

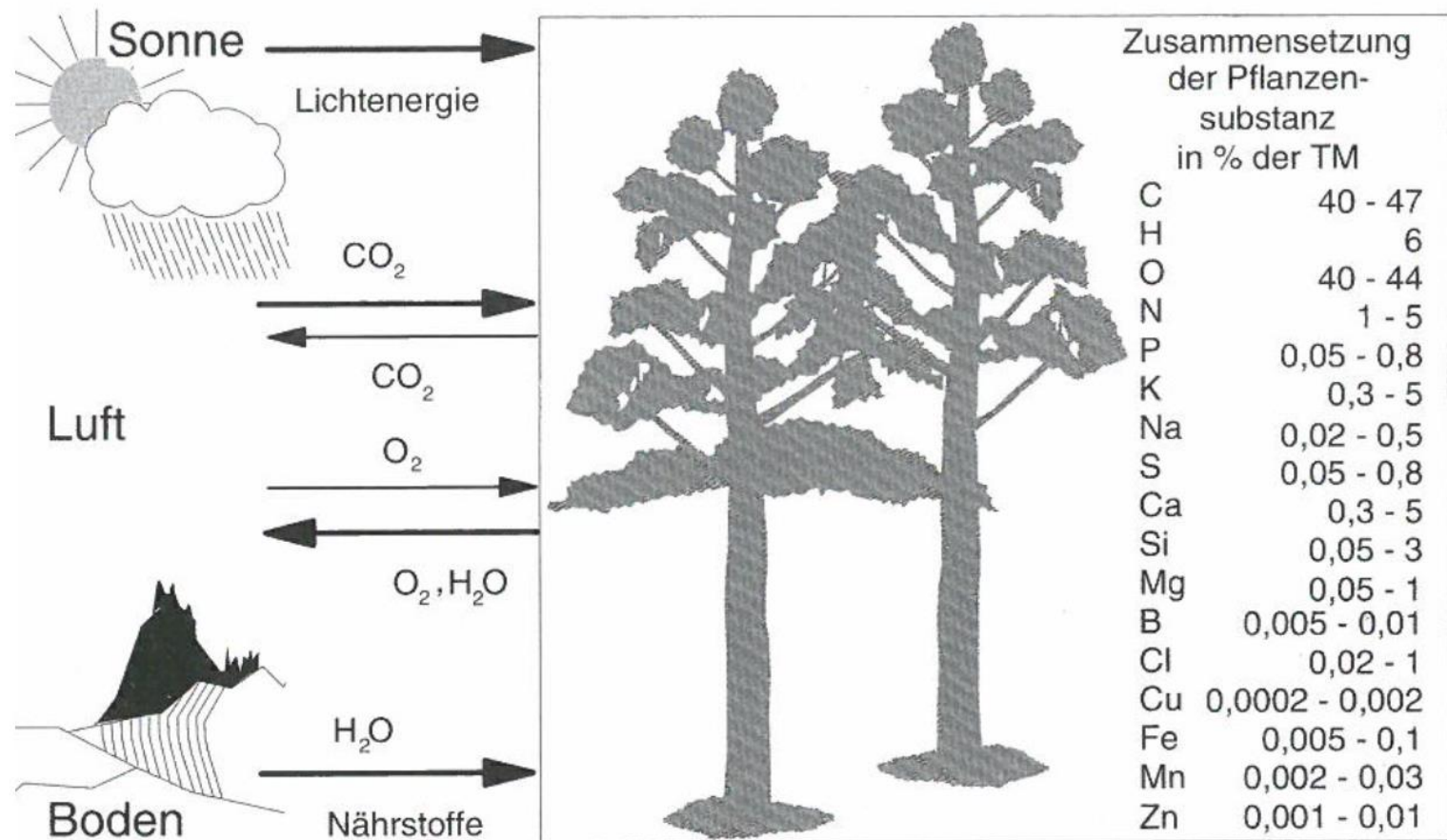
Pepel in kako z njim rokovati

3. LOKALNI TERNING – webinar

Emisije, kvaliteta zraka, logistika goriva in pepela. Webinar,
20.9.2021

Franci Voglar
Javne službe Ptuj, d. o. o.

