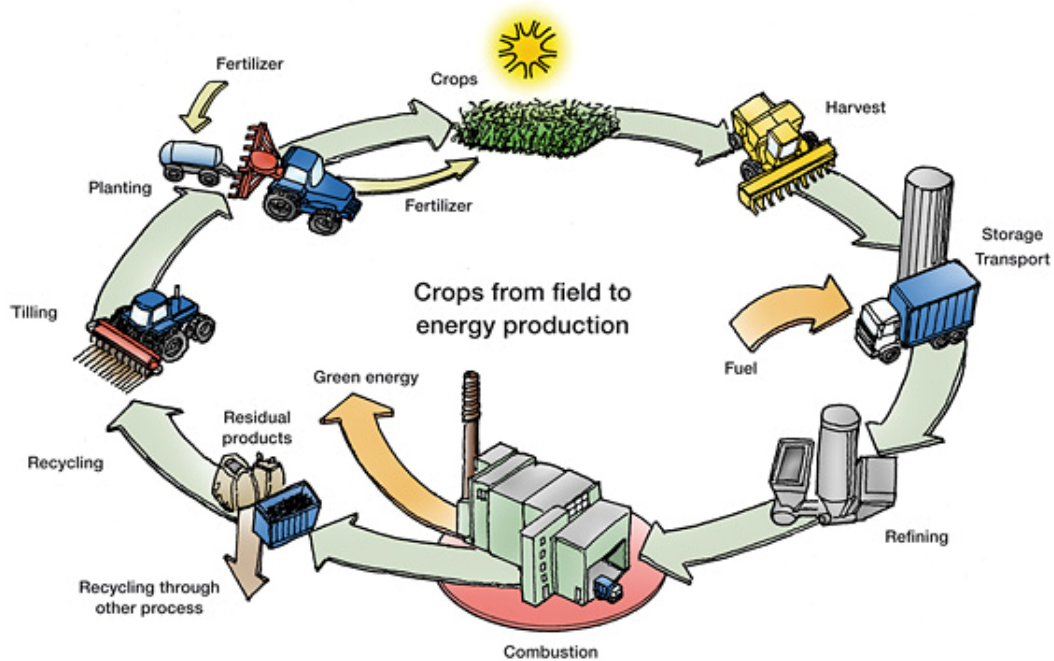




**Värmeforsk's and Stiftelsen Lantbruksforskning's  
joint research program for the years 2006 - 2009**

**Crops from field to energy production –  
salix, straw, cereals, reed canary-grass, and hemp**



## Summary

Energy crops from fields are still an almost totally unused potential for heating and electricity production. In times with harder competition for biomass, the interest for crops like salix, straw, cereal, reed canary-grass and hemp increases. To increase the potential for energy crops as fuel a working chain is needed from cultivating and harvesting via storing, transport, preparing and quality proofing to burning and dealing with the ashes. Therefore Värmeforsk and Stiftelsen Lantbruksforskning (SLF) have made a joint initiative to a research program. A close cooperation between the two trades that together deal with the chain is a prerequisite to let the production and the use of the energy crops from fields to become the resource that is expected and needed.

The programs long-term goal is to increase the production and the use of bio energy from the agricultural sector to burning for heating and electricity production in Sweden. The vision is that during the time of the program decisive steps towards a well functioning and better fuel market for bio energy from the agricultural sector. The program will be limited against and coordinated with other programs for example programs aimed towards vehicle fuels.

### **The program has the following part objectives:**

- To increase the knowledge about the use of energy crops for heating and electricity production.
- To increase the knowledge in regards to fuel qualities meaning the effect of variety choices, the growing conditions, fertilizing, strategies for harvesting, strategies for storing, preparation and fuel mixes.
- To make production possible and use of energy crops from fields both in volumes and in number of crops.
- To identify and remove problem areas in the chain.
- To identify and prevent hindrances for a well working market for energy crops.
- To make the knowledge available and financially, technically and environmentally describe well working full solutions.

The efforts will be of a demo character, development project and a research project. Each projects connection to the whole project will be clear from a technical, financial and an environmental angle. This means that the whole chain from cultivating, harvesting, storing and transport to quality assurance, preparation, refinement (if needed), dosage, burning, cleaning the smoke gases and to take care of the ashes will be dealt with within the program.

### **The program will contain:**

- **Pre studies / literature summaries**  
Existing knowledge and experiences will be summarised and synthesised. These summaries will be used for judging where to put in extra efforts.
- **Identification of hindrances and possibilities**  
Hindrances in the shape of unclear and/or conflicting regulations must be identified in order to be able to remove the hindrances for a functioning energy crop market.
- **The fuel quality's dependence on cultivating and harvesting.**  
The possibilities to control the level of ashes and the ash quality through variety choices, cultivating and harvesting methods and also harvesting time so that eventual problems with sintering, increase and high temperature corrosion is minimised.
- **Storing**  
Knowledge in correct dealing and storing of different fuel qualities if expansion will be investigated.
- **Refining the fuels**  
Operations regarding pelleting will in this program only be a complement to already existing programs within the Energy authority.
- **Preparation and dosage of the fuel**  
Technical solutions for fuel preparation, mixing and dosage.
- **Burning energy crops**  
Experience in burning varies strongly for the energy crops salix, straw, cereal, reed canary-grass and hemp. Within the program experiences must be looked into from (Denmark for example) Recommendations for the best choice of burning technique for different fuel qualities such as choice of materials and operation strategies will be brought forward. The possibility to use additives for the fuel preparation or the boiler will be looked into.
- **Production of electricity**  
The effect of the energy crops qualities on the possibility to produce electricity with a high electricity working grade will be investigated.
- **Smoke gas purification and emissions**  
The effects of the energy crops qualities on the demands on purification technique (primary or secondary) in order to minimise the pollution of particles, nitrogen oxides and souring subjects. Also the risk for creation of dioxin will be looked into.
- **Dealing with the ashes and giving back ashes to the field**  
Technique for a rational way of dealing with ashes and how to give back to the fields. Also the demands for the purity of the ashes, other components and clear limits for heavy metals must be investigated.

During the course of the program, emphasis will be made on the spreading of information and knowledge. It is very important that these results are brought to the market participants as fast as possible. The project reports will be made public on the web sites of Värmeforsk's and SLF's and via Institutet för Jordbruks- och miljöteknik (JTIs) coming web portal for bio energy. The results will also be spread in seminars, workshops and newsletters. When the results are being reported at conferences, home pages, seminars etc the financial contributors to the execution of the project will be mentioned.