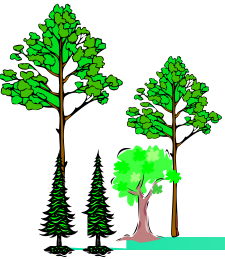
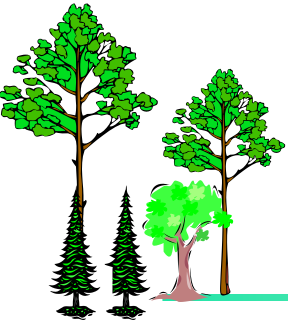


# **From Visions and political Statements to substantial Activities**



## **Realizing the Potentials of Bio-energy Trade – how much, when and by whom?**

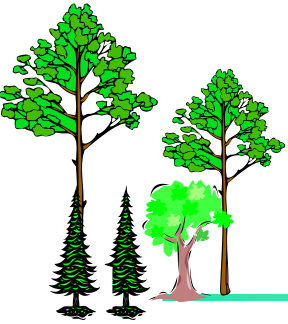
Bo Hektor  
August, 2009



# The Issue

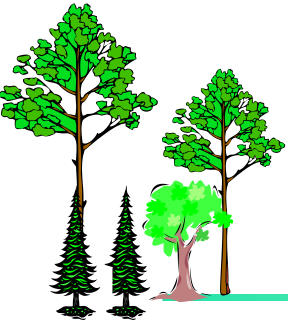
---

- High political visions/targets for bioenergy call for a drastic increase in international trade
- but
- Little emphasis is put on the development of adequate structures and concrete incentive measures

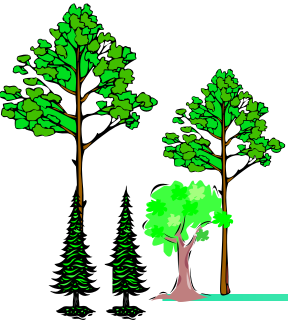


- Specific Features of international Bio-energy Trade
  - A young activity with immature institutions and norms
  - Many links in the chain between producer and end-consumer, all of which must be made to function in a system
  - The chain must be efficient
    - internally; technologically, economical, socially
    - externally; support, incentives, acceptance, "good citizenship", etc.
  - "international" means differences in laws, culture, moral, ethics, norms, climate, calculation models, etc.
  - Drivers, resistance, obstacles are different in the various links
  - Ignorance and unawareness of basics (except within a small group of "insiders")
  - Great uncertainty of targets, opportunities and relevans

## Supposition (1)

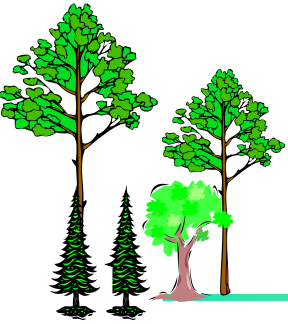


- Individual links do not develop “by themselves” to form efficient chains
- System approach; crossing of boarder lines, calls for actors, entrepreneurs and innovators
- Incentives should recognize and be adapted to support creativity



# The structure of Bio-energy Trade

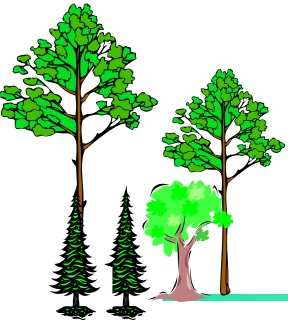
- Several supply chains; different structures (following slides)
  - Ethanol
  - Pellets
  - Chips
  - Round-wood
  - By-products
    - Food industry
    - Forest industry
  - Electricity
  - Bio-refineries



# Ethanol

(present structure, bio-refineries in later slide)

- Raw material grown in the agricultural system
  - Sugar cane, corn, wheat, cassava, vine, etc.
  - Wide range of producers
  - Embedded in the legal, professional, organizational agricultural structure (strong political influence)
- Industrial integrated production process
- Established technology for storage, shipping, and distribution
- Subject to trade restrictions ("agri-product")
- Buyers: big megacorporations
  - Little interest in engagement in production
  - Buying from agents and trading companies



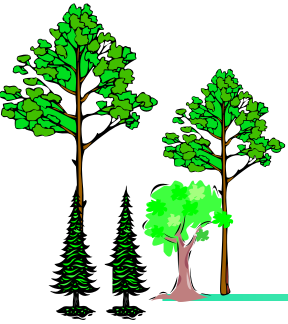
# Refined solid biomass fuels; Pellets

## ■ Raw material:

- In recent years, cheap residues, e.g. saw dust
- In the near future, also directly from trees and dedicated crops

