Biorefinery concepts for the production of ethanol including biogas-production and upgrading

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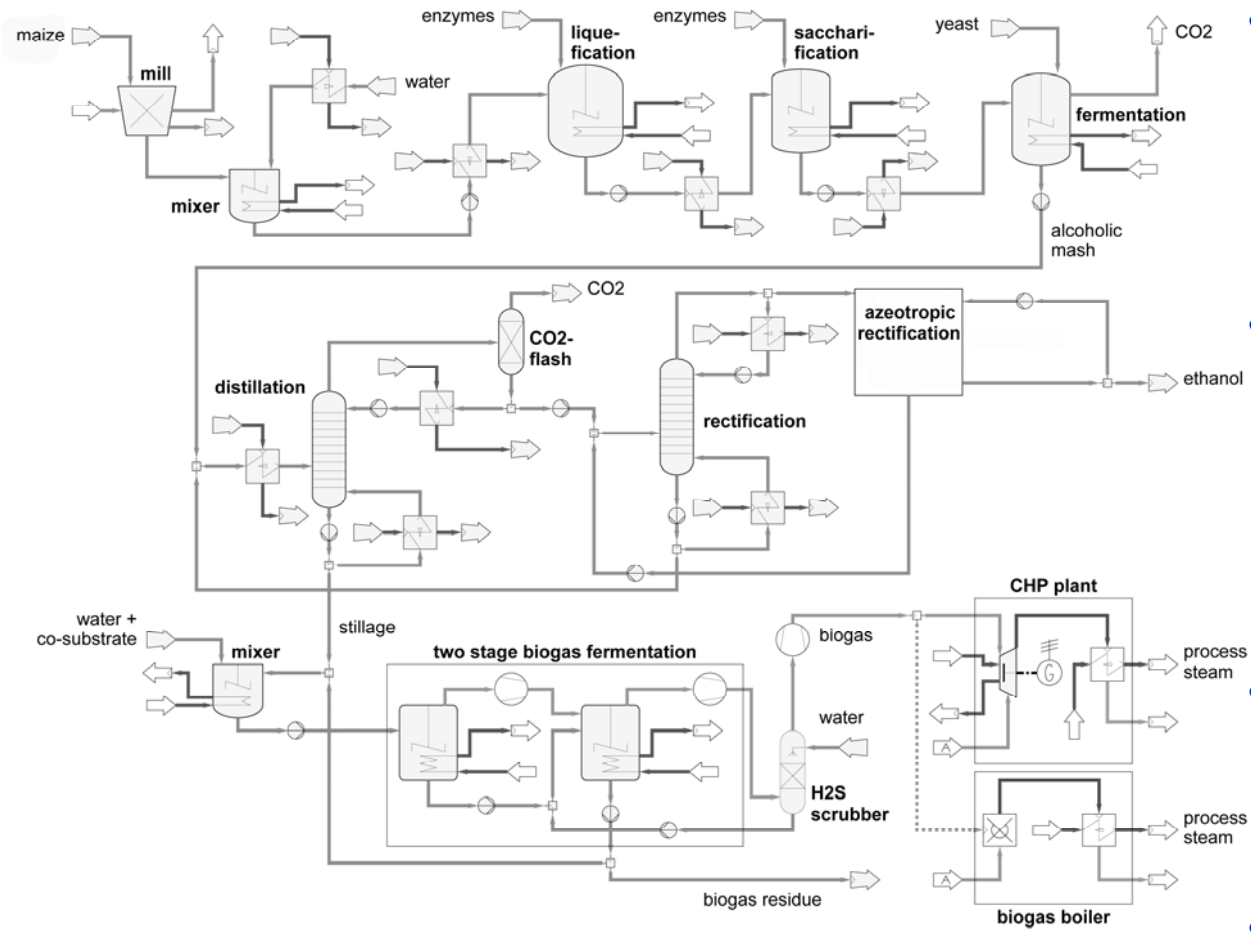
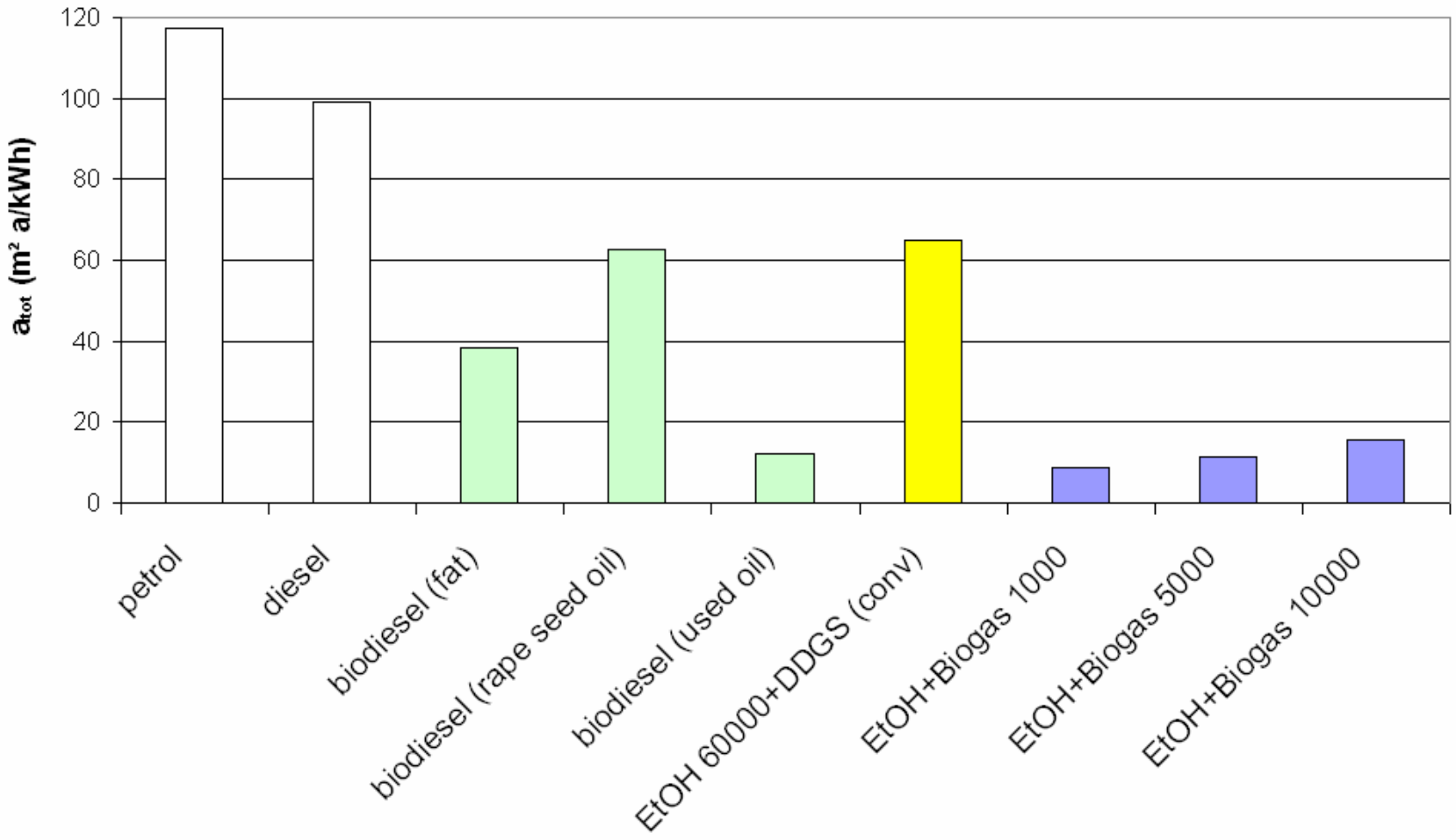
Bioethanol Process Optimisation



