pyrolysis of pulpa

timetable

- technology
- experiences and results
- advantages and disadvantages
- feasibility
- challenges
- outlook

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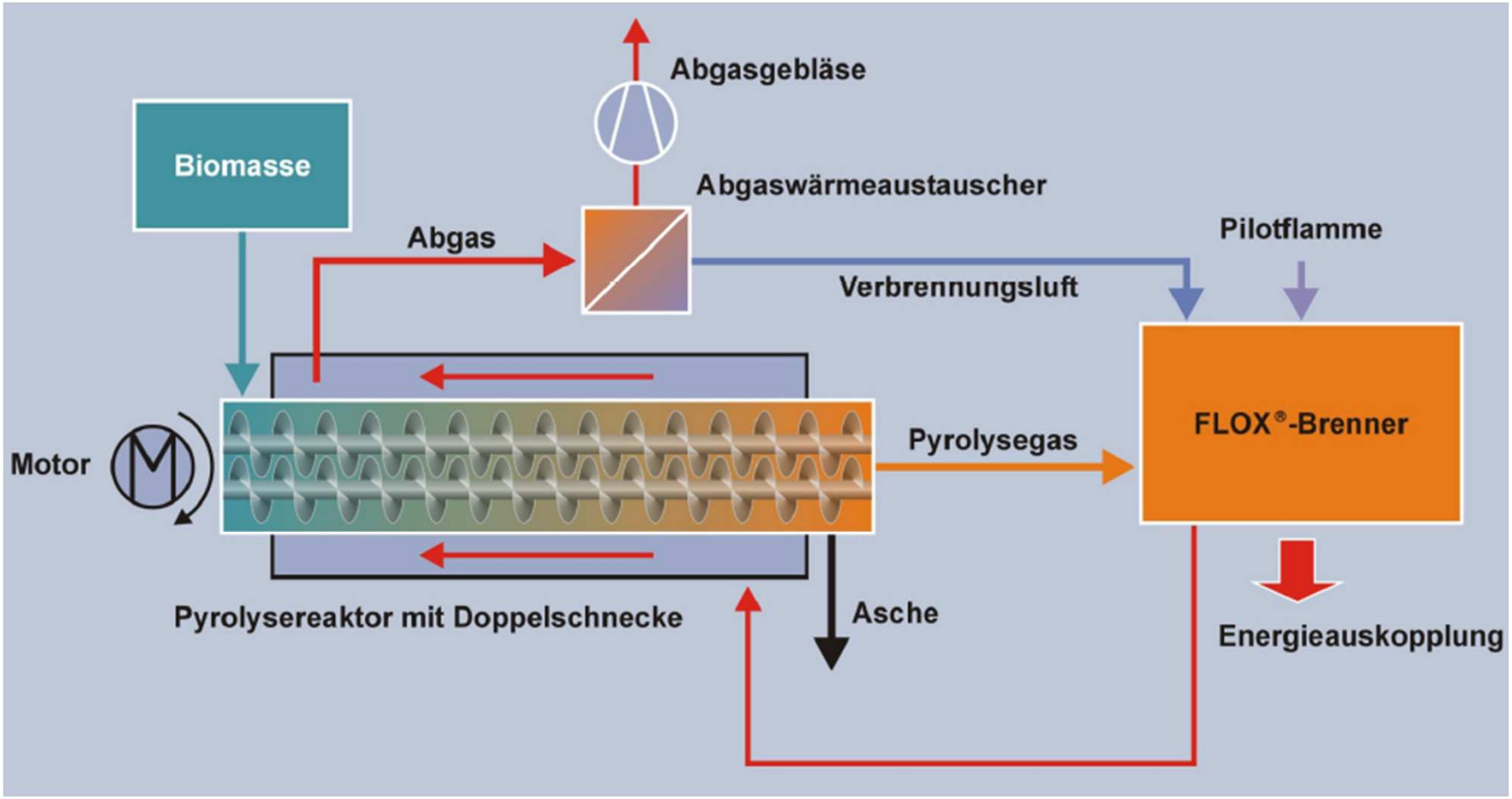
technology – pyrolysis (1/2)

- process
  thermal decomposition of high-molecular organic compounds to burnable gas (CO, CH_4, H_2, tar) and charcoal without oxygen at a temperature of about 500°C
- technical unit of Pyreg GmbH, DE
  1. reactor with feeder
  2. gas burner (FLOX®)
  3. heat recuperator (no need of external energy, net heat production)

technology – pyrolysis (2/2)



