The CAP & Bioenergy
Driver or Barrier?

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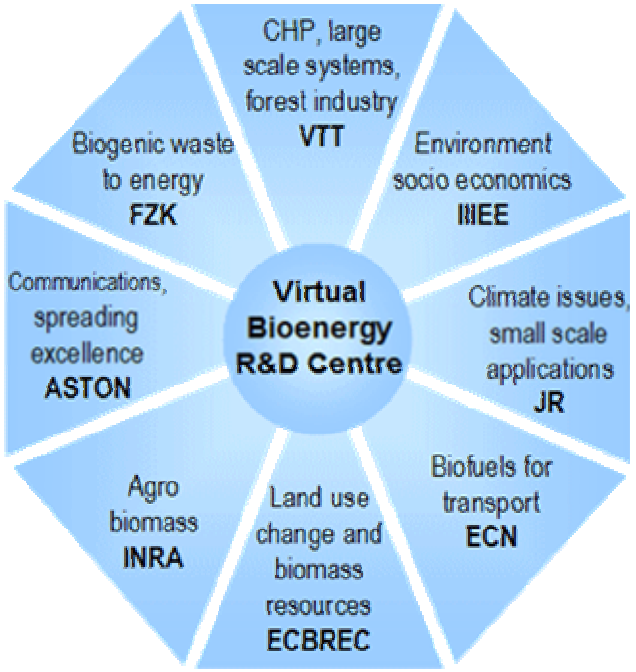
IIIEE ?

- A (relatively) small institute in a large University
- Scope: Sustainable systems of production and consumption
- Approach: Multi-disciplinary and multi-cultural
- Research
  - Energy for SD
  - Products & Services
  - SD & Buildings
- Education
- Outreach

Bioenergy NoE ?

- Integrating activities across research institutions in the EU thereby creating a 'virtual bioenergy R&D centre of excellence'.

- Finland, Sweden, Austria, Poland, the Netherlands, France, Germany, and the UK.



This presentation

- To provide insights into the interplay between energy crops and the CAP
- Examples & perspectives at farmer levels from case studies in Sweden, Poland, Italy and Austria
- Some insights – more queries than insights perhaps!

To start with a summary – impressions from a ”non-CAP-presenter”

- CAP interplay not clear but my feeling is that there are ”swings and roundabouts”
  - More important issues and interplays than the CAP
  - Strong demand & crop evolution may change many things
- Underlying CAP themes (rural development, cultural landscapes) are central to SD and bioenergy

Energy Crops

- Energy crops in agriculture.
- Dedicated energy crops (such as poplar and willow)
- Conventional crops utilised for energy purposes (such as maize and rapeseed).

BAP – what is it?

- Defines how to accelerate the development of bioenergy.
  - Agricultural residues, forestry residues, waste streams and energy crops.
  - Heat, electricity and biofuels for transport.

- Suggests a campaign to inform farmers about markets for energy crops.

BAP – Potentials (Mtoe)

	Biomass Production (2003)	Biomass Potential (2010)	Biomass Potential (2020)	Biomass Potential (2030)
Wood from forests	67	43	39-45	39-72
Organic wastes, wood industry residues, agricultural and food processing, manure		100	100	102
Energy crops from Agriculture	**2**	**43-46**	**76-94**	**102-142**
TOTAL	69	186-189	215-239	243-316

CAP – what was it?

The origins of the CAP were born in the aftermath of the Second World War.

- Widespread destruction of industry
- re-allocation of resources on a massive scale towards military output
- dislocation of population and labour

All contributed to shortages of food

Thus motivated and driven by a desire to increase self sufficiency in food within Europe.

CAP – what was it?

- The CAP was formally introduced in 1962 and aimed to achieve the following:
  - Increase production of food in Europe
  - Increase productivity of food production in Europe
  - Reduce dependence on imported food
  - Introduce a degree of price stability for consumers
  - Introduce a degree of income stability for farmers
  - Increase the overall standard of living of all those involved in agriculture
- It succeeded and by the 1980s Europe had ”mountains” of surplus food

Reforming the CAP

- Reform of the CAP was inevitable but massive protest …
- The main thrust of reforms has been as follows:
  - Reducing production through quotas and set aside schemes
  - Encouragement to farmers to diversify
  - Incentives to produce organic products to reduce the environmental impact of intensive farming
  - Direct payments given to farmers in compensation for cuts in prices given to them for their products - a transition
- Non-food production on agricultural land is only a minor aspect in the CAP.

