

International bio-energy trade and development

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Nord-Süd - Weltmarkt für Bioenergie zwischen
Klimaschutz und Entwicklungspolitik - Eine NRO-
Standortbestimmung. Bonn, 20-21 Juni 2005

Übersicht

- Vorstellung Task 40
- Studie: Zertifizierungssysteme
- Studie: Quicksan of global bioenergy potentials to 2050 & Sustainable bioenergy production case studies for Brasil and Ukraine
- Studie: Biomassehandel in den Niederlanden



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Background (1)

- A reliable and sustainable supply of biomass is vital to any market activity aimed at bio-energy production.
- Given high expectations for bio-energy on global scale, pressure on available biomass resources increases.
- Without the development of biomass resource potentials (e.g. energy crops) and a well functioning biomass market those ambitions may not be met.
- A lack of availability of good quality (and 5 cm competitive) biomass resources has proven to be a structural showstopper for many market initiatives.

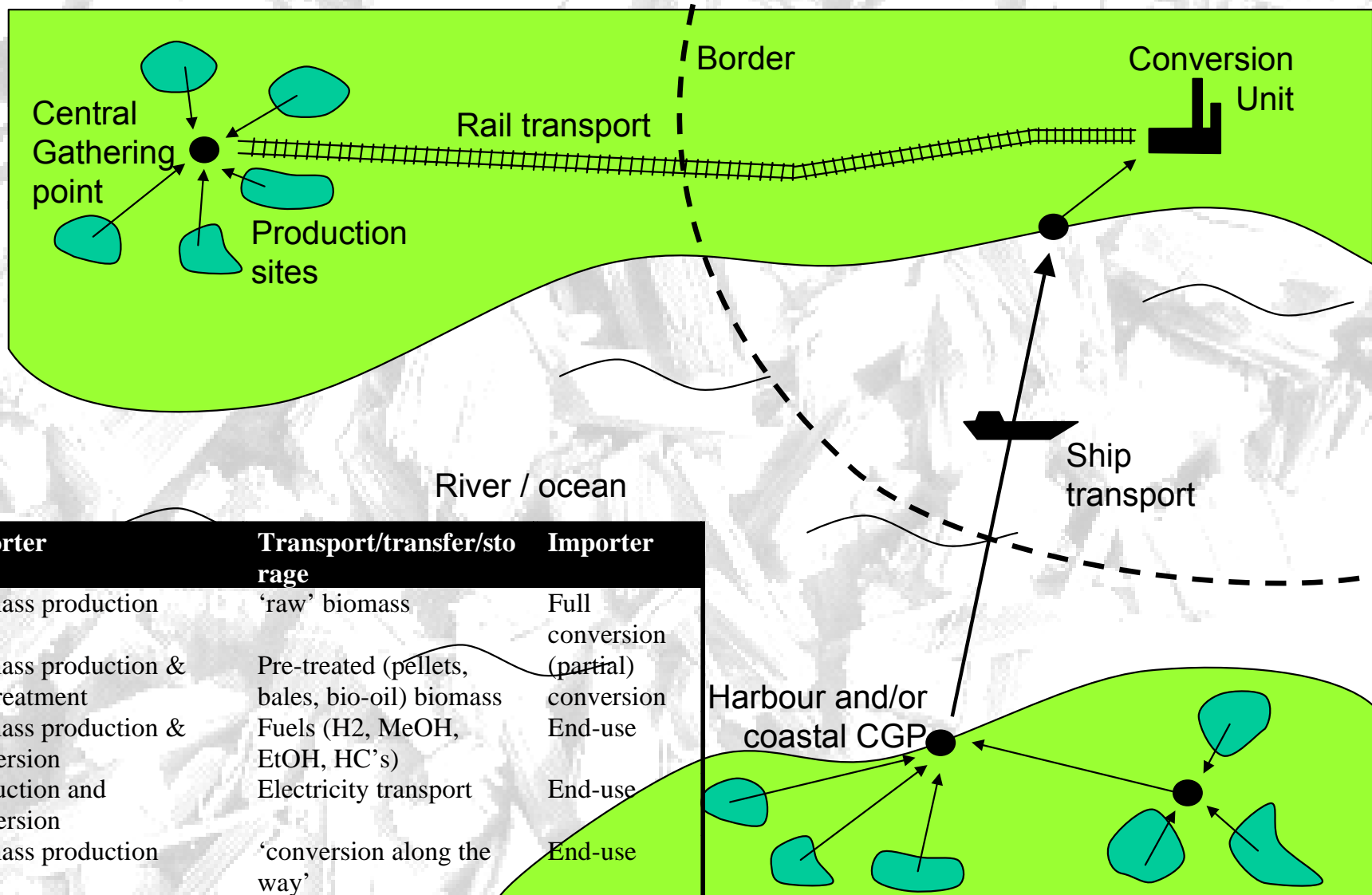
Background (2)

- Much experience in various countries with building biomass markets, as well as related sectors.
- Relatively recently, international trade of biomass resources became part of the portfolio of market parties.
- Optimism about opportunities, fear for unsustainable practice.
- **Previous debate concluded:** *“Structure and institutionalise (...) debate for a longer period of time, involving all key stakeholders. This does include international institutions, NGO’s, industry, national bodies and the scientific community alike...”*

Phases in bio-energy use and market development...

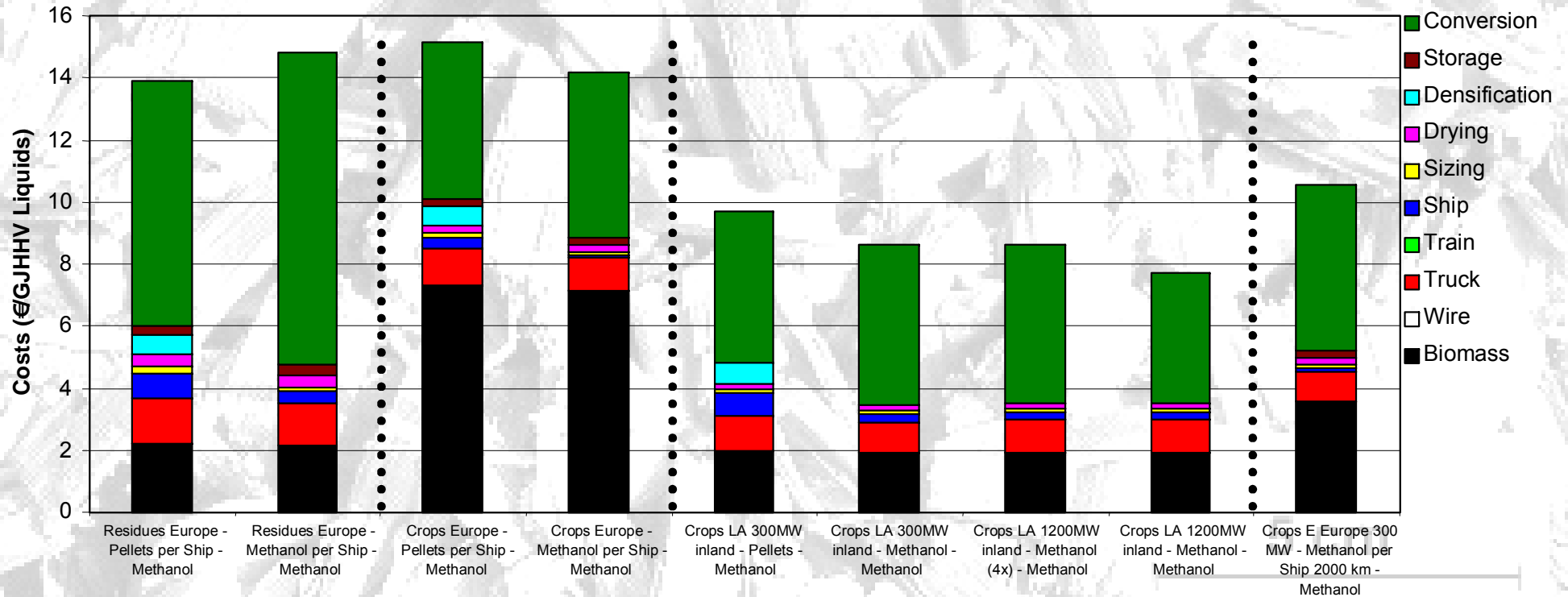
1. Waste treatment and process residues; use on site, low costs.
2. Local use of (more expensive) forest and agricultural residues; some infrastructure development.
3. Regional biomass markets, larger scale utilisation, increasingly complex logistics; supportive policies needed.
4. National markets with complex set of suppliers and buyers; often increased availability.
5. Increasing scale, cross-border flows; role for cultivated biomass; bilateral activities.
6. ***Global commodity market; pricing mechanisms; complex interlinkages with existing markets (food, forestry, feedstocks)?***

International bio-energy logistics



Source: Hamelinck, Faaij, 2003

International logistic chains: bio- methanol produced from North & Eastern European and Latin American biomass supplied to Rotterdam Harbour.



