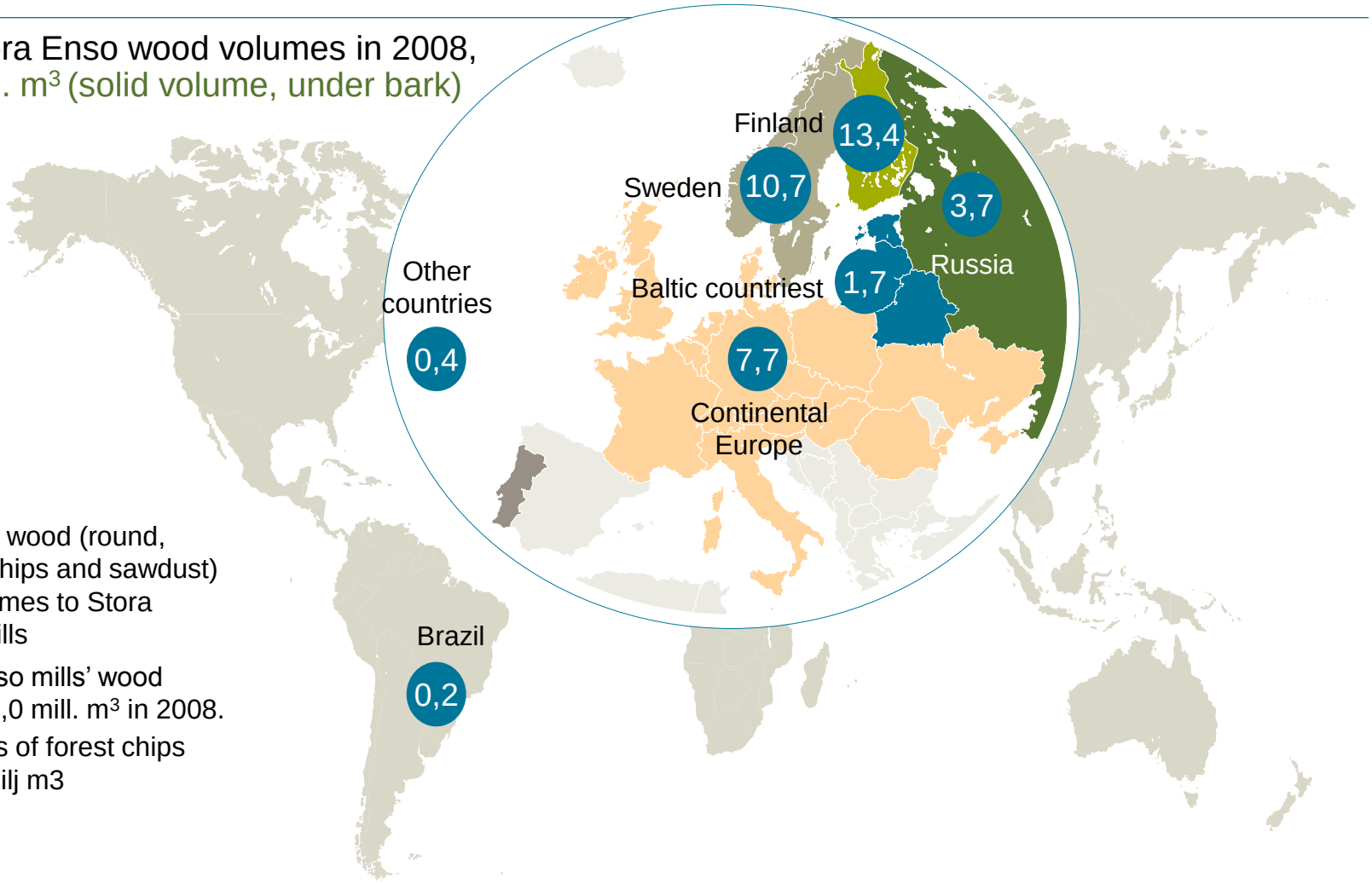
Aspects on Biomass availability and usage

