SRC from field to user

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SRC

- Willow or Salix is SRC
- Plantation with cuttings, about 15 000 per hectare
- First harvest after about 4 year
- After that, one harvest about each 3 year
- After about 20 – 25 year, we will finish the growing
- Chips from willow will be used in boilers for forestry residues
- Water content in fresh willow chips is about 50 %

Comments about SRC management

- Little work for growers after the planting year
- Soil preparation during the plantation year is in most cases done by the farmer
- Entrepreneurs take care of planting and harvesting
- One planter or one harvester will plant or harvest large area of SRC
- The large area is one reason why entrepreneurs do the plantation and harvesting
- Most management activities outsourced!

Mechanised planting with approx. 12 000 cuttings/ha

Planting

- Capacity planting about 1 - 3 hectares per hour
- Cultivation life of about 20-25 years

➔ One planting machine can handle large area of SRC


CLAAS
15


CLAAS
20

Harvester

- Capacity of harvester approximately 0.5 hours per hectare
- Harvesting about every third years

➔ It's enough with about one harvester per approx. 1000 hectares of SRC cultivation

Different ways of organizing harvest

- Farmers have a contractor to harvest
- Farmers sell the chips themselves
- Entrepreneurs harvest and sell the chips
- Power plants or broker buy Salix unharvested at the field
- Collaboration between farmers in growers' association that sells chips and organizes harvesting

SRC can be harvested as:

- Wood chips
- Whole shoots
- Billets
- Round balls


BIOBALER
REAR
WB-55
7530

Harvest in winter after 3 years

Chips harvester

Advantage of chiping direct in field

- Cheapest
- Ready to use in large boilers
- Lowest transportation cost

Disadvantage of chiping direct in field

- Problems with storage
- High moisture content is sometimes problem

Whole Shoot Harvesting

Benefits whole shoot harvest

- Can be stored
- Drying during storage
- Higher dry matter content which gives higher energy content

Disadvantages of shot harvesting

- Higher cost caused by field transport and chipping

Things that improve profitability

- Engagement in the management/cultivation and selling of chips
- Well-managed crops that result in high yields
- Geografical localisation
- Municipal sludge and/or wastewater
- Collaboration between all parts

