A report on results from
Questionnaire regarding the use of agro-biomass in heat and power generation.

January- mars, 2010

The survey was composed of two questionnaires, one directed to producers of energy crops regarding their need of information and one directed to district heating plant and combined heating plants (CHP) managers regarding experiences of use of reed canary grass.

- About 30 questionnaire sheets were distributed to the participants
- About 6 were filled and returned. Four of these are from energy crops producers and two are from managers of biofuel heating plants.
- Questionnaires with relevant answers have been scanned as attachment of this report.

There were few from the two target groups attending the training course and InfoDay activities. Therefore the survey has been extended with a follow up by sending questionnaires by e-mail to 115 producers of heat and electricity from biofuel.

In total there were 20 returned answers in questionnaires and another 15 returned answers through e-mail. The e-mail respondents generally stated that they did not use reed canary grass and therefore did not have anything to contribute to the investigation. One of these respondents however wrote that the grass could be a future option in their newly installed straw boiler.

The questionnaire answers can be summarized as follow:

Type of plant: 12 Heating plants, 7 combined heat and power plants (CHP) and 1 other plant (bioenergy combine)
**Type of boiler:** 14 Grate boiler, 4 fluid bed boiler, 1 other boiler (Eckrohr)

**Total effects of boiler:** From 4 to 130 MW

**Annual production:** From 17 to 1100 GWh

**Total annual amount of fuels:** From 22,5 to 1300 GWh

**Fuels used (most frequent mentioned):** Wood chips, forest residues, peat, bark, waste

**Reed canary grass, amount used:** Two positive answers (the users will in following relevant answers will be identified with a) and b) respectively); a) 6 GWh and b) < 1000 ton

**Share of reed canary grass in fuel flow:** Two answers; a) Maximum 10%, average 5% (weight) and b) maximum 2%, average 1% (weight).

**Supply of reed canary grass, from where?:** Two answers; a) ) within 30 km from plant b)Bioenergigårdar/maskinringen (regional project).

**Transport to plant:** Two answers, a) already crushed b)bales

**Crushing with own equipment at plant yard:** One answer, b) yes!

**Problems with crushing:** One yes, “ b)If it’s not crushed it will be trouble with the transport within the plant”.

**Straw, average length:** Two answers, a) 40 mm and b) “desirable 50 mm”.

**Straw, maximum length:** Two answers, a) 100 mm and b) “desirable 100 mm”.

**How to mix with main fuel? :** Two answers; a) with wheel loader in plant yard b) in minor flow

**Problems with handling:** Two answers; a) To long straws, b) uncrushed material cannot be transported in screws etc.

**Solved problems?:** a) informed suppliers b) will test to grind material and mix with another material

**Changes in boiler while combusting reed canary grass?:** One positive answer; b) the temperature becomes higher in upper part due to dry and light material, which is not good for the plant.

**Biggest bottleneck at your plant in utilization of reed canary grass?:** Three answers a) feeding system not adjusted to this fuel. b) Bulky fuel, too long straws in disk sieve c) The fuel handling routines are not adjusted to this fuel.

**Future plans concerning utilization of reed canary grass:** 11 answers whereas three indicated possible increased use, a) from 6 to app. 10, b) Depends on demand and price, but technically it must be considered as a problem fuel and therefore has to be mixed thoroughly to be a part of the fuel mix. c) We do accept fuels if they are manageable and to right price. The remaining answers negative.

**Research needs, suggestions etc:** a) quality aspects, delivery experiences, working experiences, economy b) reduce losses in harvest, transport logistics, compressing of raw material, terminal solutions.

**Comments:** From just two examples of experience in reed canary grass combustion, no unambiguous conclusions of course can be drawn. Still there are some similarities in the answers that can be high-lighted. Both points at the problems with too long straws, causing difficulties
with handling within the plant and especially in the sieves. Connected with that problem is the problem with bulkiness of the fuel since this partly is due to long straws. One respondent reported combustion problems (high temperatures in upper part of the boiler) that maybe could be solved if the grass was cut in smaller pieces and better mixed with other fuel. No problems were reported with sintering or corrosion in these examples. Such problems cannot however be ruled out in other circumstances and since consequences from that can be very costly, further knowledge in that area is necessary.

Summing what research and development in the area primarily should focus on:

i) Minimize harvest loss,

ii) Easy ways of compressing raw material at field side thus making transport easier,

iii) Accomplish fuel that are readily mixed with other fuels (preferably in the same step as the field-side compressing)

iv) Develop methods for combustion of ash-rich and potentially sintering and/or corrosive fuels.