Knowledge-based bio-economy 14 Sep 2010

Timo Heikka Stora Enso Oyj

Stora Enso procurement of forest biomass
Targeting the greatest total efficiency of biomass usage for products and energy

Stora Enso wood volumes in 2008,
mill. m^3 (solid volume, under bark)



Procured wood (round, sawmill chips and sawdust) total volumes to Stora Enson mills

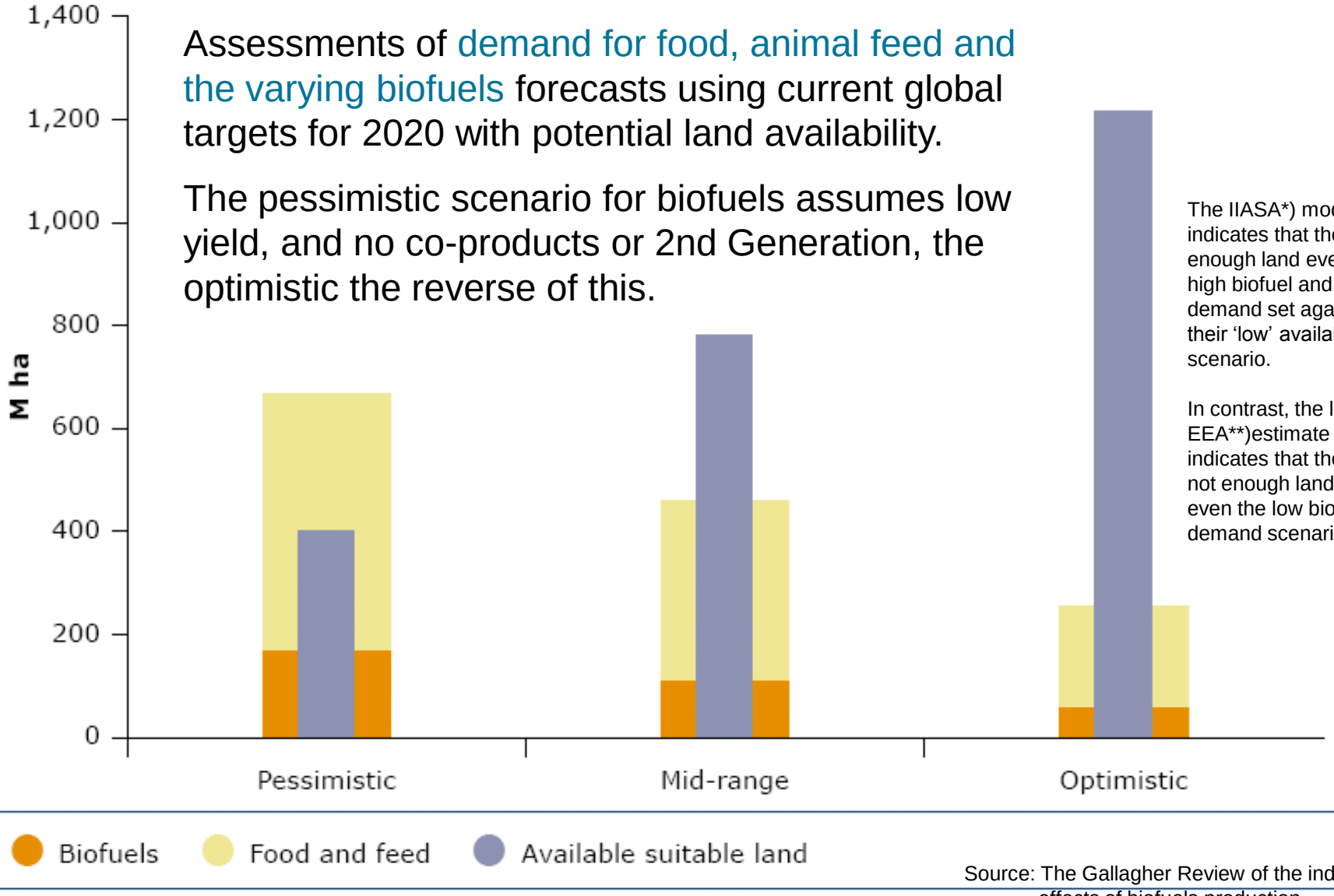
Stora Enso mills' wood usage 37,0 mill. m^3 in 2008.