Nejc Jurko
Zavod Kssena Velenje



Quelle: Kaltschmitt 2001, Energie aus Biomasse

Zusammensetzung der Pflanzen- substanz in % der TM

C	40 - 47
H	6
O	40 - 44
N	1 - 5
P	0,05 - 0,8
K	0,3 - 5
Na	0,02 - 0,5
S	0,05 - 0,8
Ca	0,3 - 5
Si	0,05 - 3
Mg	0,05 - 1
B	0,005 - 0,01
Cl	0,02 - 1
Cu	0,0002 - 0,002
Fe	0,005 - 0,1
Mn	0,002 - 0,03
Zn	0,001 - 0,01

Glavni elementi (> 1% resp. > 10.000 mg/kg)

- Ogljik, C
- Kisik, O
- Vodik, H
- Dušik, N

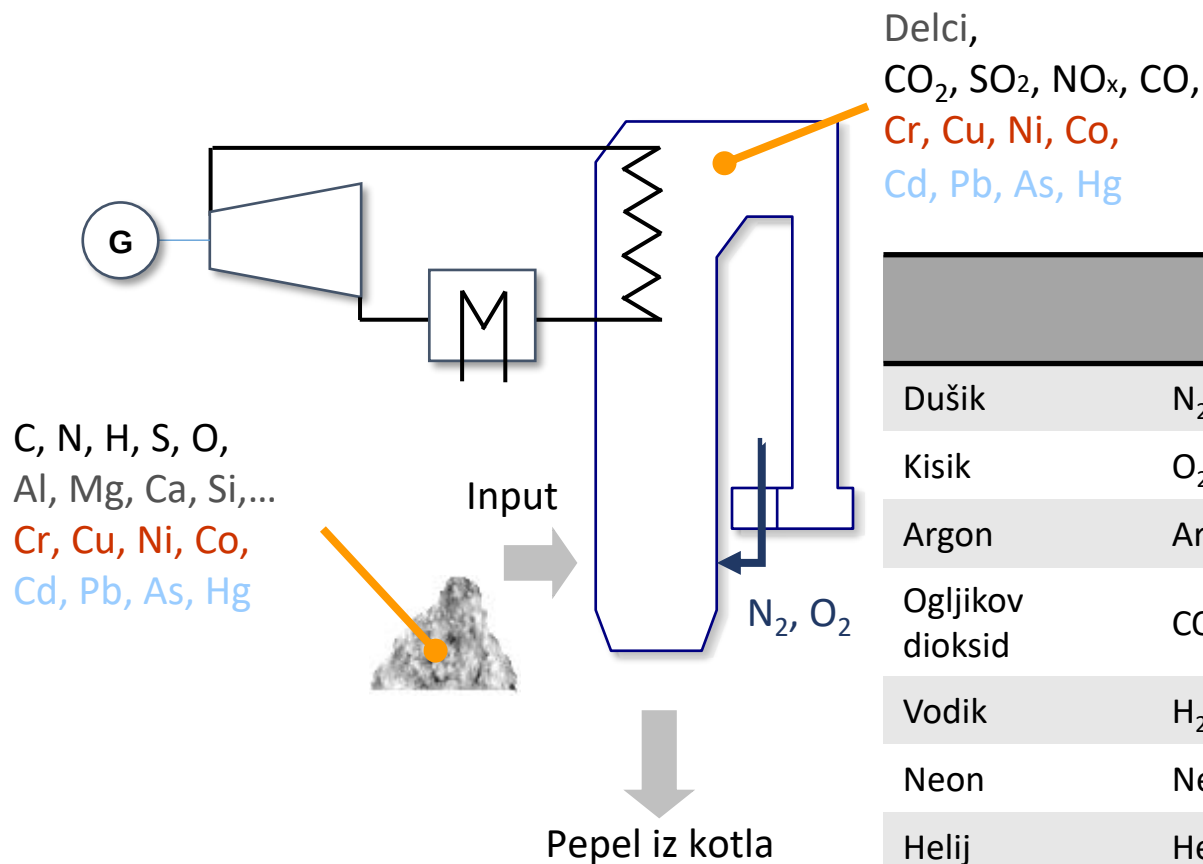
Manjši elementi (0,01 – 1 % resp. 100 – 10.000 mg/kg)