Main objectives IEA Task 40

- Investigate what is needed to create a “*commodity market*” for bio-energy.
- Contribute to the development of *sustainable* bio-energy markets on short and on long term and on different scale levels.

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5 cm

Objectives/activities/deliverables IEA

Task 40

1. Mapping market experience.
2. Strategic advice on (removal of) barriers, opportunities and policy actions.
3. Improve understanding of markets (e.g. Modelling).
4. Supply chain analyses
5. Certification systems
6. Pilot projects
7. Case studies and impact analyses
8. Evaluation of markets (Bio-ethanol, pellets, bio-oil)
9. Dissemination & lobbying.

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Membership IEA Task 40 (June 2005):

- **Countries:**
 - Members: Netherlands, Sweden, Norway, Brazil, Finland, Canada, Italy, UK)
 - Observers: EC
 - Membership worked on: **Germany, Belgium,...**
- **Affiliated international bodies**
 - FAO, World Bank; (interest from UNECE)
- **Remarkable (++) combination of market parties and scientific world.**

Remaining Task 40 events in 2005

- Presentations and possibly a workshop at the 14th European Biomass conference in Paris, October 2005
- Joint Workshop with IEA Bioenergy Tasks 30 & 31 early December in Brasil: **Sustainable biomass production for the world market**

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www.fairbiotrade.org

- Detailed activities
- Background information
- Results (e.g. country reports, analyses)
- Events (e.g. Business Forum at FAO).
- ...

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Steps towards a certification system for sustainable Bio-energy trade

Demand for Certification systems

On the background of rising bio-energy trade activities concerns arise on the potential negative impacts of these activities like competition with food production, deforestation, expropriation of small farmers, unsustainable production methods etc.

For this reason criteria and tools are searched for that help to avoid that biomass, unsustainably produced, is sold as 'sustainable resource' for the production of 'green electricity' in Europe.

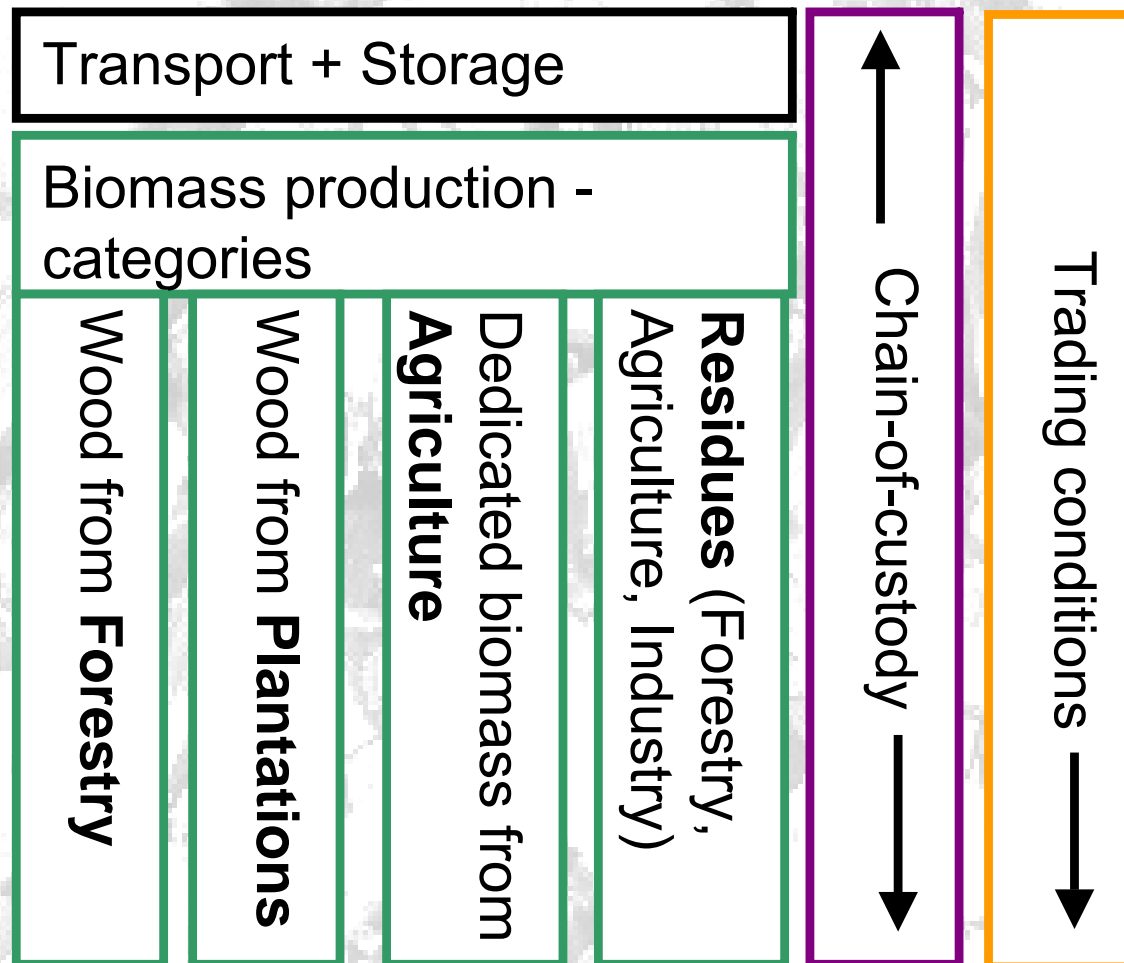
In forestry the development of certification systems was a market based response to address public concerns related to deforestation in the tropics.

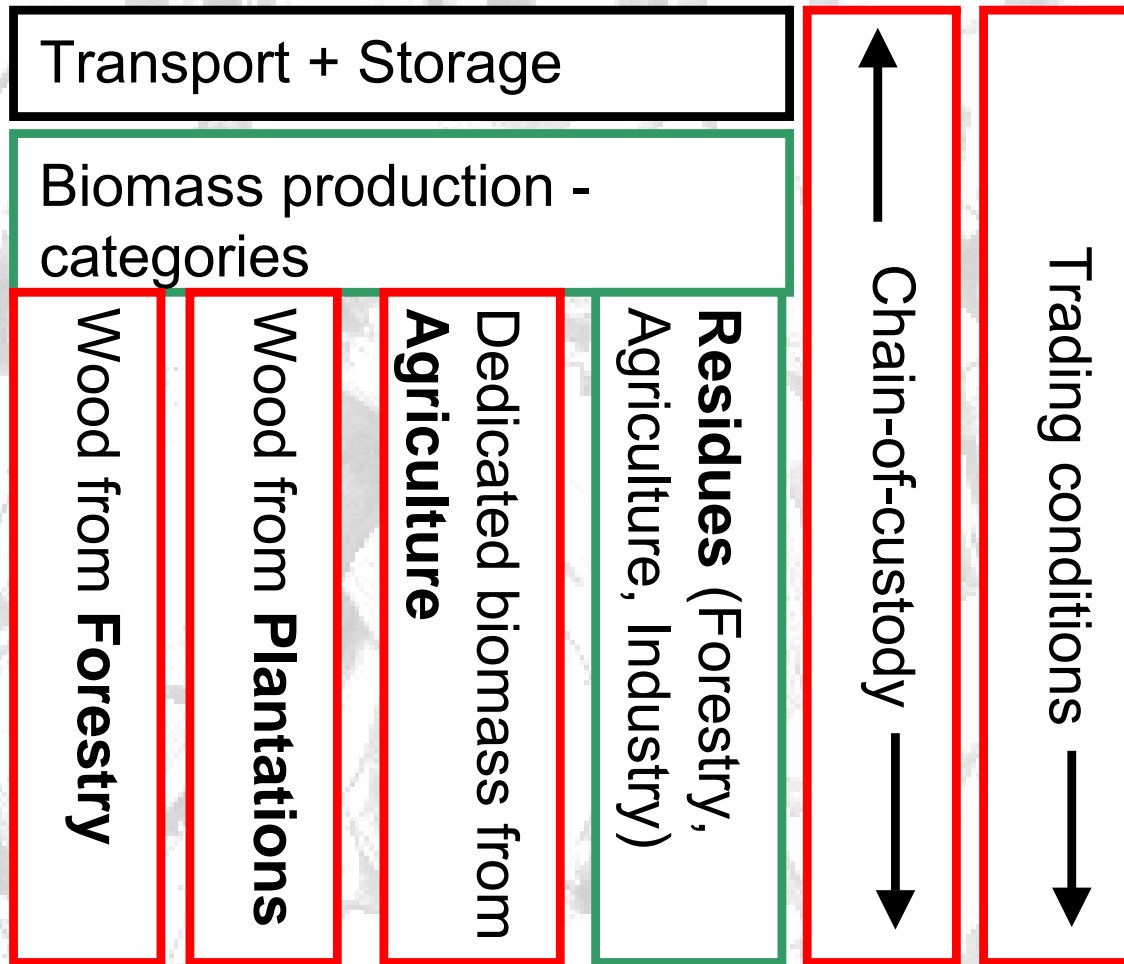
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- Can certification systems contribute to sustainable biomass trade and how should effective certification systems look like?