## ■ Production:

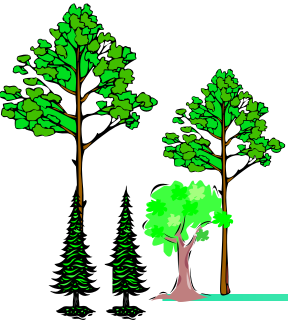
- Typical cases integrated with e.g. saw mills
- Wide capacity range
- Bigger units more capable of export
- A few very big stand-alone mills
- Cost of raw material a major factor
- Overcapacity has led to escalating raw material costs
- (Cont.)



# Refined solid biomass fuels; Pellets (cont.)

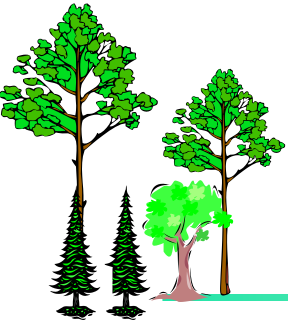
- End use in two different segments
  - Large scale combustion units
    - Power stations, CHP, industries
    - Large, well established, often public enterprises
    - Various drivers for choice of fuel; economy, quota, policy commitments
    - Fuel contracts directly between producer and consumer
  - Small and medium scale heat units
    - Residential, schools, service buildings, etc.
    - Competition with other energy systems; effects on the private economy is a strong decisive factor
    - Supply by distribution firms
    - Consumption is highly weather dependant (+-30% yearly)





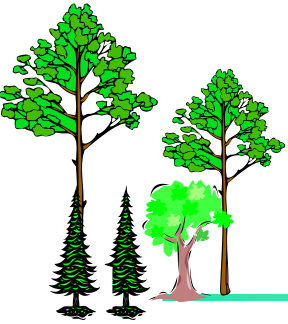
# Wood chips

- At present mainly local/local
- Storage and transport problems
  - Loss of substance, health hazards, ignition, freezing
- Some international trade
  - Chips from wind thrown trees in the USA to Europe
  - Recovered demolition wood within the EU
  - Contracts: *ad hoc*, agents, and direct contacts
- Phyto-sanatory issues are important
- Specific chip boilers required, or large coal grid boilers
- Large scale users
- Chips seems to be only a marginal biomass fuel form in international trade



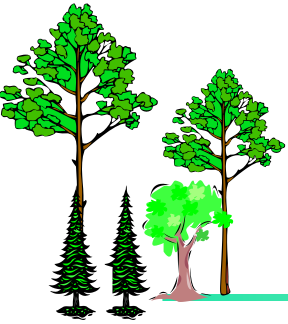
## Round-wood

- Large quantities are traded internationally for the forest industry
- Could be feasible also for energy
- Well developed, although somewhat awkward technology for logistics, incl. shipping
- Will be based on dedicated energy plantations in the longer perspective
  - Political, economic, social, and land use issues
  - Designed for energy export: cost efficient production and transport, high wood density, good combustion qualities, etc.
- Buyers: large scale users, bio-refineries



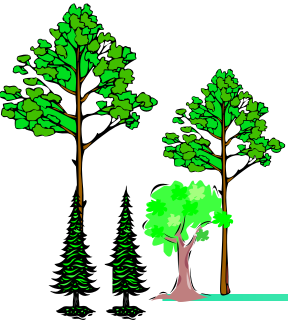
## By-products from the food industry

- International trade is “easy and simple” as the fuel products already are within the product flow
- Some fuels may cause problems in the combustion process
- Limited supply will cause price competition
- Buyers: large scale users. Sellers: food corporations (often large multinationals)



# Bio-refineries

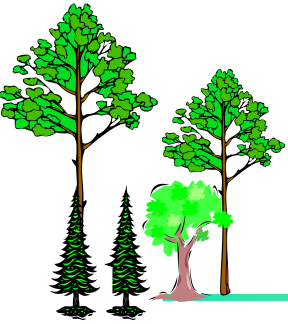
- Aim: to make optimal use of (limited) biomass resources
  - Fibre, electricity, heat, propellants, solid fuels, etc.
- Likely localization: close to consumer markets (esp. for heat and electricity) rather than close to biomass resources
- Large scale units
- Leads to (international) trade
- Managed by large corporations, initially with government support



