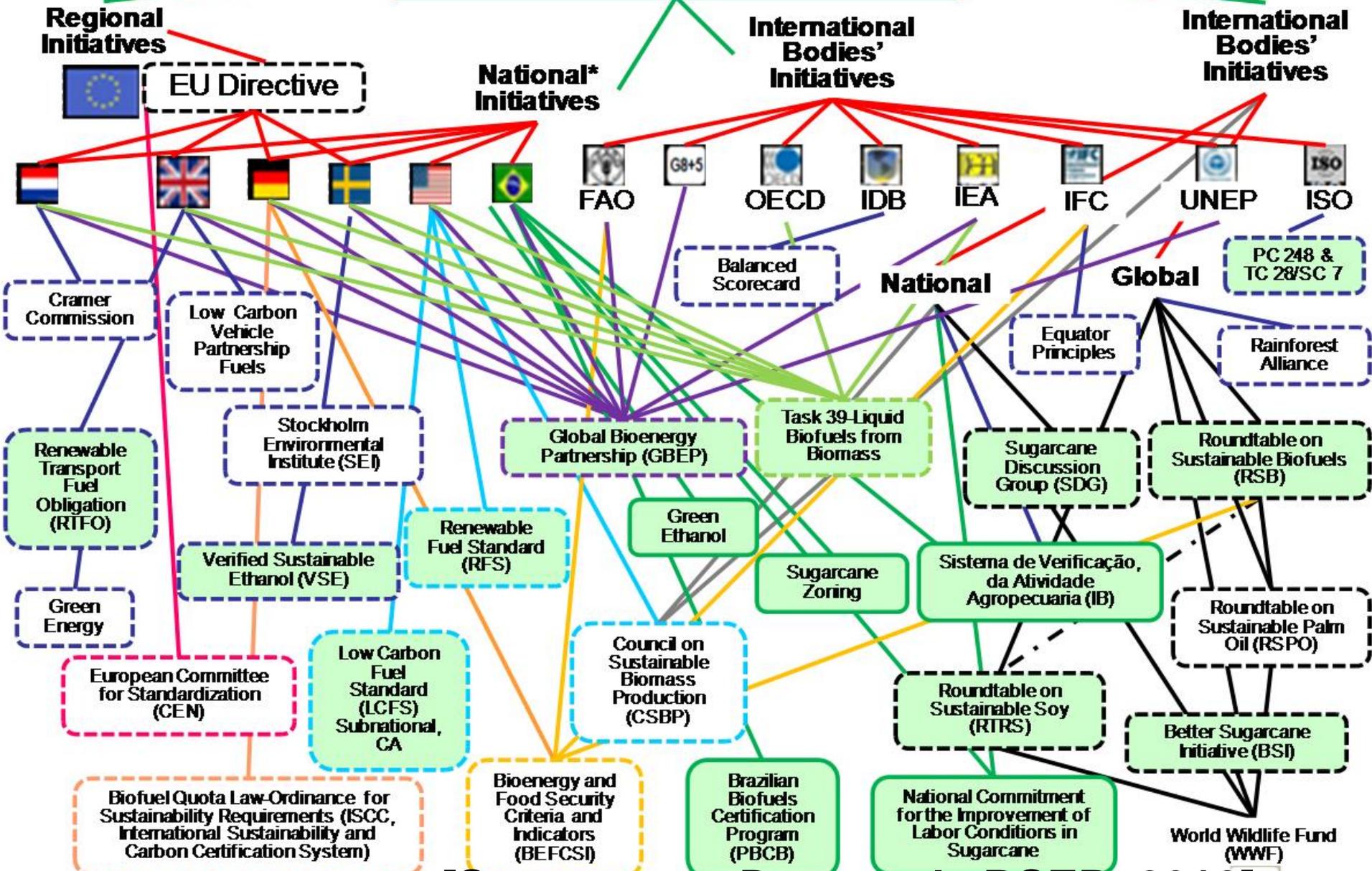


Biobased economy; friend or foe?