Steps towards a certification system for sustainable Bio-energy trade

Inventory of existing Certification systems



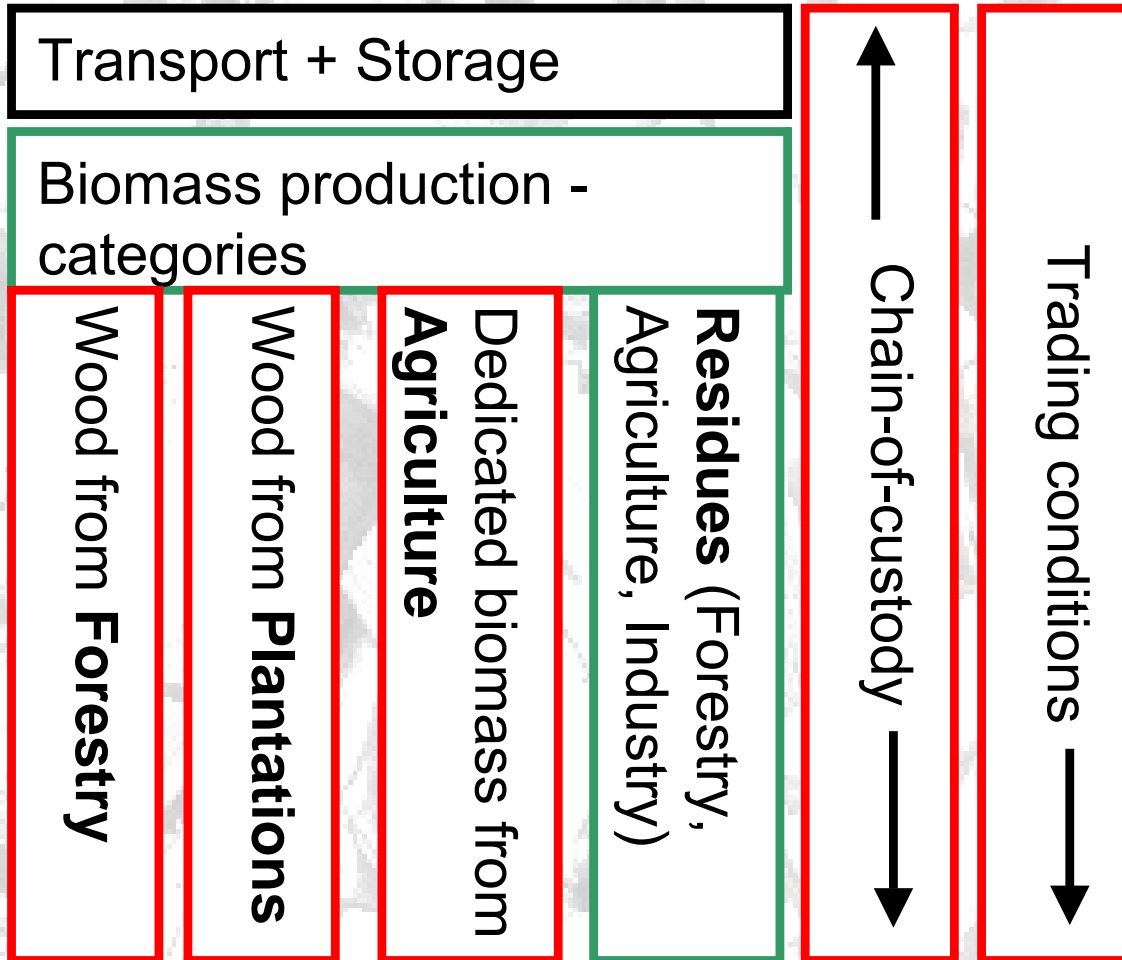


Certification systems:
Fairtrade
IFOAM
OXFAM
...

Forest certification systems: FSC, PEFC,

Certification systems for:
▪ Organic agriculture: IFOAM, EU, ...
▪ Good Agricultural Practice (GAP): EUREPGAP

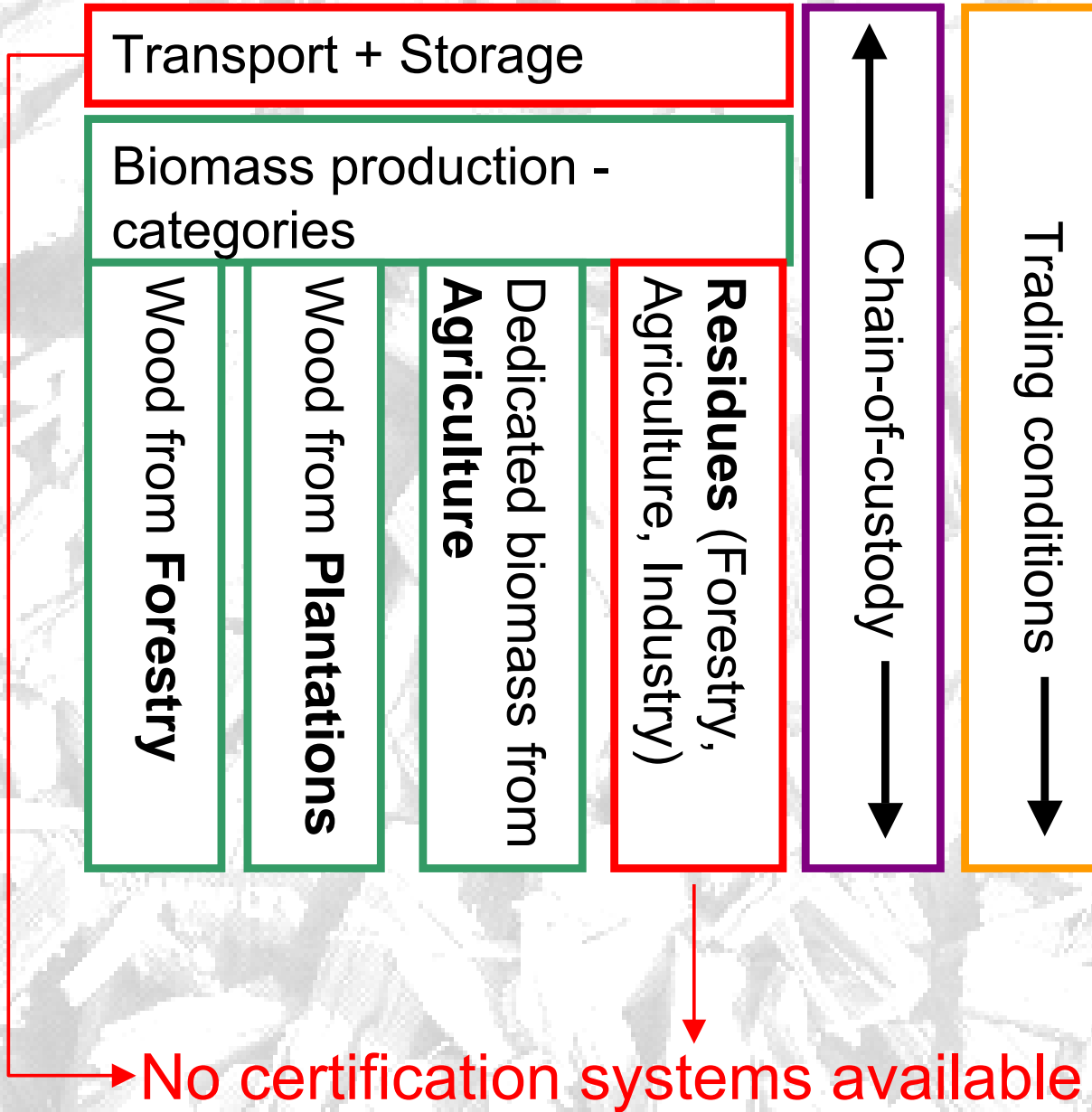
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All certification systems contain

- criteria and indicator or
- management rules

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Areas of concern relevant for sustainability of the biomass production and trading chains