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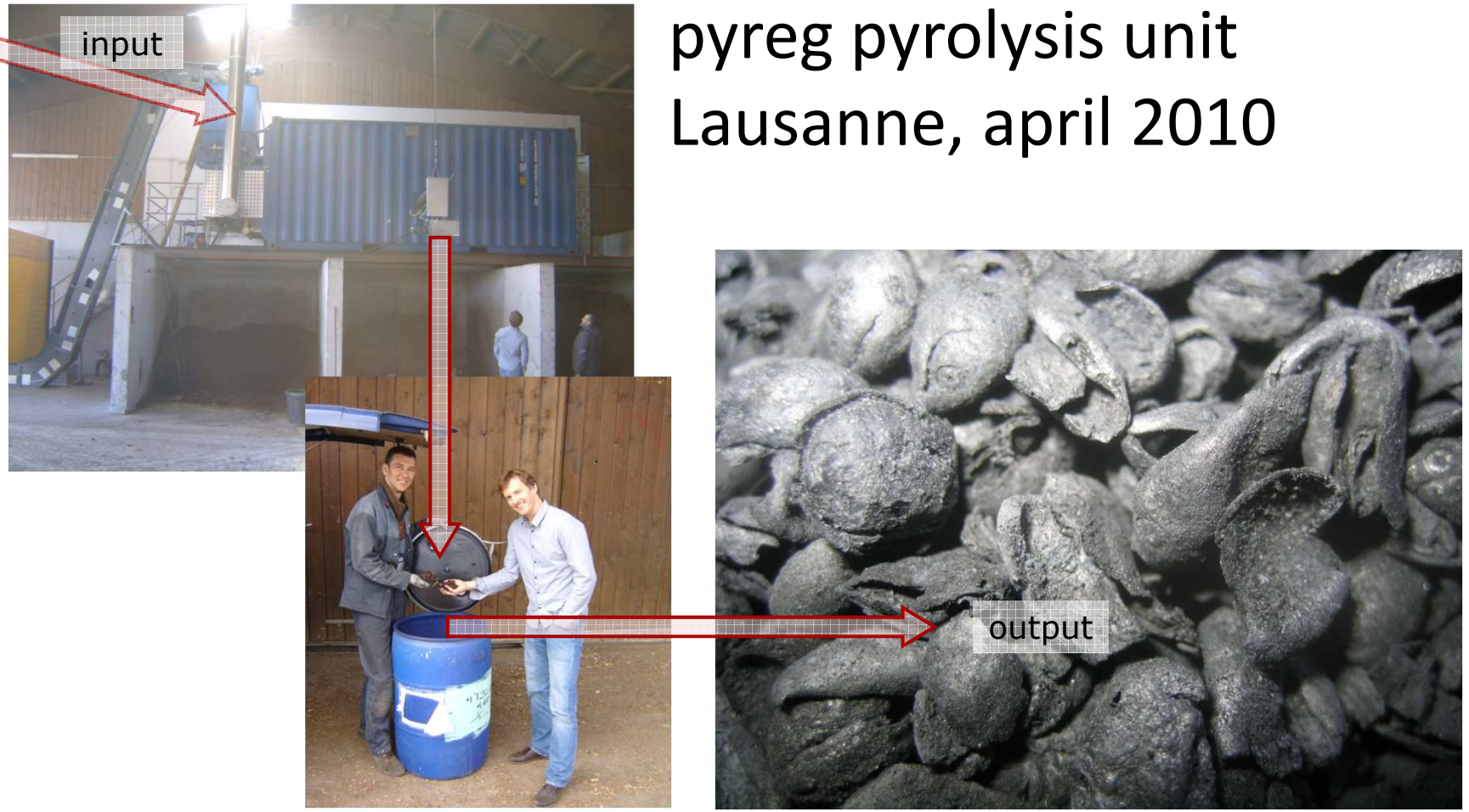
experiences and results (1/3)

- Oekozentrum Langenbruck OEZL has just finished its burning analysis with the verdict «unburnable» when the pyrolysis unit of Pyreg GmbH was put into operation in Lausanne in april 2010;
- good connections to OEZL made it possible to deliver two barrels of pulpa to the pyreg pyrolysis unit;
- the first try run of pyrolizing pulpa in april 2010 was successful.

experiences and results (2/3)

pyreg pyrolysis unit
Lausanne, april 2010



experiences and results (3/3)

- the try run of pyrolizing pulpa was successful (based on a 20 minutes run with 400 litres of 50% dry pulpa):
  - the consistence of the material is excellent to be transported into and within the unit
    → high production rate
  - the material was carbonized completly
    → good carbon quality
  - the gas release was sufficient to maintain the process and to hold the temperature
    → net heat production

timetable

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advantages and disadvantages