- Food vs. Fuel
- Biofuels a *crime against humanity*
- Threats for biodiversity, water, farmers...
- LUC, iLUC, iWUC, Carbon Payback... result in poor GHG balances
- Large number of external damages



Biofuels Sustainability



[See e.g: van Dam et al., RSER, 2010]

* Australia Subnational, NSW



Snapshot on certification

- RED sustainability criteria for biofuels: GHG, soil, water, biodiversity
- EC follows a meta-standard approach.
 - Variety of certification systems (e.g. ISCC, RSB) RED approved
- RED crucial; CAP 1st gen biofuels. iLUC factors 'put aside'. Evaluated in 2014.
- ISO process ongoing...
- Biobased economy to compete for the same resources...
 - Should meet the same sustainability criteria...(but that is not the case today!)
- Criteria for solid biomass to be introduced (meets resistance as well).
- Response from SBP (former IWPB) (large utilities).



Sustainable biomass partnership

- Expected to be adopted as well for solid biomass, inline with the sustainability criteria for liquids
 - Initiatives Wood Pellet Buyers (IWPB) → Sustainable biomass partnership (SBP)
 - Large European Utilities: GDF, Vattenfall, Dong Energy, Drax, RWE-Essent, E-on)
 - Based on IWPB sustainability principles and established sustainability criteria:
 - EU-RED bioliquids
 - National Initiatives (UK, NL, BE, DE)
 - FSC / PEFC
 - Ensure compliance with Member state rules (stringent compliance)
 - Integrate with EU Timber and Wood regulation (EUTR)
 - Chain of custody



Sustainability criteria

	Issue	EU-RED	CSBP	GBEP	RSB	ISCC	NTA8080	RFTO	SBP
Environmental impacts	GHG emissions	✓	✓	✓	✓	✓	✓	✓	✓
	Biodiversity	✓	✓	✓	✓	✓	✓	✓	✓
	Soil		✓	✓	✓	✓	✓	✓	✓
	Water		✓	✓	✓	✓	✓	✓	✓
Socio- economic impacts.	Legality				✓		✓		✓
	Food security	✓		✓			✓		
	Economic viability			✓	✓				✓
	Local prosperity			✓	✓		✓		✓
	Labour conditions		✓	✓	✓	✓	✓	✓	✓



Key issue

- There is a broad acceptance that biomass for bioenergy should be produced in a sustainable manner
- There is a general support for main sustainability criteria
 - Environmental
 - Social
 - Economic
- Key problem:
 - The sustainability of biomass production is very site & production chain specific
 - How to measure sustainability in a quantitative, reliable and verifiable way



Research objective

To develop a methodological framework for the integrated assessment of the sustainability of biomass supply chains and to identify the preconditions under which negative impacts can be avoided and positive effects can be optimised.

What would be the total sustainable biomass supply potential in a specific region given the potential environmental and socio-economic limitations.

Demonstrate this for an increased wood pellet production in SE of US for domestic and foreign markets



Results

- For wood pellet producers/ consumers
 - How to comply with sustainability criteria (ensure EU market)
 - How to balance sustainability issues with economic viability
 - 'go'- 'no-go' areas, does and don'ts in management
- For Policy makers
 - How to include biomass for energy in sound land use planning
 - Preconditions for sustainability, how to optimize positive effects, avoid negative effects
- For certification bodies
 - How to quantify, verify and monitor sustainability



BE-Basic

- Public-Private Partnership in the Netherlands
 - Universities / Research institutes
 - Industry
- Aim: Building a sustainable biobased economy
- Flagship 9.1: Identifying, Quantifying and Qualifying Sustainability for the Biobased Economy
- UU coordination of Flagship 9.1
- 12 subprojects
- 5 sub-projects are performed by UU, 4 UU PhDs involved
- First case study: sustainability of the expansion of the ethanol sector in Brazil



Be Basic

- Next case study: pellet production SE USA
(RWE Essent, EU Utility → co-firing coal fired power plant)
- Collaboration with ORNL and potential other US Research partners



Thank you for your attention

Question? More information?