General criteria

- e.g. Traceability
- Avoidance of leakage effects
-

Social criteria

- e.g. Labor conditions
- Human safety and health
-

Economic criteria

- e.g. Viability of the business
- Yields
-

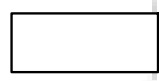
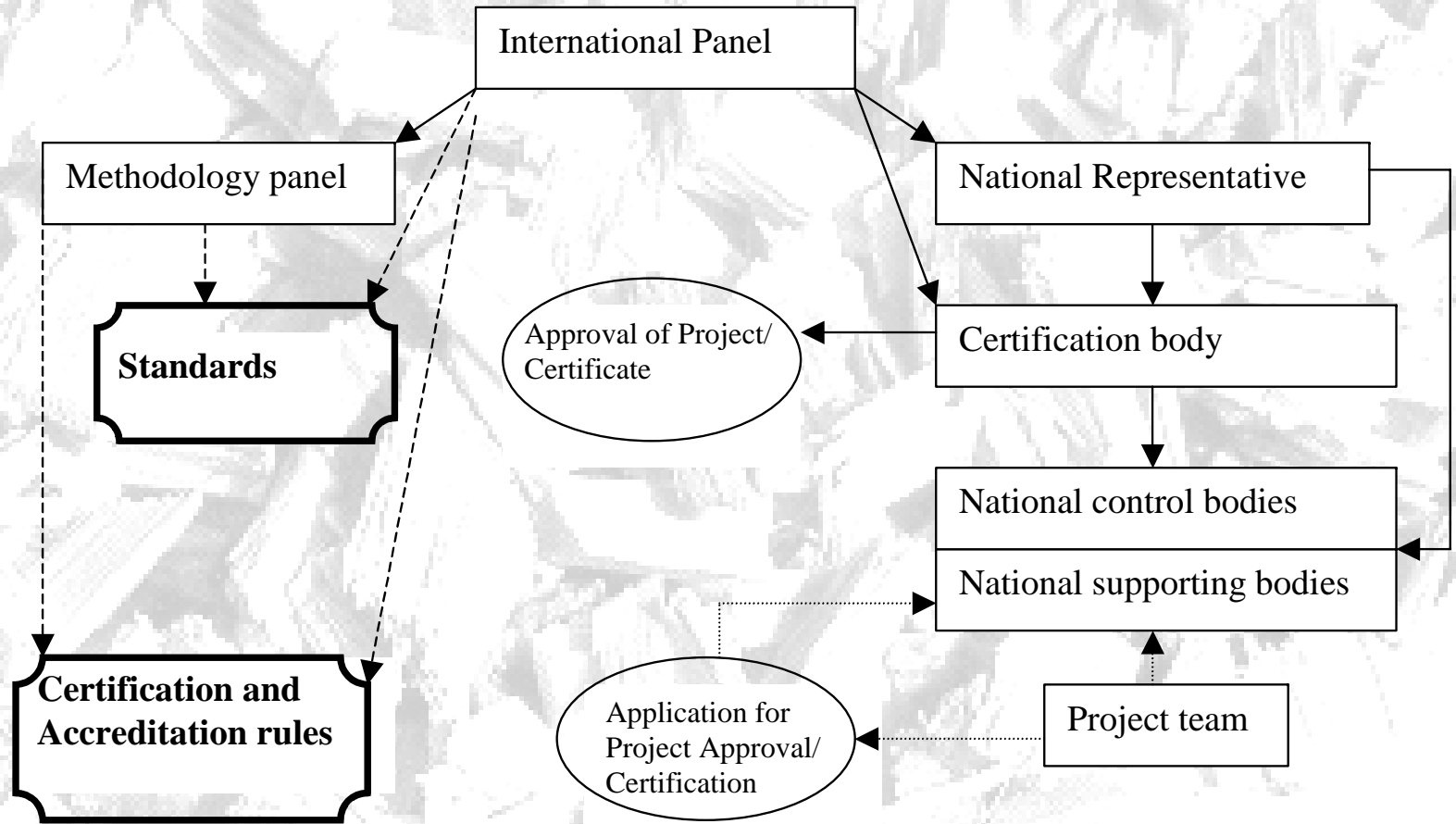
Ecological criteria

- e.g. Preservation of existing sensitive ecosystems
- Conservation of ground and surface water
-

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⇒ Many criteria, but quantitative and measurable indicators are often missing

Elements of internationally working certification systems



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Other findings

Development of criteria and indicator for certification systems to be performed:

- within an **international consortium**
- by stakeholder involvement

Research needs

→ Development of indicators for different sustainability criteria like:

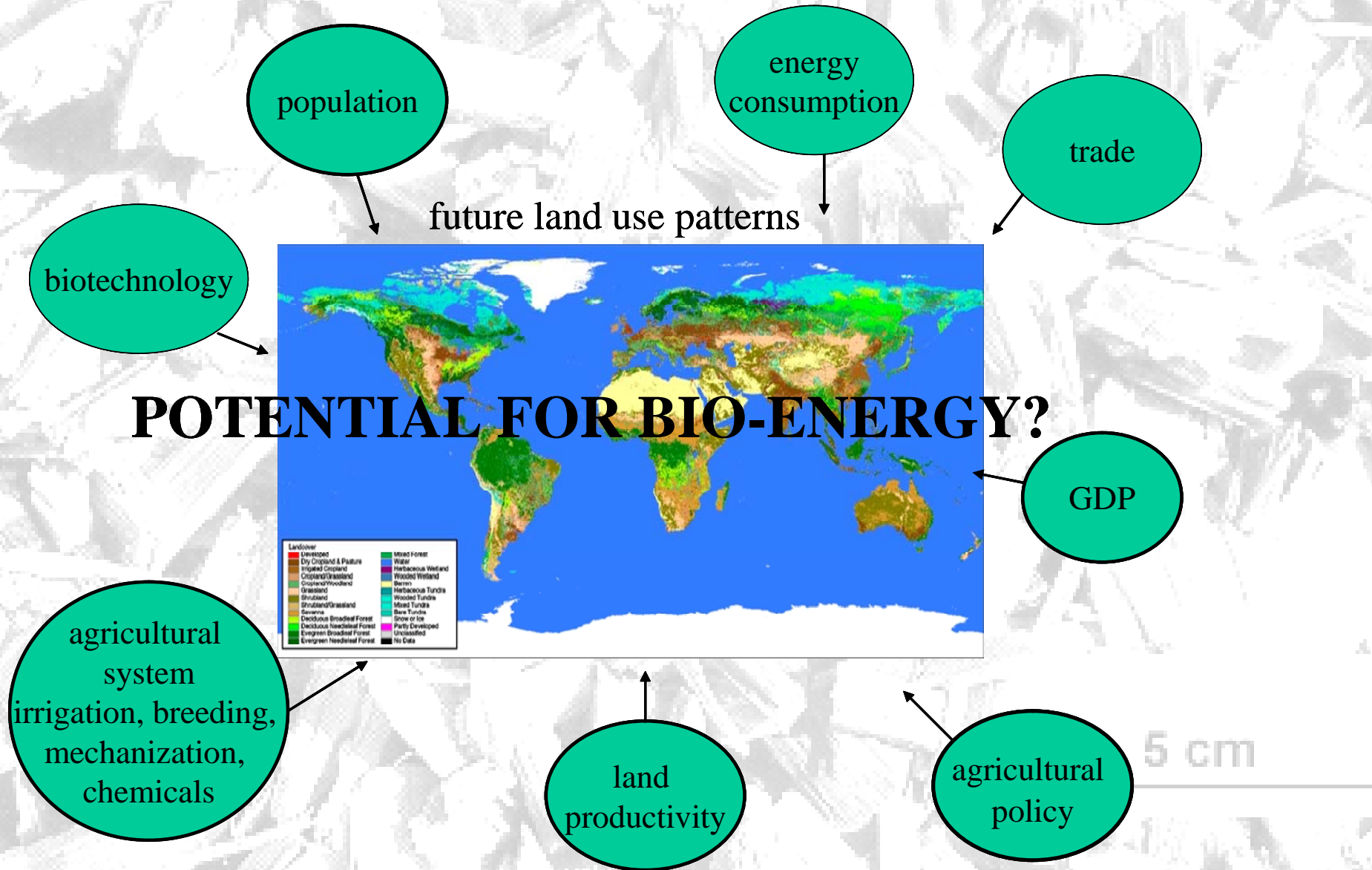
- avoidance of leakage
- food and energy supply security
- Measuring additionality
- local benefits of biomass trade
- poverty eradication
-