As agriculture covers about half of the EU-territory, the CAP is a main driver determining land-use structure and landscape quality.

It aims to ensure adequate market prices and satisfactory income to farmers and rural development, including the preservation of landscapes through agri-environmental schemes.

Increasingly CAP aims at maintaining agricultural activity in less suitable and environmentally sensitive nature protection areas to avoid degradation of the associated landscapes.

The CAP – what is (ostensibly) it now?

- Incentive to meet (exacting) environmental, animal welfare, land management and food safety and quality standards.
- Rewards farmers for preserving Europe's unique rural landscape and protecting the environment.
  - As such, the provision of public goods which cannot be supplied by the market.
- Ensures provision of a wide choice of high quality foods,
- Supports transition reform process for reduction of export subsidies undermining overseas producers (pledge to phase out by 2013)
- New CAP also features Rural Development policy measures

CAP – Single Payment Scheme

- Payments are decoupled from production.
- Farmers receive payments for the amount of land they utilise independent of the amount they produce.
- Flexibility = opportunities for the promotion of energy crops.

CAP – Set Aside Land 10%

- Compulsory set aside land was initiated in the CAP reforms of 1992 to respond to excessive food production in the EU.

- Farmers are not allowed to use set aside land for any food and fodder activities, but they ARE allowed to use it for industrial crops or energy crops.

CAP – Aid for Energy Crops

- An aid of 45€/ha is available to farmers producing energy crops on agricultural land (not on set aside land).
- Limit for this scheme of 1.5 Mha.
  - Approximately 1.3 Mha of this taken up 2006
  - consideration to increase to 2 Mha
- Proposals to extend aid to for cultivating energy crops to all member states
- 8 countries (new members) do not qualify for 45€

Research

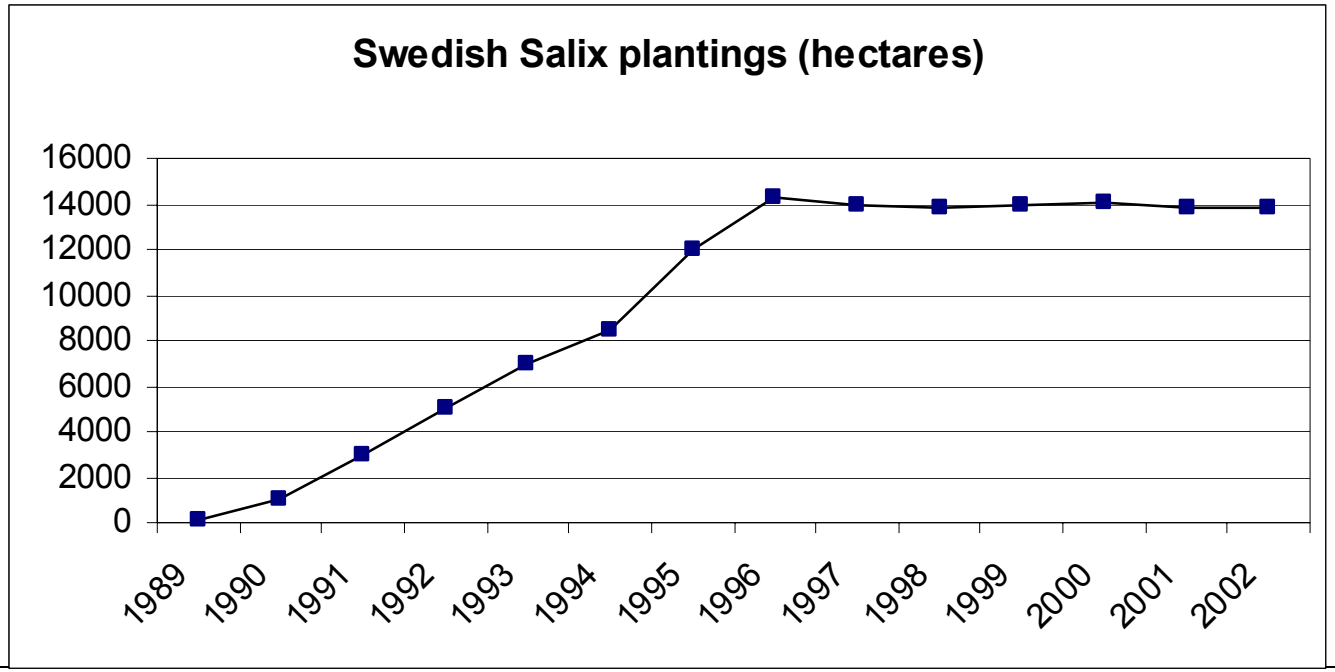
- Several case studies from Sweden, Mureck in Austria, Umbertide in Italy, Grudziądz in Poland
- Shortage of work in these areas
- Difficult (impossible) to generalize for the EU from a selection of case studies. However, case studies do provide valuable insights into 'real-life' challenges.