Deliveries of forest chips ca. 3,5 milj m3

Global land availability and requirements

Assessments of demand for food, animal feed and the varying biofuels forecasts using current global targets for 2020 with potential land availability.

The pessimistic scenario for biofuels assumes low yield, and no co-products or 2nd Generation, the optimistic the reverse of this.

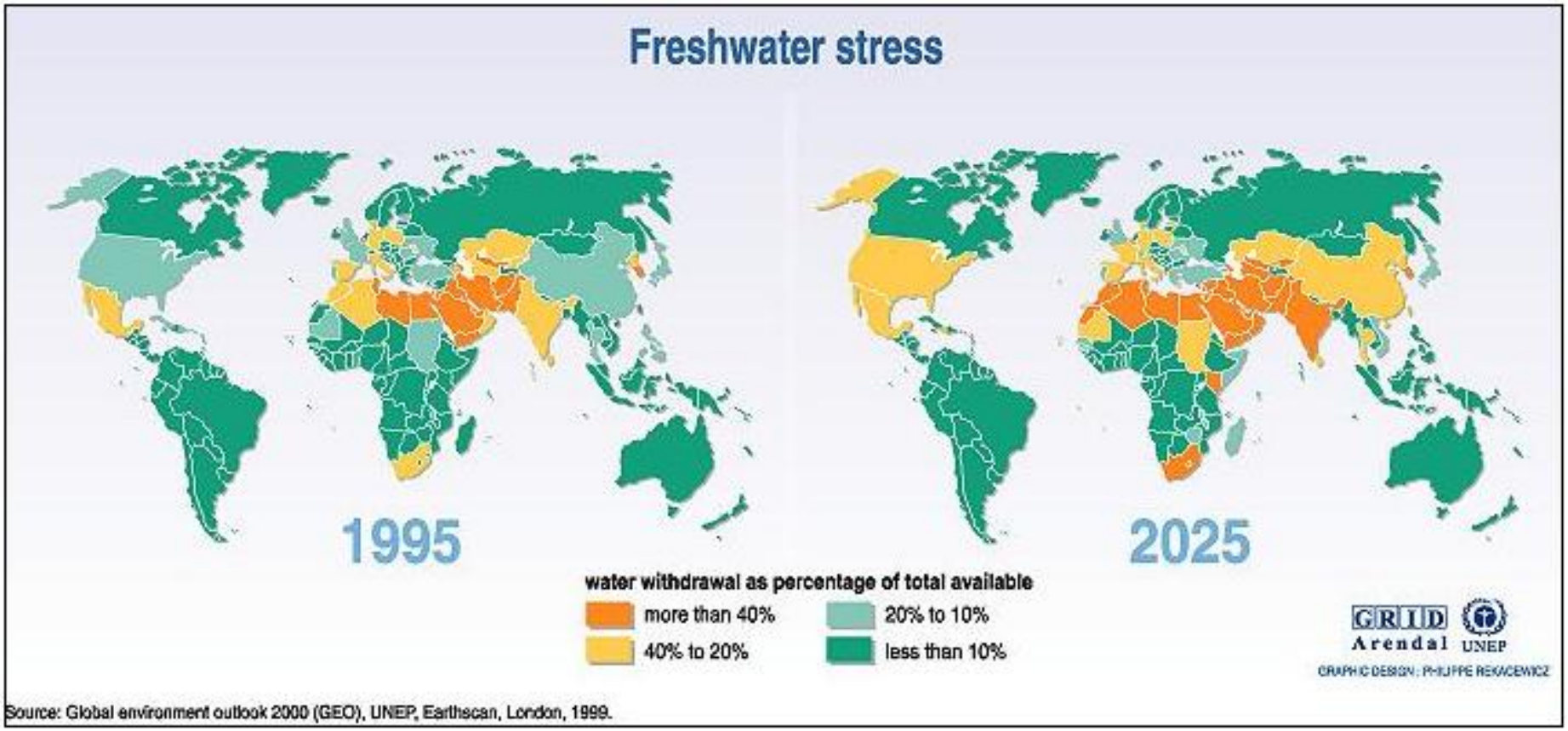


The IIASA*) modelling indicates that there is enough land even for high biofuel and feed demand set against their 'low' availability scenario.

In contrast, the lower EEA**)estimate indicates that there is not enough land for even the low biofuel demand scenarios.

IIASA= Intnl Institue on Applied Systems Analysis; EEA= EU's European Environmental agency

Source: The Gallagher Review of the indirect effects of biofuels production
UK Renewable Fuels Agency 2008


Freshwater stress
1995
2025
water withdrawal as percentage of total available
more than 40%
40% to 20%
20% to 10%
less than 10%
GRID Arendal
UNEP
GRAPHIC DESIGN: PHILIPPE REKACEWICZ
Source: Global environment outlook 2000 (GEO), UNEP, Earthscan, London, 1999.

Demand for agricultural land - One of the most significant drivers of deforestation

Increased demand for land for food and feed (200-500 million hectares by 2020) continue to cause a greater proportion of land-use change than the additional land demand for biofuels, which is estimated to be between 56-166 million hectares.

Biofuels - use only about 1% of current arable land

Their marginal effects may be more important, particularly in specific high risk locations, with huge releases of soil carbon from peat or loss of high value conservation areas

Biofuels have the potential to reduce greenhouse gas emissions in the transport sector if land-use change can be avoided

Source: The Gallagher Review of the indirect effects of biofuels production
UK Renewable Fuels Agency 2008

Land suitable for agri or biofuel expansion
Big variation in estimates due to complexity of issue

”Idle land”:

- Former or current agricultural land that will not otherwise be used for food production
- Land that is potentially suitable for agricultural production