→ Development of **quantifiable and measurable indicators**

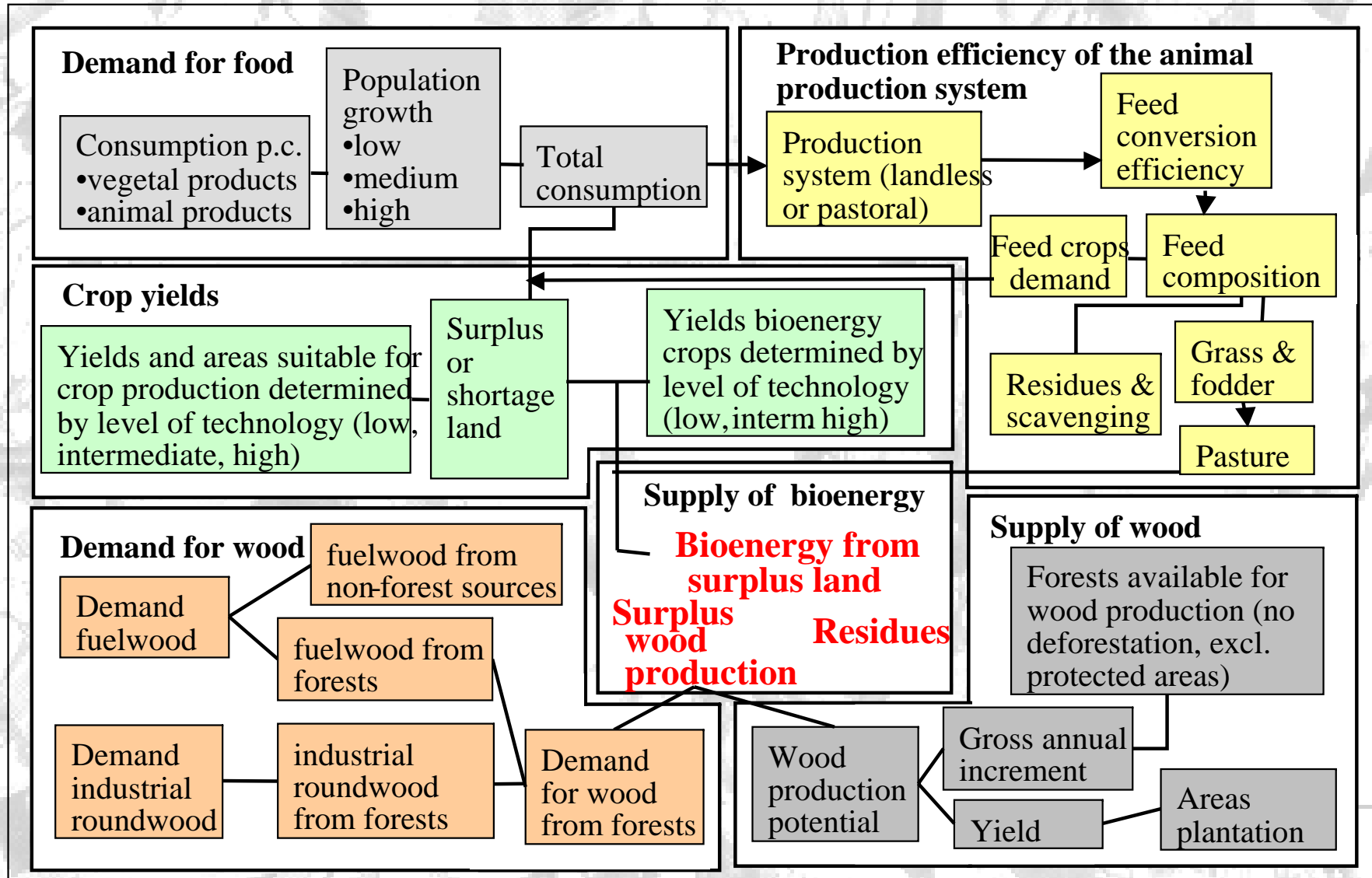
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→ Performance of case studies with stakeholder involvement and in regional to local context

Quickscan of global bioenergy potentials to 2050

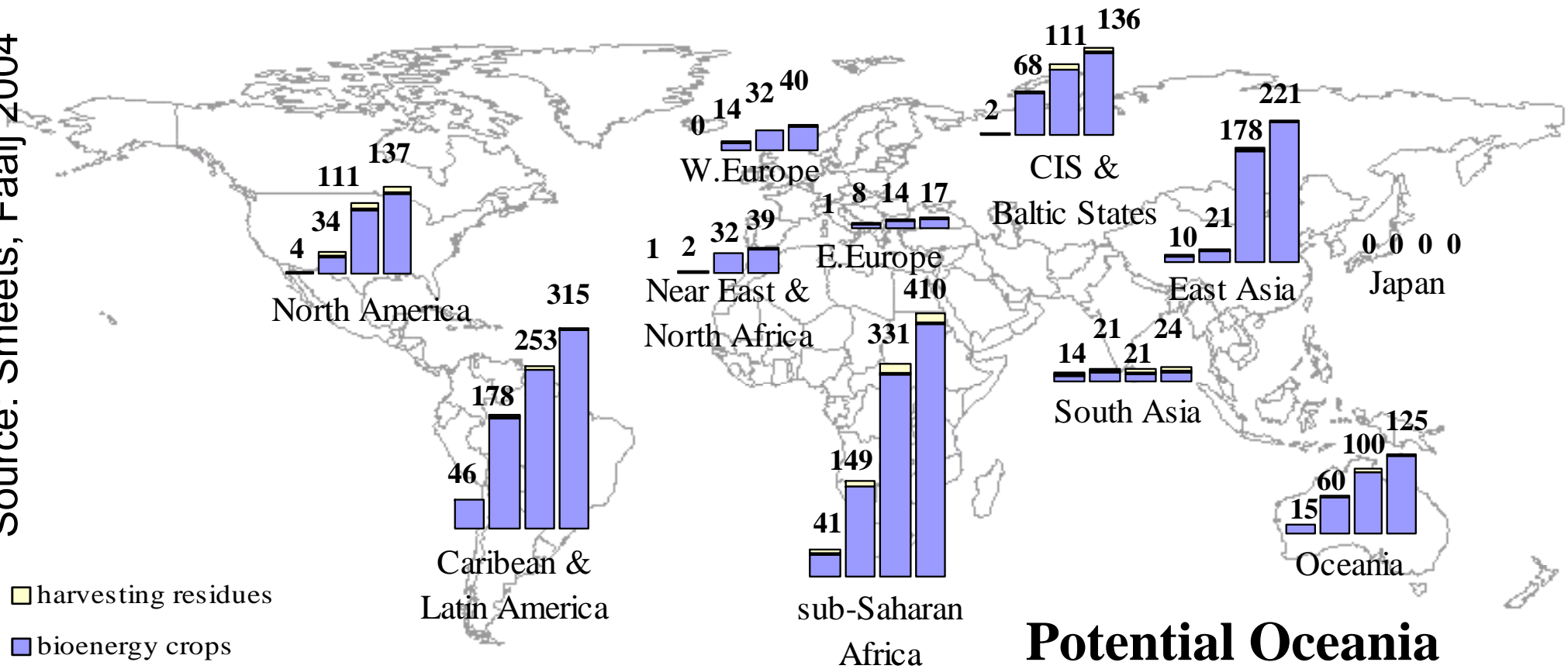


FAIRBiotrade: Global Quickscan



Bioenergy production potential in 2050 for different scenario's

Source: Smeets, Faaij 2004



Potential Oceania
4-6 times projected
primary energy use

Sustainable bioenergy production and trade

**An assessment of the potentials and
limitations of various sustainability
criteria for the sustainable
production and trade of bioenergy
from Brazil and the Ukraine**

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Sustainability criteria

Economic criteria

- Economic viability of bioenergy production
- Long term perspective
- Strength and diversification of local economy
- Reliability of resources
- Yields
- No blocking of markets
- ...

127 criteria!

Social criteria

- Labor conditions
- Protection of human safety and health
- Rights of children, women, indigenous people
- Access to resources ensuring adequate quality of life
- Food and energy supply and safety
- Capacity building
- Combating Poverty
- Democratic participation
- Land ownership
- Community (institutional) well-being
- Fair trade conditions
- ...

