Review of Master´s Thesis of Bc. Andrey Kutsay
„Thermal-Expansionary Pretreatment of Lignocellulose Wastes in Industrial Scale“

The diploma thesis deals with very important problem – renewable sources of energy. According the diploma thesis assignment goals of the thesis were:

- Summary of present knowledge - principle of biogas technology, pretreatments
- Design of a non-intensified and an intensified biogas plant for a model raw material including mechanical disintegration and thermal-expansionary pretreatment
- Energy-economic feasibility study of intensified and non-intensified biogas plant
- Ecological and economical aspects of the proposed solutions

The Chapter 1 deals about history of biogas use, expansion of biogas production and raw materials used for its production including the raw material composition

In the Chapter 2 is the critical literature research. In the first part an effect of various parameters on the process of anaerobic digestion is specified. The next part describes methods of raw material pretreatments. The final part of this chapter is devoted to the laboratory experiments with thermal-expansionary pretreatment.

In the Chapter 3 are specified objectives of the thesis that result from the thesis assignments and literature research.

The last part of the Thesis describes results of a design and calculation of intensified and non-intensified plant for biogas production.
The detailed flowsheet of the plant is in the appendix.

To the presented work I have only minor observations arising from lack of experience of the student. It is mostly wording inaccuracies and oversights that do not affect the level and results of the work. Some typing errors I corrected in the thesis.

I have several these remarks to the work:

p.12 Tab. 1 - I am not sure if it is possible to use the sugar cane bagasse as a source for the biogas production. In cane sugar factories is the bagasse used as a fuel in steam boilers.

p.14 The abbreviations ORT and HRT should be explained in the text. The HRT is not in the list of symbols.

p.16 Tab. 2 - The sum of concentrations is higher than 100 %,.

p.20 The abbreviations ORT and CSTR should be explained in the text.

p.22 Why are sometimes mentioned authors in the text but sometimes only a number of reference? it is not only on this page.

p.23 Explain what is the organosolv process.

p.26 In the Fig.9 I miss symbols for pretreated substrates. They are only in the Fig.8.

p.42 Where is estimated the compressor energy consumption?

p.43 The compressed vapor used for heating will be very superheated (c. 400 °C or more). Therefore I think that the proposed value of the coefficient k is too high (see eq. 12). I suggest to cool the superheated vapor before its use. How was the k value specified?

p.48 Constants a, b and n were taken from this source (29) too? And are they valid for your equipment and parameters too?

p.50 Here the compressor has No. 110, but in the previous text and flow chart it has No. 202. The compressor power 40 kW seems to be too low.

p.65 Is the error approximately the same for both tested plants? And is with the same sign?

Questions for discussion:

See the above specified

Overall assessment of the thesis:

The present work meets all requirements for master's thesis. Due to its level of expertise, diligence and execution of technical processing and formal level and with aspect to the Czech regulations I give to the Thesis a note:

„ výborně - mínus" ("excellent - minus") = "A - "

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