# Global Potentials.

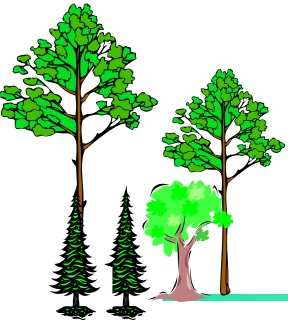
Assumption: Land Use Priority will be for Fuel Production

- **Agricultural land: <100- >300 EJ**
- **Marginal lands: <60- 150 EJ**
- **Agro residues: 15-70 EJ**
- **Forest residues: <30-150 EJ**
- **(Dung: 5-55 EJ)**
- **(Organic waste: 5 - >50 EJ)**
- ***TOTAL: < 250 - > 500 EJ***
- ***(exceeding present world energy use)***
  - **Source IEA Bio-energy Program, Task 40**
- **Conclusion (?) from previous slides:**
  - The larger potentials are (much) more difficult and takes more time to realize than e.g. some of the residuals



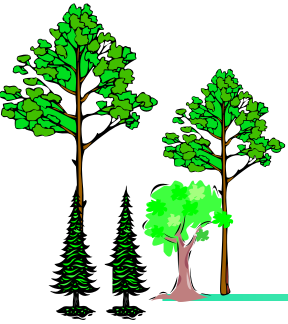
## Supposition (2)

- Supply chains and their logics are different
- Incentives and support measures must recognize these differences, to be efficient
  - Long term/short term
  - Production/consumption
  - General/specific



# Bio-energy Trade as Business Ventures

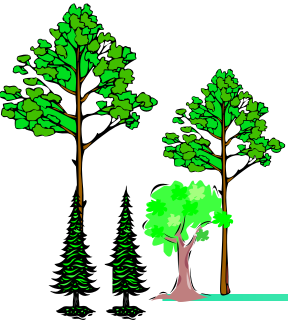
- Highly volatile and varying structure
  - Cost of competing energy systems
  - Cost of competing biomass resources
  - Cost of shipping
  - Incentives
  - Price of “green” energy
- Great variations in costs of input factors
  - Labour, land
  - Capital (risk assessment, security)



## Supposition (3)

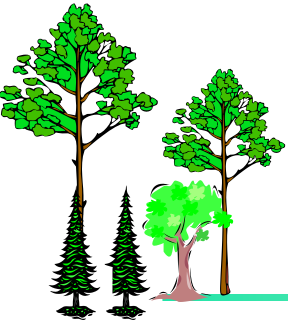
- All components in a supply system must be allowed to “make money”





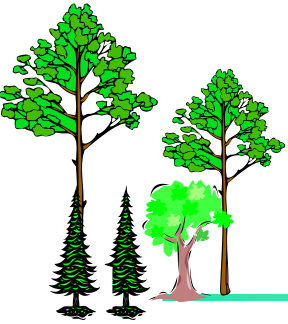
# “External Efficiency” of Bio-energy Trade

- Win public acceptance
  - PR and information (factual and correct)
  - Active participation in the policy debate; lobbying
  - Co-operate with “friends”
- Form alliances and participate in networks



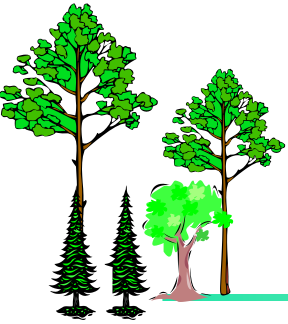
## Supposition (4)

- Incentives and support measures could include also structures and activities to increase “external efficiency”



# Bio-energy Trade – what is possible and feasible

- Cheap – in techno-economic perspective
  - Industrial residues – however soon exhausted
  - Cheap portions of forestry and agricultural residues
  - (Could suffice appr. 5 years to satisfy expected demand)
- Low risk
  - Short term as above
  - Medium and long term
    - Dedicated plantations in favourable sites and in politically stable conditions
    - More from forestry and agricultural residues
    - (May suffice appr. 10-15 years to satisfy expected demand)
- (cont.)



# Bio-energy Trade – what is possible and feasible (cont.)

- Long Term – Large scale – High commercial risks
  - Dedicated energy/agro-forestry plantations in rural development programmes
  - Integrated in political change processes – takes time and requires competent management resources
  - Needs strong political commitments and considerable amounts of front end capital
  - Stricter institutional framework than present CDM (market, pricing, etc.)
  - If successful, large quantities can be produced, sufficient to satisfy present visions of future demand
  
- Ecological/environmental
  - Mostly “win-win”, some genuine conflicts of interest
  - Problem solving mechanisms will be needed, no “veto” power from single stakeholders