50 criteria included

12 criteria analysed

Ecological criteria


- Protection of the atmosphere
- Preservation of existing sensitive ecosystems
- Conservation of biodiversity
- Conservation of soil erosion and fertility
- Conservation of ground and surface water
- Combating of deforestation

- Prevention of desertification and drought
- Conservation of non-renewable resources
- Waste management

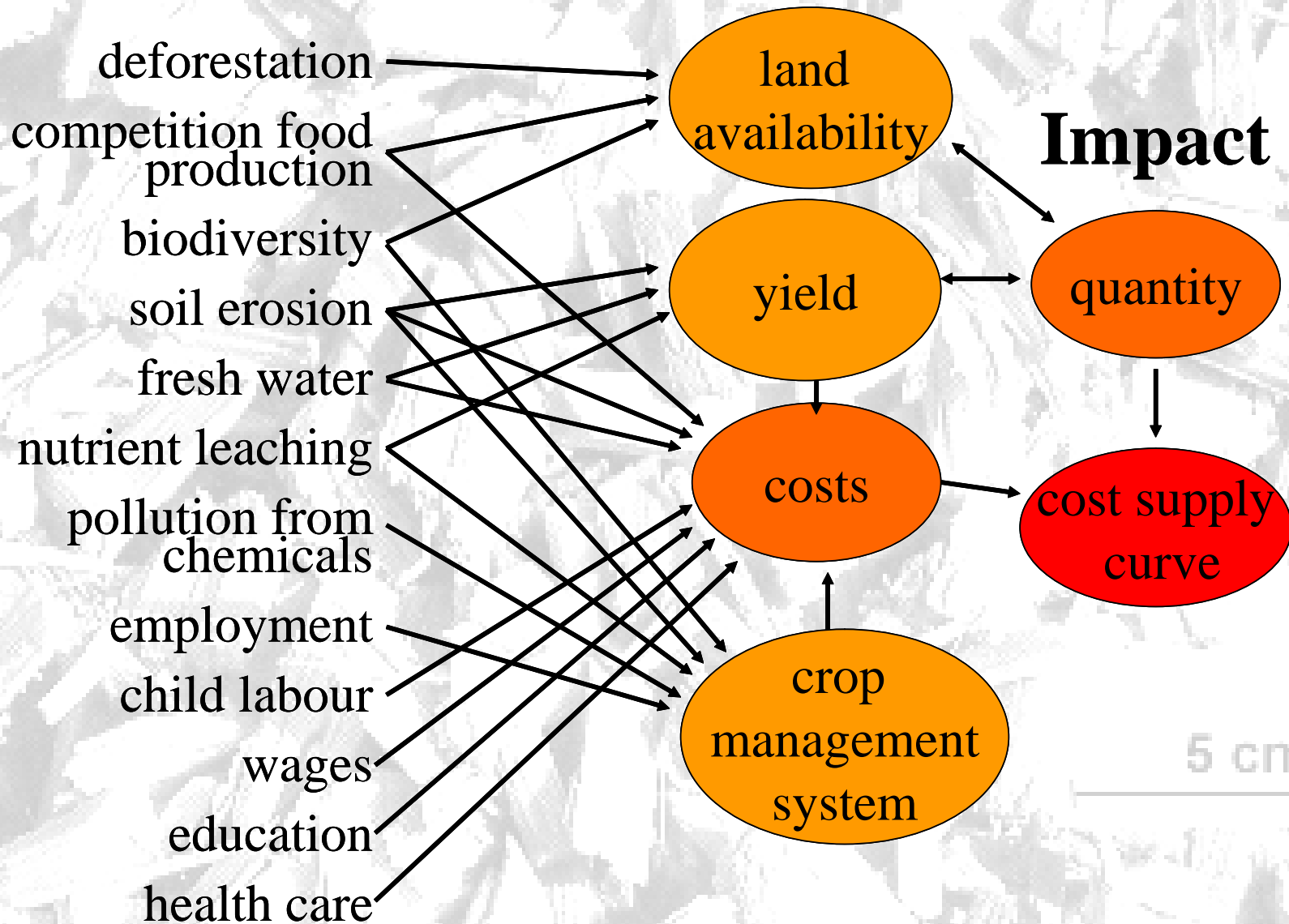
General criteria

- Compliance with laws and international agreements
- Traceability
- Avoidance of leakage effects
- Strengthening the role of non-governmental organisations
- Improvement of conditions at local level
- ...

Sustainability criteria

- 12 criteria included → 3 key areas of concern:
 - land use
 - social issues
 - natural resources & environment
 - first effort (no existing certification systems)
 - no definition on what is sustainable or not!
- 
- 5 cm
- strict and loose set of criteria are included

Criteria/indicator



Regional selection

- potentials on short term (2015), modest assumptions:
- Ukraine: central region poplar
- Brazil: southern region eucalyptus

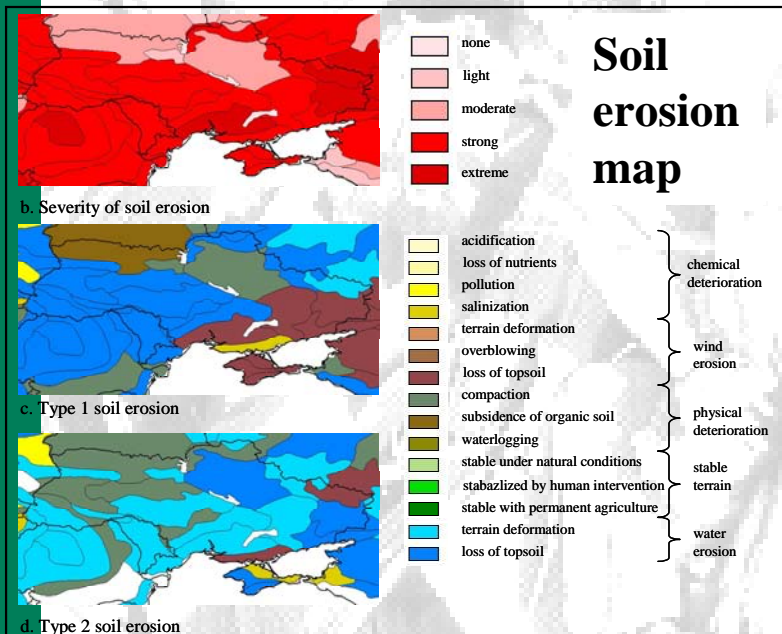
	crop yield increase	feed conv.eff. increase	surplus agric. area	surplus agric. area	bioenergy crop potential
			(%)	(mln ha)	(PJ)
Brazil	2.2	1.5	19	3.3	1250
Ukraine	1.9	1.0	13	7.7	1500

Erosion

Loose
improvement

Strict
reduction of erosion rate
to natural soil formation rate

- calculation present soil erosion rates
- calculation of natural soil formation rates
- calculation of soil erosion under bioenergy crop production
- average costs to prevent soil erosion



Universal Soil Loss Equation (USLE)

$$A = R * K * LS * C * P$$

A = soil loss

R = rainfall (intensity, duration, size)

K = soil erodibility factor (the cohesive character of a soil type)

LS = slope length and slope gradient factor

C = cropping cover management factor

P = agricultural practice factor (dimensionless)

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Water use

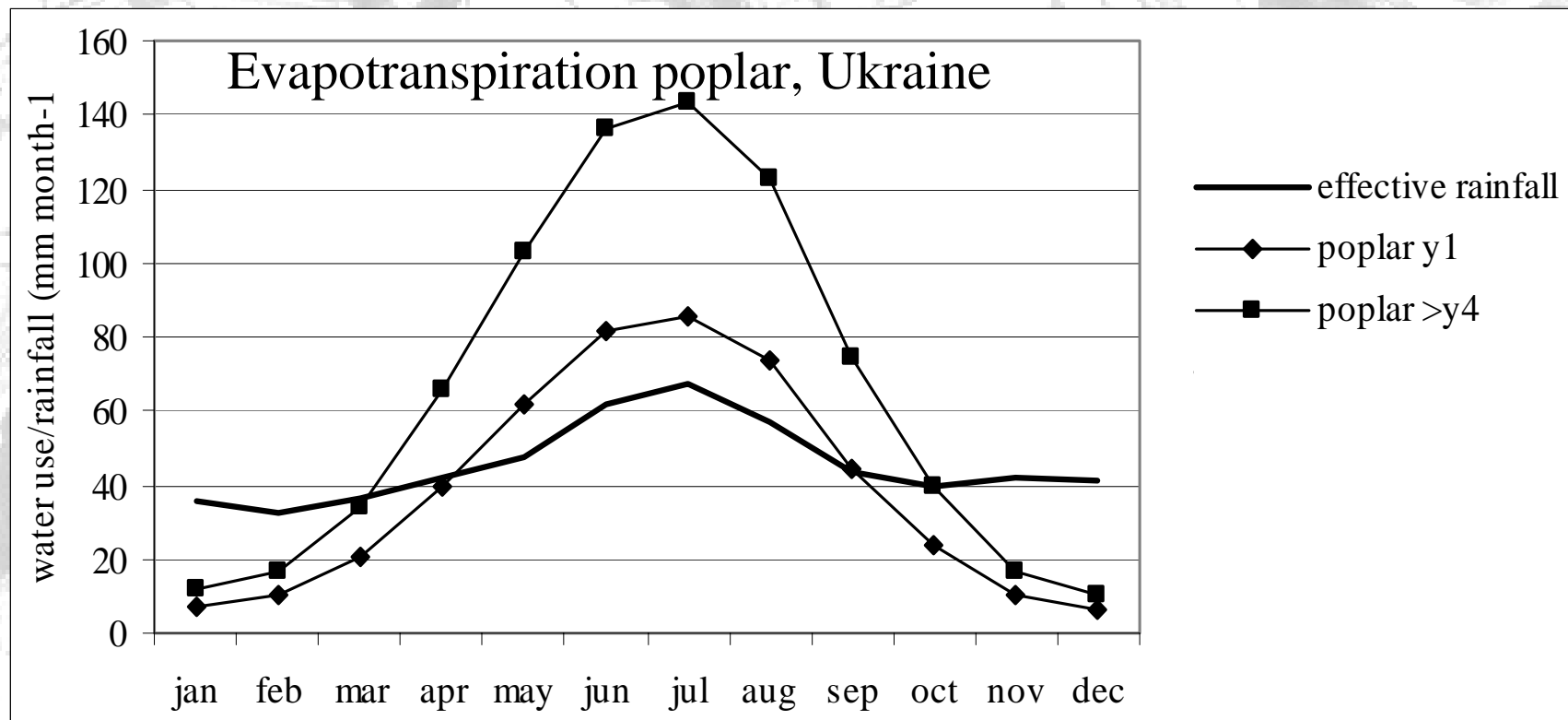
Loose

improvement

Strict

no overuse

- calculation of evaporation rates current land use
- calculation of evaporation rates bioenergy crop production
- no costs to prevent overuse were included