Willow growers in Sweden – an example to underpin this discussion

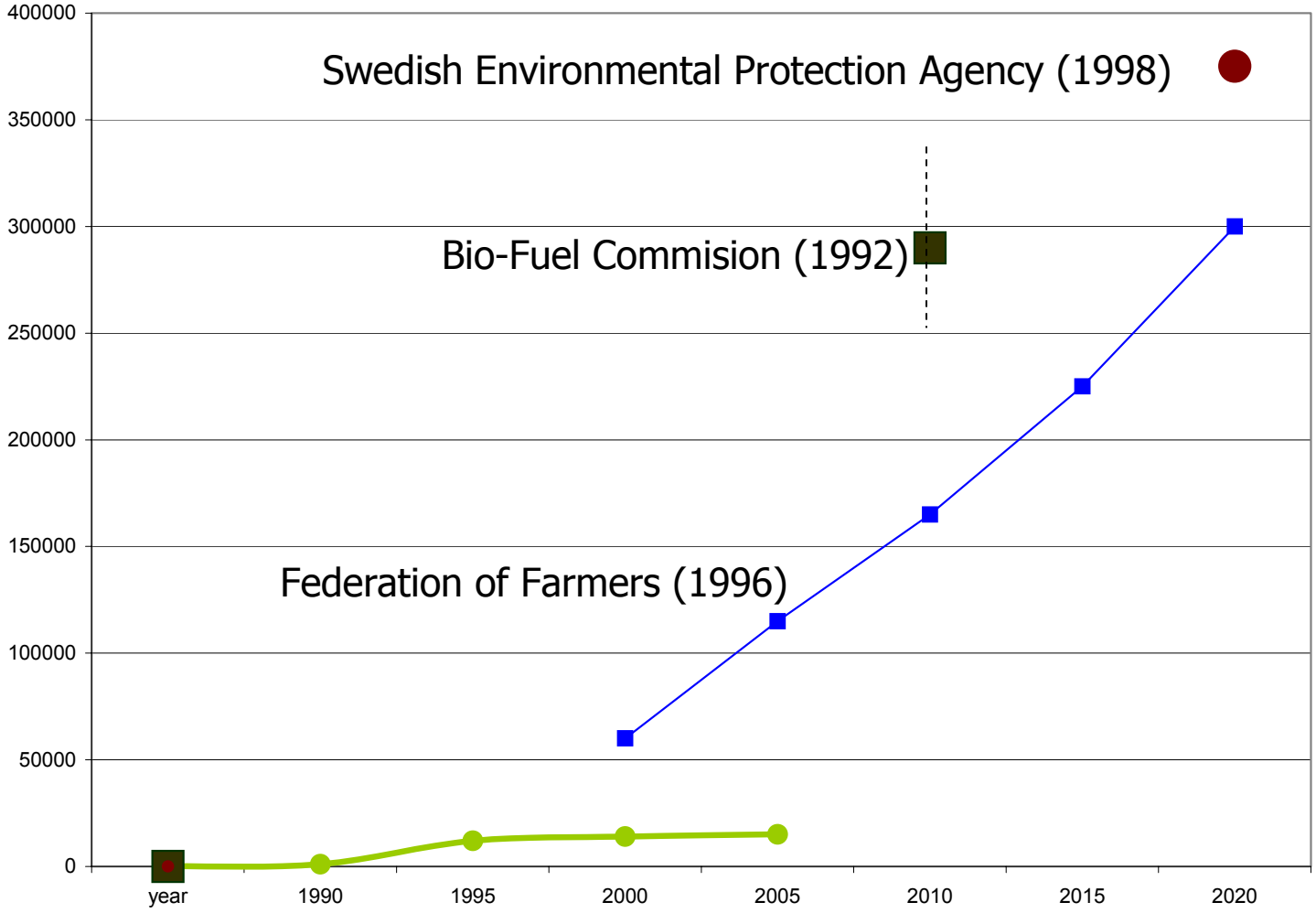
- Speciation of farmer/farm types/parcel sizes
- Mapping of experiences
- Rationalisation of negative experiences and retreat
- Experiences predate/include CAP
  - Studies by Swedish University of Agricultural Sciences & Env. & Energy Systems Studies, Lund University