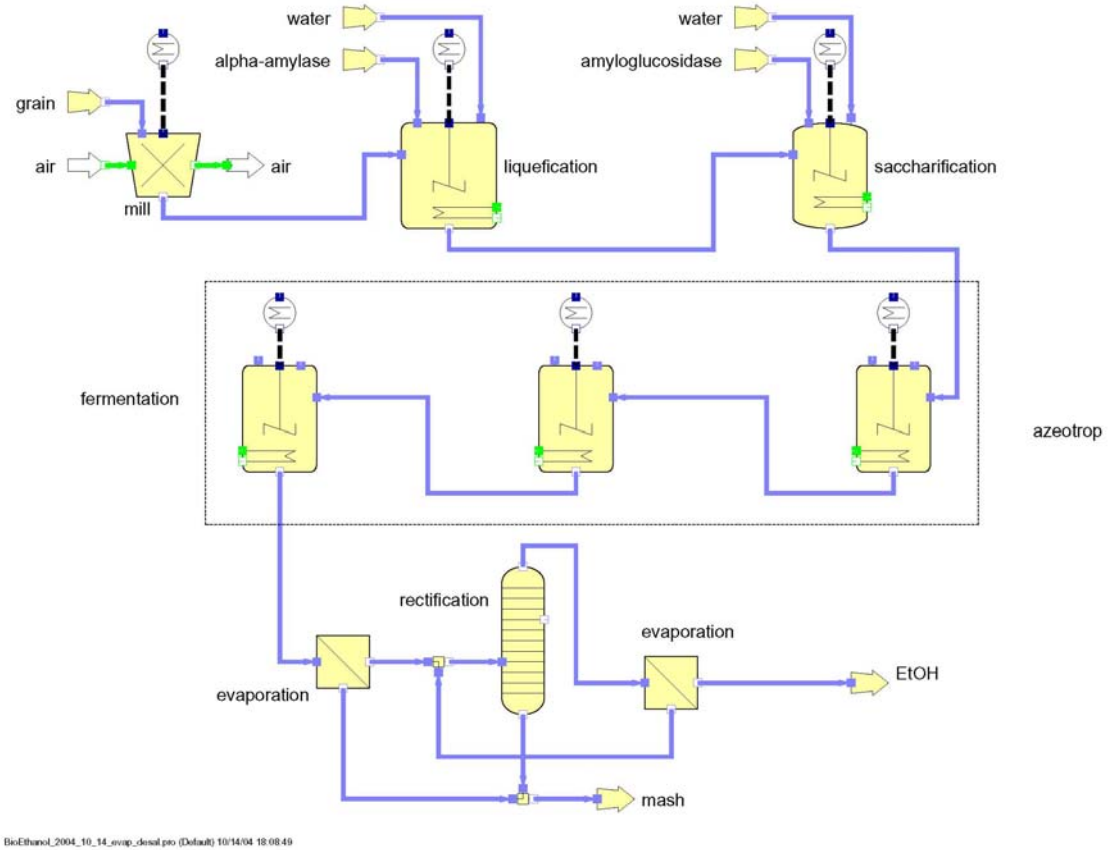
- Fermentation
  - Mashing
  - Liquefication
  - Saccharification
  - Fermentation (8 wt% EtOH)
- Purification
  - Distillation (40 wt% EtOH)
  - Rectification (94 wt% EtOH)
  - Azeotropic rectification or Membrane process (99,8 wt% EtOH)
- Biogas production
  - CHP Plant
  - Biogas boiler
  - Biogas upgrading
- Straw incineration

SPI of Small-Scale Ethanol-Biogas Process - Corn



Ref: EdZ (Projects-807764, 811262); M. Narodoslawsky (RNS), TU Graz; T. Amon, ILT-BOKU Wien

Membrane Processes during Ethanol Purification



- Pervaporation and Vapour permeation

Membrane Process for Biogas Upgrading

- First fully integrated GP based biogas upgrading in Europe
- Plant capacity (Bruck/Leitha): 180m³/h biogas (100 m³/h biomethane)
- Zero CH_4 emission via enhanced process integration with CHPs
- Meets Austrian quality regulation ÖVGW G31 / G33
- Start of continuous operation in 10/2007