Other criteria

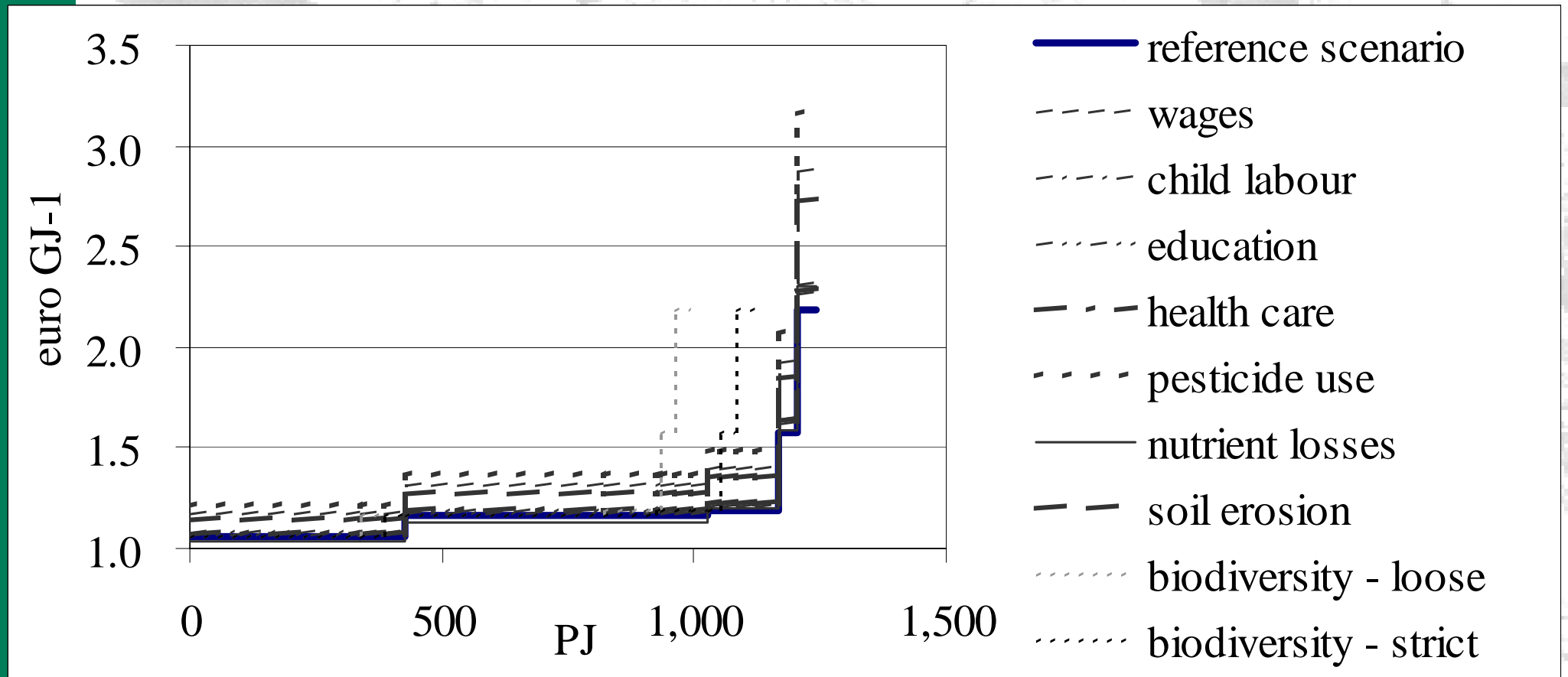
- Nutrient leaching
- Pollution from chemicals
- Wages
- Child labor
- Education
- Health care

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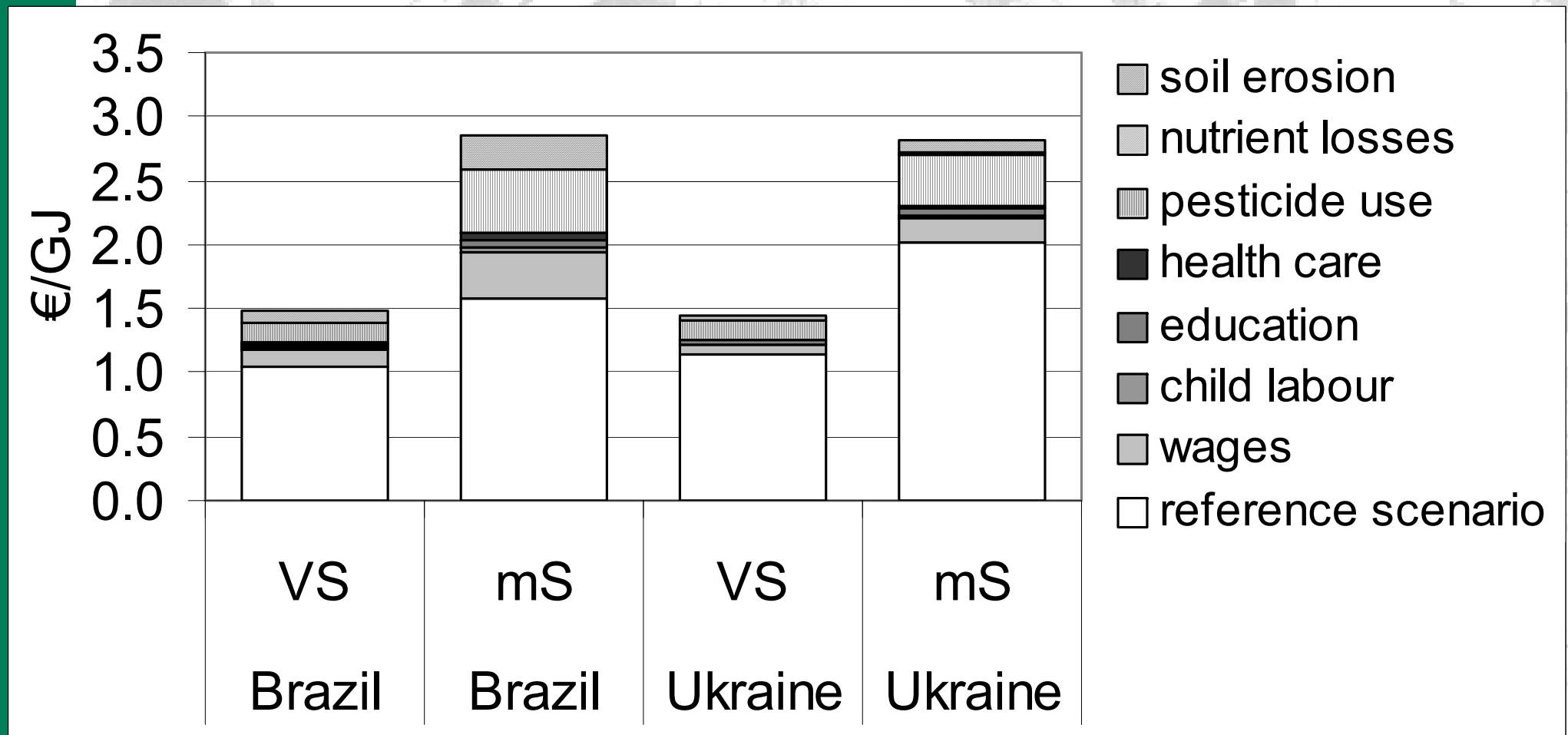
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Cost supply curve