Salix in Sweden

- Initial enthusiasm and planting subsidies (1000€+/hectare) drove wave of plantings
- This halted at circa 15 000ha.
- Planting subsidy reduced 1995
- A trickle of plantings has maintained area since then – just enough to replace plantation removal



Swedish Salix: Scenarios vs Reality (Helby et al, 2006)



Salix & bad experiences

- Usually a farmer chooses his marginal (least productive) land as set-aside. On this land, he must refrain from growing cereals for food or feed production. In principle, this gives an advantage to Salix/energy crops

- A significant number of crop failures and damaged reputation

- 41% of farmers assessed in SE regret having ever planted or have even retreated (before the end of Salix life cycle).

Poor agricultural practice

- The CAP pushed Salix towards low-quality lands, conflicting with goals of biological productivity and economic efficiency, and even with the EU's own desire to promote energy crops as alternatives to cereals

- Post 95 better grain prices (and EU guaranteed price) reduced needs for alternatives to cereals

- CAP made fallow more attractive for set aside – some disadvantage to Salix

Indeed, CAP may have made dairying more attractive

Stability as a major theme

The volatility of set aside requirements appears to work as a disincentive for Salix.

- A farmer may want to grow wheat on his ordinary production land and Salix on his set-aside.
- To implement such a decision, he needs to know what land belongs to each category (normal production land or set-aside).
- If the lifetime of a Salix plantation is 20 years, desire to see 20 years into the future.
- EU regulations are changed much more often. In 1995 set-aside requirement was 12%, in 1997, it was 5%, now 10%
- Nobody can tell the farmer under what rules they will work in 2010 or 2015.

This appears to work as a powerful argument against any long-term commitment of land. Even if EU regulations are meant to be neutral they do not appear to be – they favour annual crops.

Grudziądz in Poland (prelim study)

- Detail survey of 30 farmers and a power utility seeking plantings for co-combustion in 1 region
- Generally small farmers
- Focused on ? of industrial planters

Poland - an EiT in EU

- Poland is interesting
  - large area of arable land, circa 15Mha
    - Land abandonment
  - the rapid changes that its agriculture is expected to experience since its integration to the EU
  - the transitional CAP measures (SAP with Po supplements for cereals, rapeseed, beets)
  - (most) suitable bioenergy crops (willow, miscanthus, sida)
  - Only 5000ha willow at present

Lots of unsuitable actors

- Farm Scale – 10s of hectares must be 100s!
- High economic risk for farmers as they have to wait 4 years before they receive payment for a crop.
  - investment in new technology and plantation costs.
- There needs to be a market demanding the product for farmers to plant (but utilities need plantings before …)
- Lack of knowledge, awareness and experience of cultivating dedicated energy crops (the danger of negative experiences ..)