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Judith Verstegen

Land use change
modeling



Michiel Nijsen

Impacts on water
and Biodiversity



Gert Jan Jonker

Optimisation of
biomass supply chains



Sanne Heijnen

Socio-economic impacts
and food security



Thank you for your attention!

For questions and more information please contact:

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- Probably even more towards 2030 due to Advancing markets...pushed by technological progress and pulled by high oil prices
 - 2nd generation biofuels...
 - Biorefining, biochemicals, biomaterials...
 - Aviation and shipping...
- Likely to compete for the same resources...
 - Should meet the same sustainability criteria...(but that is not the case today!)
 - Competition or synergy?



From Initiative Wood Pellets Buyers to Sustainable Biomass Partnership

Originally created to facilitate intercompany trading of all **solid biomass to power**

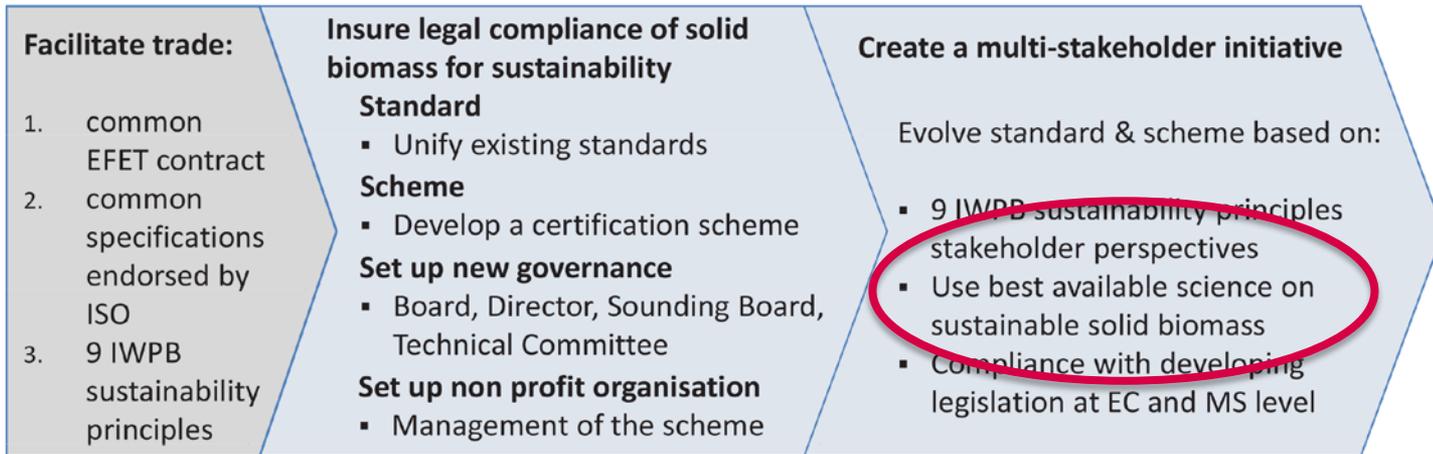
Moving towards a stakeholder driven effective & credible biomass sustainability standard

SBP current members:
Critical market players
in biomass use for large
scale power generation



SPB today and tomorrow:

IWPB **Sustainable Biomass Partnership mid 2014** **Sustainable Biomass Partnership 2015**



Approach

- Scenarios on total biomass requirements
- Spatio-temporal modelling of land use and management change
- Socio economic impacts (employment, GDP, trade)
- Environmental impacts (water, soil, biodiversity)
- Spatial optimisation of biomass supply
 - Environmental, socio-economic
- Sustainable production potential