Brazil



Cost supply curve

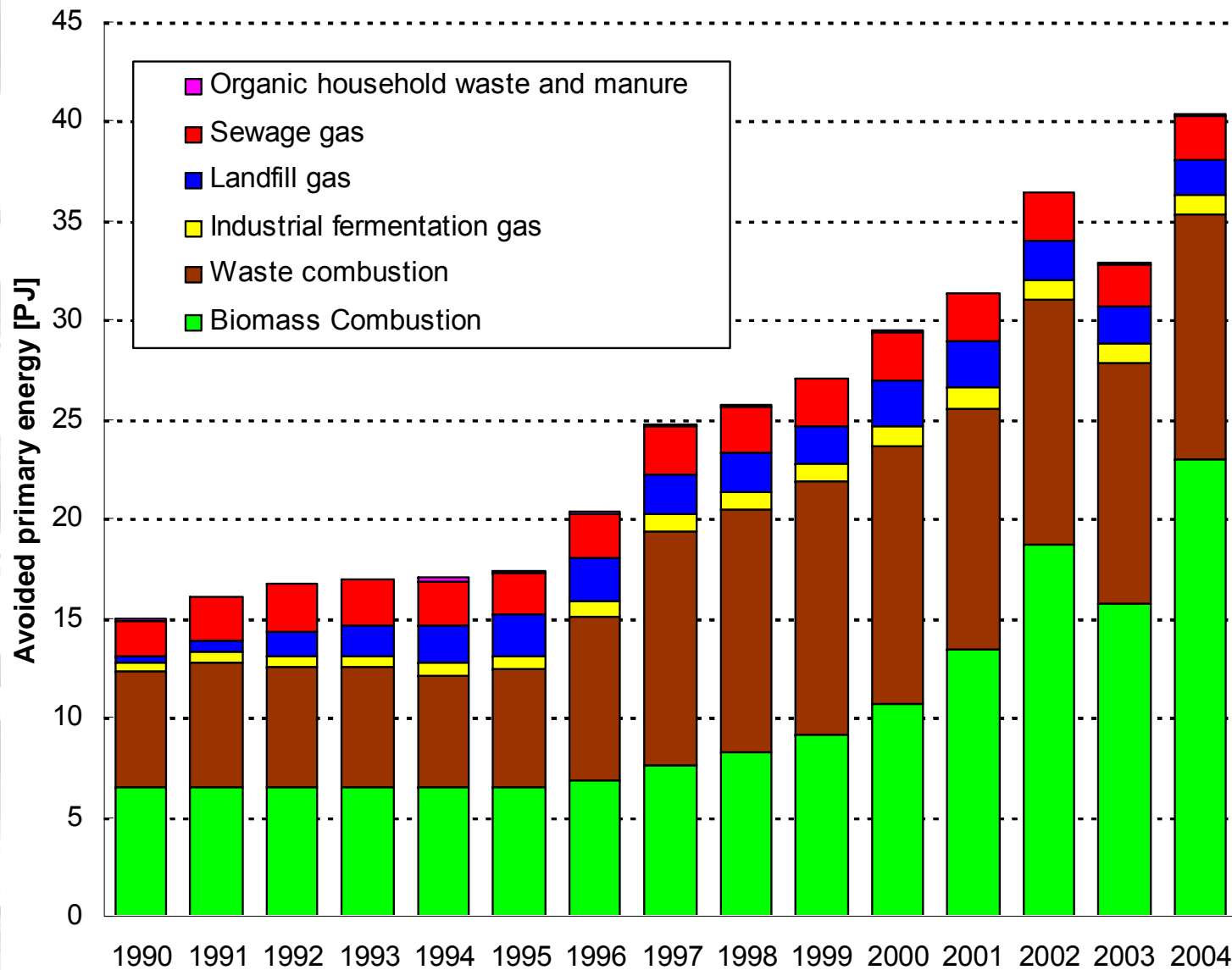


Conclusions

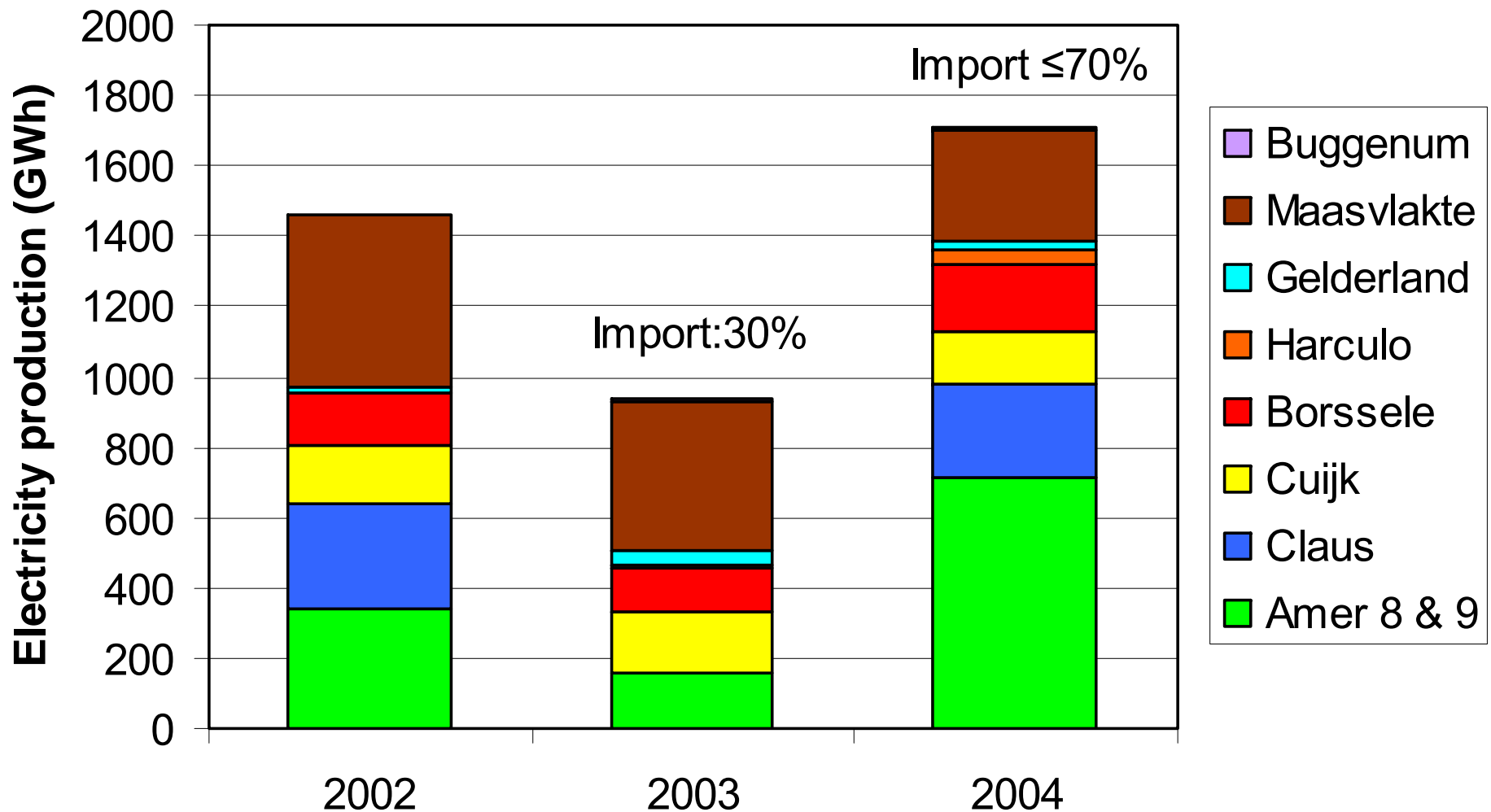
- explorative study; first indication
- considerable potentials at attractive cost levels
- strict criteria can be incorporated at modest additional costs and limited impact on potential
- not analysed are overall costs/benefits; particularly important for employment effects and the efficiency of agriculture; difficult trade-offs between benefits & disadvantages
- desktop research → detailed field research is needed, also involving stakeholders

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Trade and use of biomass in the Netherlands



Electricity production from biomass co-firing in power plants



Fuels used: Wood pellets, Agri-residues, Palm Oil, Bone Meal

Import / export of biomass

Import	2003		2004 ^a	
	kton	PJ	kton	PJ
Wood pellets and other wood streams	80	1.4	420	6.3
Agro residues	55	0.9		
Bio-oil	5	0.2	90	3.4
Others (Bone meal, paper sludge, etc.)	0	0	15	0.15
Total	140	2.5	525	9.85

Export	2002-2003		2004 ^b	
	kton	PJ	kton	PJ
Construction and demolition waste, wood waste	430	6.6	419	6.4
Remaining fraction from Construction and demolition waste	503	4.5	475	4.3
Paper/plastic fraction from household waste	151	2.0	147	1.2
Pellets from RDF	107	1.5	76	1.1
Others	449	0.4	372	0.4
Total	1639	15.1	1489	13.4

Most exports of wood waste to **Germany**

Conclusions

- Fast growing import market, only limited attention to sustainability
- both import and export volumes highly-dependent on regulations and policy support
- First attempts for certification system (Green Gold Label)
- Number of barriers identified by stakeholders

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