A redefinition of "farming" in EiTs

- A problem relating to planting and harvesting machinery
  - availability of such equipment is essential to a successful plantation
  - Future may be land leasing and contractors **NOT farming**
  - Clashes with CAP aims?
- Salix is not a traditional crop so there can be scepticism that it could be successful in a region where it has never been grown before
- A small number of large land "controllers" can change the picture drastically overnight

Mureck in Austria

- Farmers around the town of Mureck formed an agricultural cooperative for the production of biodiesel.

- Biodiesel refinery, biogas plant, and districting heating plant all utilising biomass.

Umbertide in Italy

- All ingredients for bioenergy – planning for a bioenergy system initiated and then abandoned on many occasions.

- Public opposition, modest knowledge and skills, cooperation difficult, and subsidies for tobacco plantations.

Enköping in Sweden

- Pioneering bioenergy system – CHP plant based entirely on biomass and a boiler converted to use biomass.

- Local energy company is leasing land from farmers, establishing willow plantations, and operating the farming with the assistance of Agrobränsle.

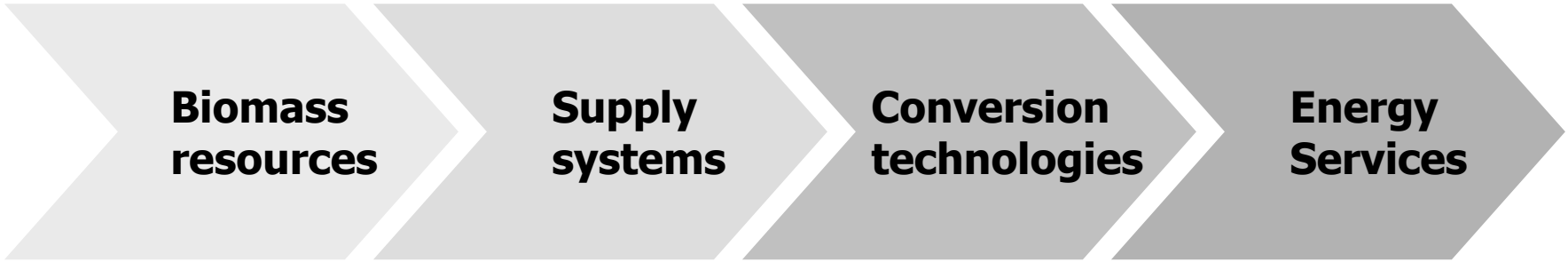
Discussion (1)

- Are recent CAP reforms sufficient to motivate farmers to cultivate energy crops?
  - Case studies suggest that the aid of 45 €/ha for energy crops on agricultural land and the permission to harvest energy crops on set aside land are not playing a leading role in whether or not farmers cultivate energy crops.

Discussion (2)

- Aid of 45 €/ha for energy crops vs tobacco subsidies of 5000 €/ha in Umbertide, Italy.

- Feed-in tariffs for "green" electricity in Mureck, Austria highlight chain of activities.



Discussion (3)

- Amount of compulsory set aside land changes and there are rotations of set aside land in some instances.
- Small-scale utilisation of energy crops (such as on farms) – set aside land
  - Opportunities for cultural landscapes?
- Large-scale chain of activities from biomass production to energy services – agricultural land
  - Tension and competition? Path-dependency?
  - Opportunities? Improved agriculture, landscape preservation, MACRO-phytoremediation

Discussion (4)

- Conventional crops for energy purposes vs dedicated energy crops (annual versus perennial)
  - GHG effectivness? Net energy yield?
- Considerable risk for farmers in changes in both work practices and economic flows
  - Part payment contracts? Simply the "right" land-users?
- Reducing and spreading risk is paramount to stimulate farmers to cultivate energy crops.

Observations (1)

- Supportive measures for energy crops are required across energy, environmental, economic and agricultural sectors (See Venedaal et al. 1997).
- Coherence on policies between the sectors is imperative.
- Many different actors need to cooperate to stimulate diffusion of energy crops.

Observations (2)

- How can policy-makers enhance supportive measures in the CAP to overcome barriers?
  - Establishment subsidies
  - STABILITY in subsidies
  - Information campaigns
  - Demonstration projects
  - Agricultural cooperatives
  - Conversion technologies

Establishment subsidies

- Always calls for subsidies and protection.
- Focused subsidies for farmers in the initial stages to establish energy crops.
- Stability in subsidies is important.