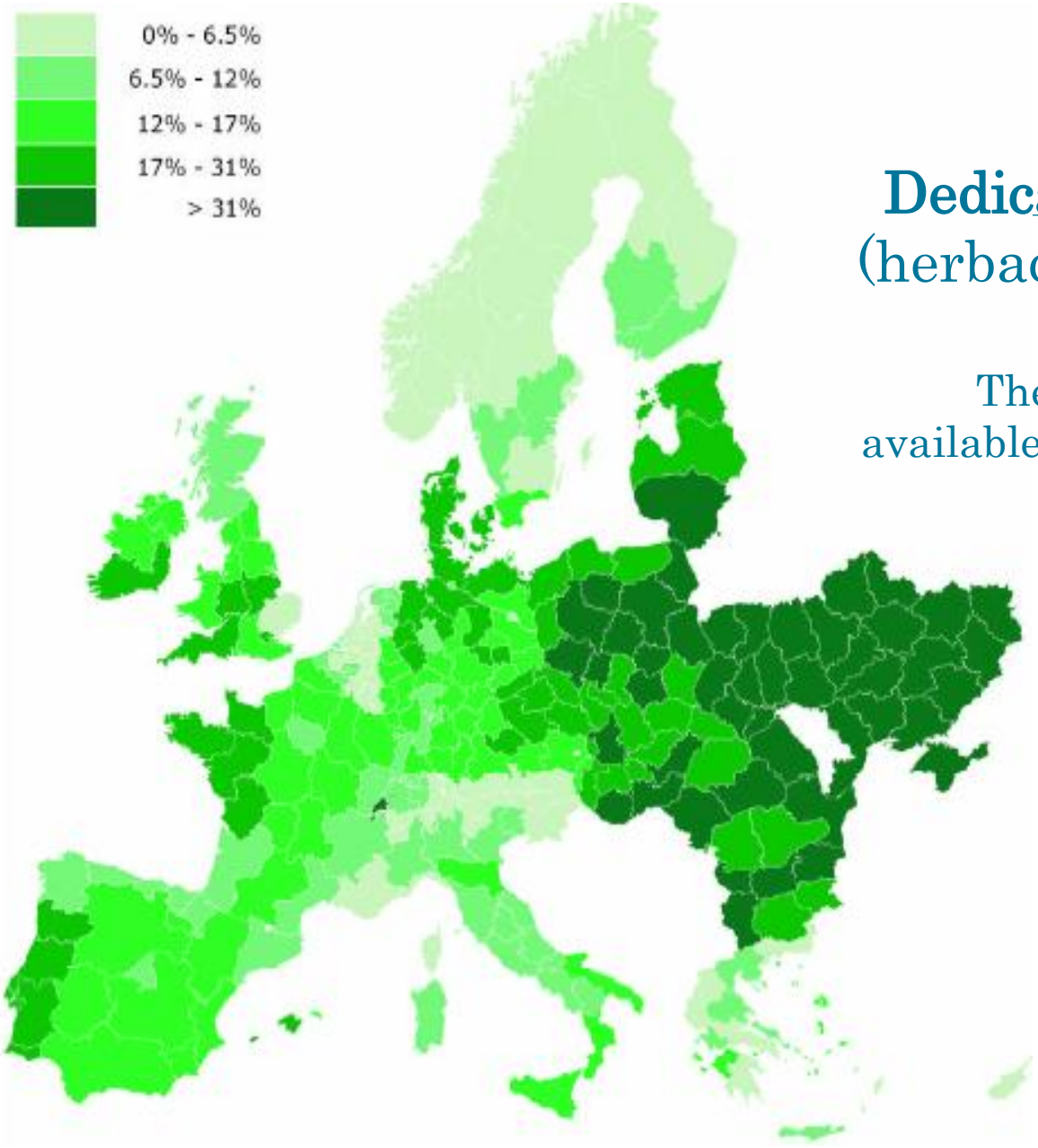
”Marginal” or degraded land:

- Land unsuited for food production, e.g. with poor soils or harsh weather environments
- Areas that have been degraded, e.g. through deforestation.

IIASA:	**EEA**:
790 million to 1,215 million hectares	50 million to 400 million hectares

IIASA= Intnl Institue on Applied Systems Analysis; EEA= EU’s European Environmental Agency

Source: The Gallagher Review of the indirect effects of biofuels production
UK Renewable Fuels Agency 2008



Dedicated bioenergy crop (herbaceous lignocellulosic) potential

The share of arable land available of the total land surface, %

Source: Refuel WP 3 Final report Jan 2008

Hierarchy for best use of biomass

according to David Morris, VP Institute for Local Self-Reliance

BEST: Chemicals and biopolymers, and pulp and paper

Sufficient plant matter must be available (most important).
Focus should be on High price sector.
Basic R&D foundation must exist.

NEXT BEST: Energy from biomass

Heating at high efficiency (80%).
Transport fuels, stores chemical energy.
Electricity should be primary “fuel” for transportation.

WORST: Electricity from biomass as it is outperformed by wind &solar.

Indicative pyramid of biomass usage in forest-based industries

STORAENSO

Unit price increases

Future

Pharma

Cos-metics

Biomaterials

Biockemicals

Traffic fuels

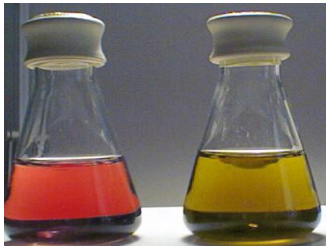
Solid fuels, heat & power

Procurement of (forest) biomass

Volume increases

Present

”Puolimatkan krouvi”, jossa lainsäädäntö takaa markkinat



Expecting an interesting discussion !