+ advantages	- disadvantages
+ fast and clean inertization of pulpa → no GHG-emissions	- only 50% of the energy content is exploited
+ 99% retention of the minerals (potash) → closing nutrient cycle	- quite expensive hightech unit
+ separation of gas release and burning → no bed ash	- no long term experience
+ production of biochar → potential of soil improvement	
+ production of biochar → carbon sink	
+ net heat production → saving energy	

timetable

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feasibility

- technical
  - tests of OEZL have shown that gasification is the only way for a energetic exploitation
  - the process of pyrolysis is ideal for the solution of the problem because of a consequent separation of gas release and gas burning)
  - first tests in Lausanne are very promising
- economical
  - in circumstances of developping countries: Pyreg-unit probably too expensive (hightech)
- ecological
  - very good, see advantages
  - very clean gas combustion only with FLOX® burner

timetable

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challenges

- conditioning (drying) of fresh pulpa
- utilization of the excess heat
- demonstration of the benefits of biochar (depending on soil conditions), besides the obvious refeed of minerals
- developping of a lowtech pyrolysis unit or establishment of a durable financing system (for investment and maintanance) for a hightech unit

timetable

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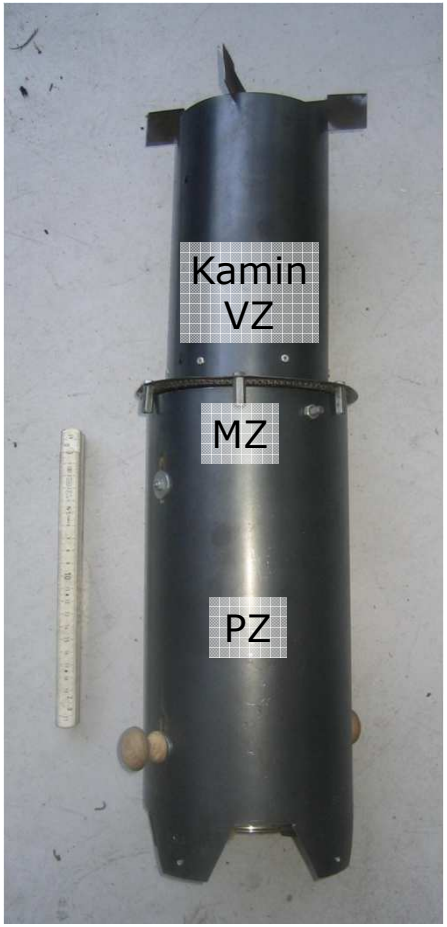
- **outlook**

outlook & chances

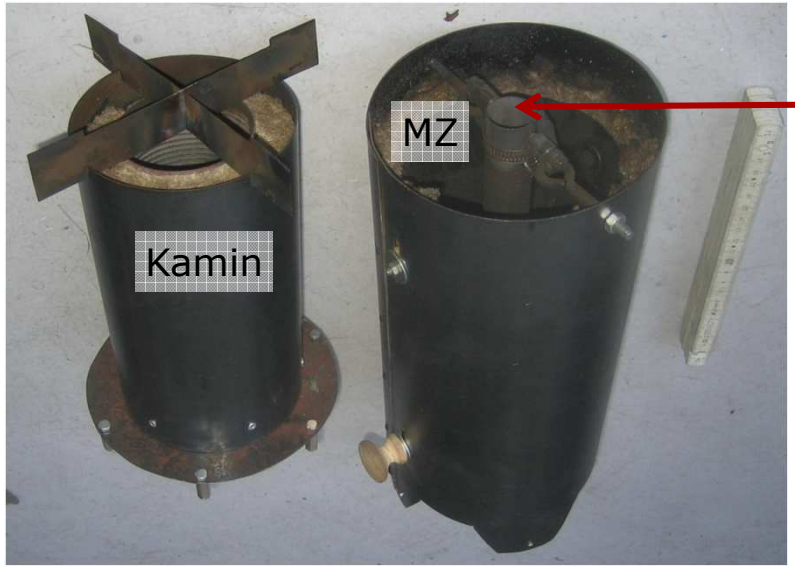
- experiences of biochar field tests are extended very fast around the world e.g. www.biochar-international.org
- new lowtech pyrolysis units were developped, e.g. www.abokobi.ch or www.kaskad-e.ch
- increasing nutrient costs increase the benefit of biochar as soil improvement
- biochar as carbon sink: industrialized countries invest in developping countries