Information campaigns

- Target key actors effectively – which types of farmers and farms are likely to grow energy crops? (See Rosenqvist et al. 2000)

Farmers to farmers – illustrate 'success stories', and explain what to do and what not to do in the initial stages.

- The right crops on the right land as part of the right logistics/system

Demonstration projects

- People believe what they see rather than what they hear.

- Demonstrations – effective way to promote energy crops and encourage farmers to learn about energy crops.

Agricultural cooperatives

- Shares the risks associated with diversifying into energy crops.

- Allows the purchase of necessary equipment and vehicles for use by many farmers.

Conversion technologies

- Large-scale conversion technologies = energy sector.
- Small-scale conversion technologies on farms = agricultural sector.
- Support to purchase or convert boilers and stoves for utilising bioenergy on farms = farmers to initiate energy crops.

Some fundamental issues

Energy crops and European Agriculture

Which policies or sectors?

Agriculture provides a fuel; but this fuel (or feedstock) may be used in different sectors and is influenced by other sectors than agriculture

Land competition is expected (unavoidable?)

Discussion on large vs. small scale end-use is needed - as this may have a profound impact on the development of the supply side structure.

Scale economies

There is an interest conflict between agriculture policy and energy policy.

- In agriculture and agriculture policy the objective is to produce products that provide work to the farmer.
- In energy, however, cost reduction is a prime objective, i.e. the products with the least labour intensity tend to be the most cost efficient.
- Annual crops are much more interesting to most farmers than perennial crops requiring almost no labour (e.g. willow).
- Large plantings provide scale efficiencies, Set Aside on small farms do not.