Examples of business concepts with SRC as a base

- Selling heat
- Dry and sell chips
- Take care of sludge or wastewater

SRC at the biomass terminal

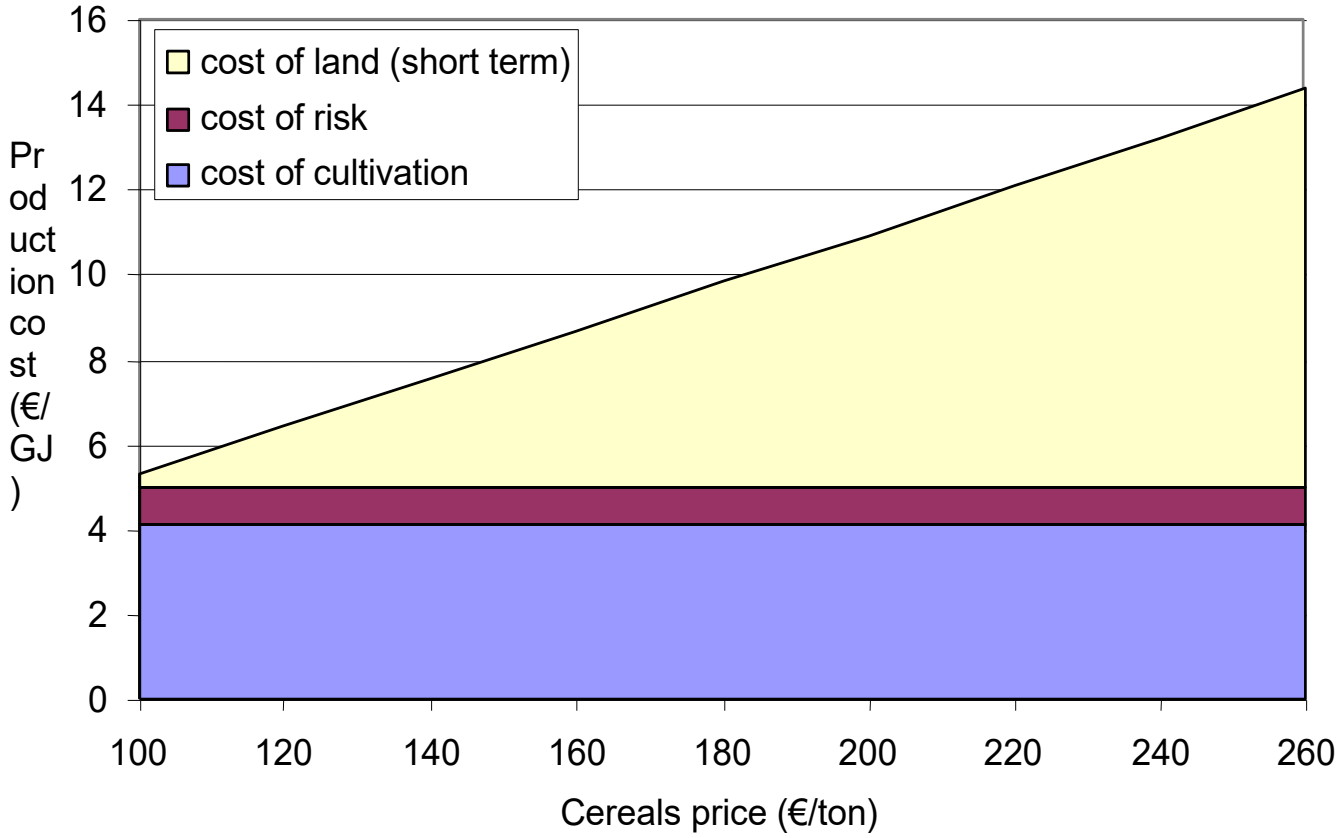
- Can mix different fuels such as SRC, forest fuels and straw to the prefered mix
- The moisture content of the fuel can be controlled by mixing
- Increased security of delivery with storage at terminal when different fuels can replace each other

Chips direct to the boiler of Combined Heat and Power

Delivery of SRC

- The agreed quantity must be delivered at the agreed time
- May be stock with SRC harvested as whole shoots that is chipped at delivery
- Can coordinate with forest fuel and deliver forest fuel in case of lack of SRC
- Difficult to deliver sometimes of different reasons as e.g. weather, machinery and planning
- The buyer often does not want to have agreements with many growers, growers need to coordinate
- Need to discuss with buyers about how Salix should be delivered
- Different buyers have different wishes

Willow production costs



Cost division in SRC (in %)

Willow SRC, production period 22 yr, fertilised only after harvest, new clones	
Average harvest (22 yr) = 8,78	

Establishment	11%
Fertilisation	13%
Harvest and field transport	33%
Tranport to DHP	19%
Selling costs	5%
Termination	1%
Management and OH costs	10%
Interest rate	9%
Sum	100%

An important lesson from Sweden

- Biology and technology are not enough for SRC will be successful

- Do not underestimate the importance of organization around SRC cultivation, especially harvesting, selling and using the fuel.

Rosenqvist's own willow SRC field

- Agricultural soil, 110 ha
- Good soil: 85 ha
- Less good soil: 25 ha
- Forest: 100 ha
- Willow SRC: 6 ha
- Willow on the worst part
- Planted 1994

- Older clones with low production
- Not fertilised
- Harvested 4 times
- Last harvest: 2016
- Winter 2014-2015 was the market poor. I moved the harvesting to next winter.

Harvest in 2016

- Harvest: 29 ton DM/ha after 7 years
- Price per ton DM: 75 € (17 € per MWh)
- Income: 2 176 €/ha
- Harvest costs: 830 €/ha
- Transport (100 km): 652 €/ha
- Loading: 119 €/ha
- Netto per ha: 576 €/ha

Thank you!