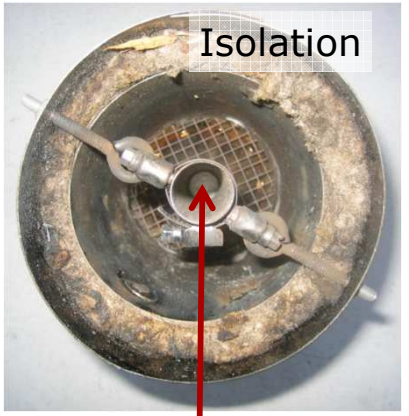
outlook - new lowtech pyrolysis units



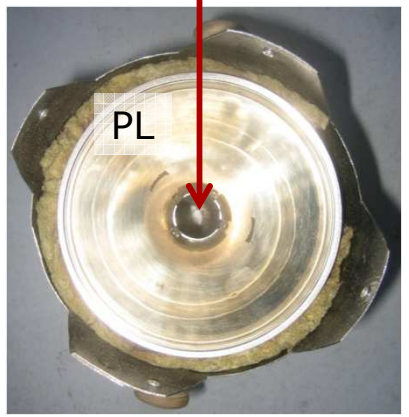
principle TLUD (Top Lit Up-Draft)

Kakskad-E GmbH, Basel





SL durch Zentralrohr



outlook

principle
TLUD

Verbrennungszone, VZ:

Verbrennung der Pyrolyse-gase; sichtbare Flamme und nutzbare Wärme

Mischzone, MZ:

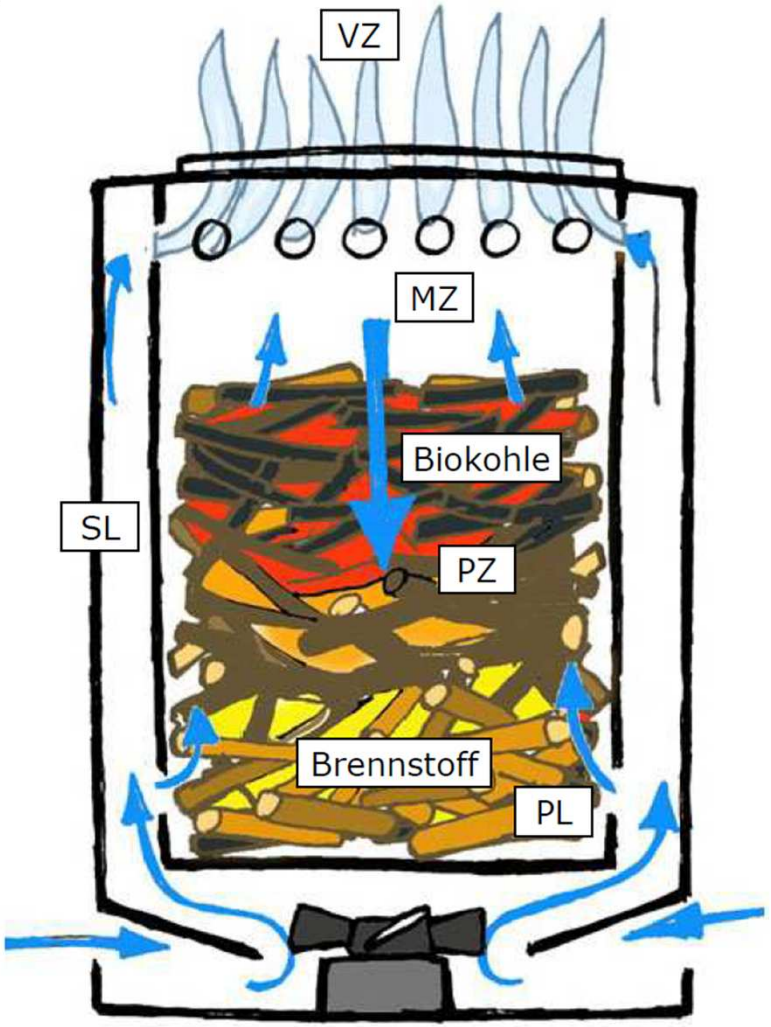
Vermischung von hoch-steigenden heissen Pyro-lysegasen mit Sekundär-luft im Überschuss

Pyrolysezone, PZ:

Nach unten wandernde, glühende Pyrolysefront; angefacht durch wenig Primärluft

Luftzufuhrregelung:

- Primärluft, PL (λ=0.2) strömt von unten in den Brennstoff und fliesst aufwärts zur PZ
- Sekundärluft, SL (λ=2.5) wird in der Doppel-wandung vorgewärmt und strömt in die MZ



Quelle: www.ithaka-journal.net, modifiziert durch Stephan Gutzwiller

Thank you for your attention !

further informations:

- www.pyreg.de
- www.swiss-biochar.com
- www.delinat-institut.org
- www.abokobi.ch
- www.kaskad-e.ch

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