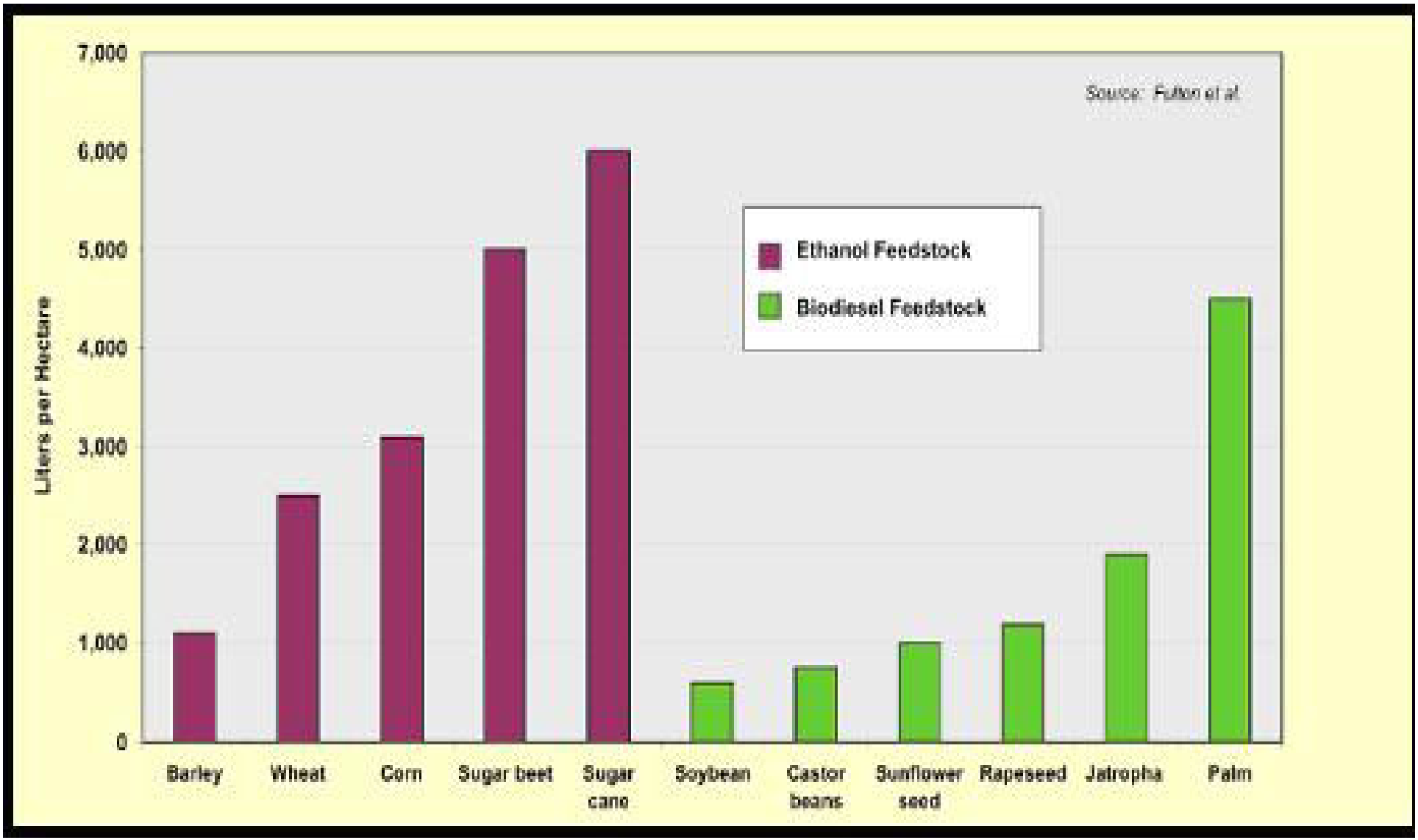
Risk

Risk is an important issue, both from economic, psychological, and biological/agronomic perspectives

A personal sidenote – hybridisation is making drastic improvements in yield, genetics could drastically improve on this, genetics will probably be central to feedstock for biorefineries …THIS is a big issue.

Biofuels & Biofuels

- Because of competition for land, high yield and high output to input ratios are important
  - Rape seed diesel 1.0-1.5
  - Sunflower 0.4 -1.2
  - Grain alcohol 1-2.8
  - Beet alcohol 2.8-3.2
- Moreover, strongly positive GHG reductions are desirable. All fuels are not equal.
- Implications?



(Worldwatch Institute, 2006: http://www.worldwatch.org/node/4078).

Landscape issues

Discussion on the scale and interaction between policy instruments from other policy areas than agriculture is needed.

- 1) The CAP is due for a major policy overhaul in 2013.
- 2) Competition for land use between food and non-food production is likely to be exacerbated.
- 3) Competition for land use may also occur between several bioenergy industries sharing the same biomass supply.
- 4) The effects of the CAP and other policy measures on biomass supply should be addressed at the local and regional level, using detailed data on farm characteristics and land use patterns.
- 5) An understanding of the decision-making process of actors (such as farmers) involved in biomass supply is needed.
- 6) Poland provides a very interesting case because of its large area of arable land, the rapid changes that its agriculture is expected to experience since its integration to the EU, and the transitional CAP measures to which it is subject.

- Energy crops have the potential to reduce GHG emissions by more than 100 percent (relative to petroleum fuels) because such crops can also sequester carbon in the soil as they grow. Estimated GHG reductions for biofuel feedstock include: fibers (switchgrass, poplar) 70–110 percent; wastes (waste oil, harvest residues, sewage) 65–100 percent; sugars (sugar cane, sugar beet) 40–90 percent; vegetable oils (rapeseed, sunflower seed, soybeans) 45–75 percent; and starches (corn, wheat) 15–40 percent.

- The GHG balance of biofuels varies dramatically depending on such factors as feedstock choice, associated land use changes, feedstock production system, and the type of processing energy used. In general, most currently produced biofuels have a solidly positive GHG balance. The greatest GHG benefits will be achieved with cellulosic inputs, such as dedicated energy crops and waste residues.

- Biodiesel, produced mainly from rapeseed or sunflower seed, comprises 80 percent of Europe's total biofuel production. The EU accounted for nearly 89 percent of all biodiesel production worldwide in 2005. Germany produced 1.9 billion liters, or more than half the world total.
- **Biofuels for Transportation: Selected Trends and Facts,** Worldwatch Institute – June 7, 2006