- Fosfor, P
- Kalij, K
- Natrij, Na
- Žveplo, S
- Kalcij, Ca
- Silici, Si
- Magnezij, Mg
- Klor, Cl

Elementi v sledovih (< 0,01 % resp. < 100 mg/kg)

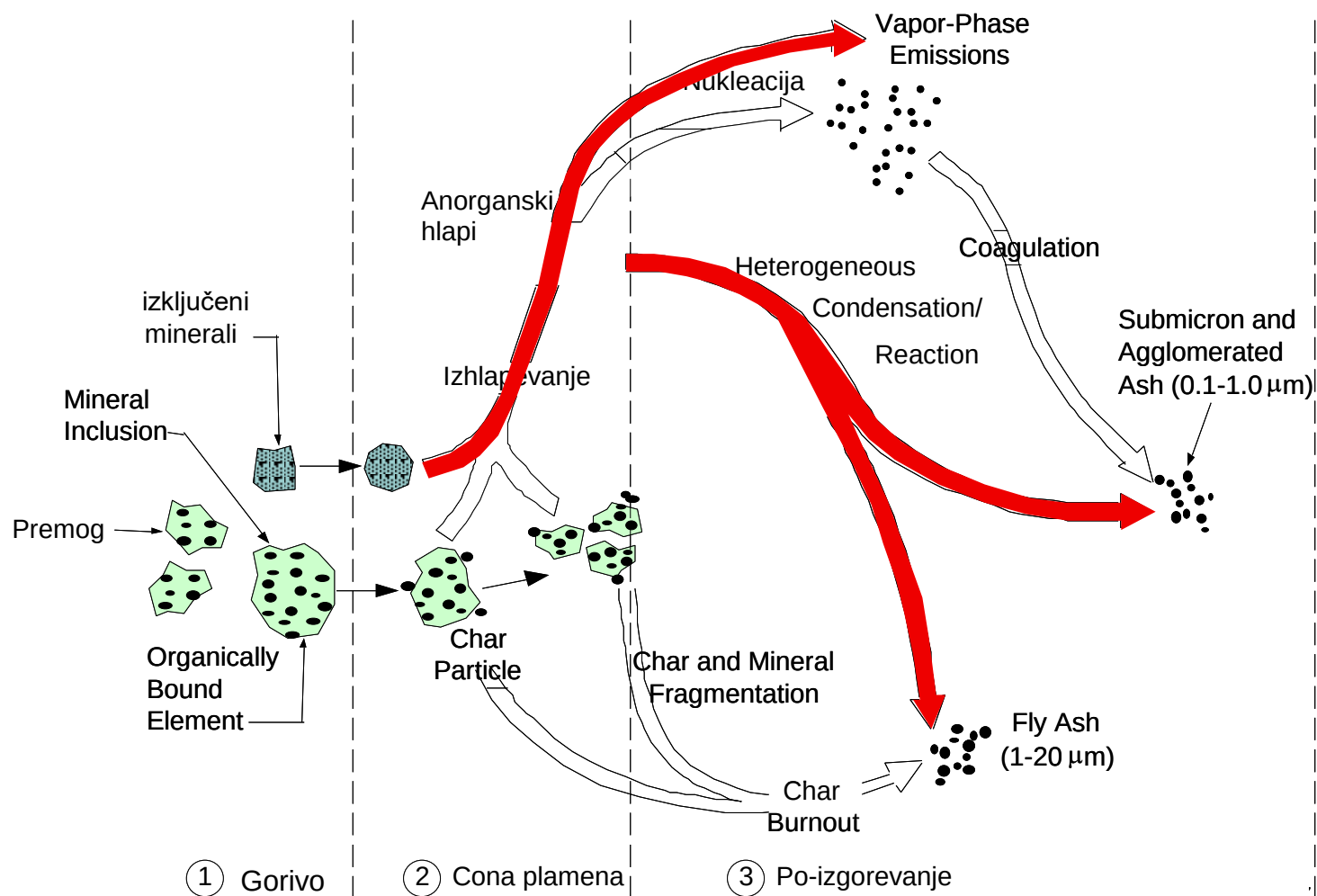
- Boron, B
- Baker, Cu
- Železo, Fe
- Mangan, Mn
- Cink, Zn

Delovanje toplotarne

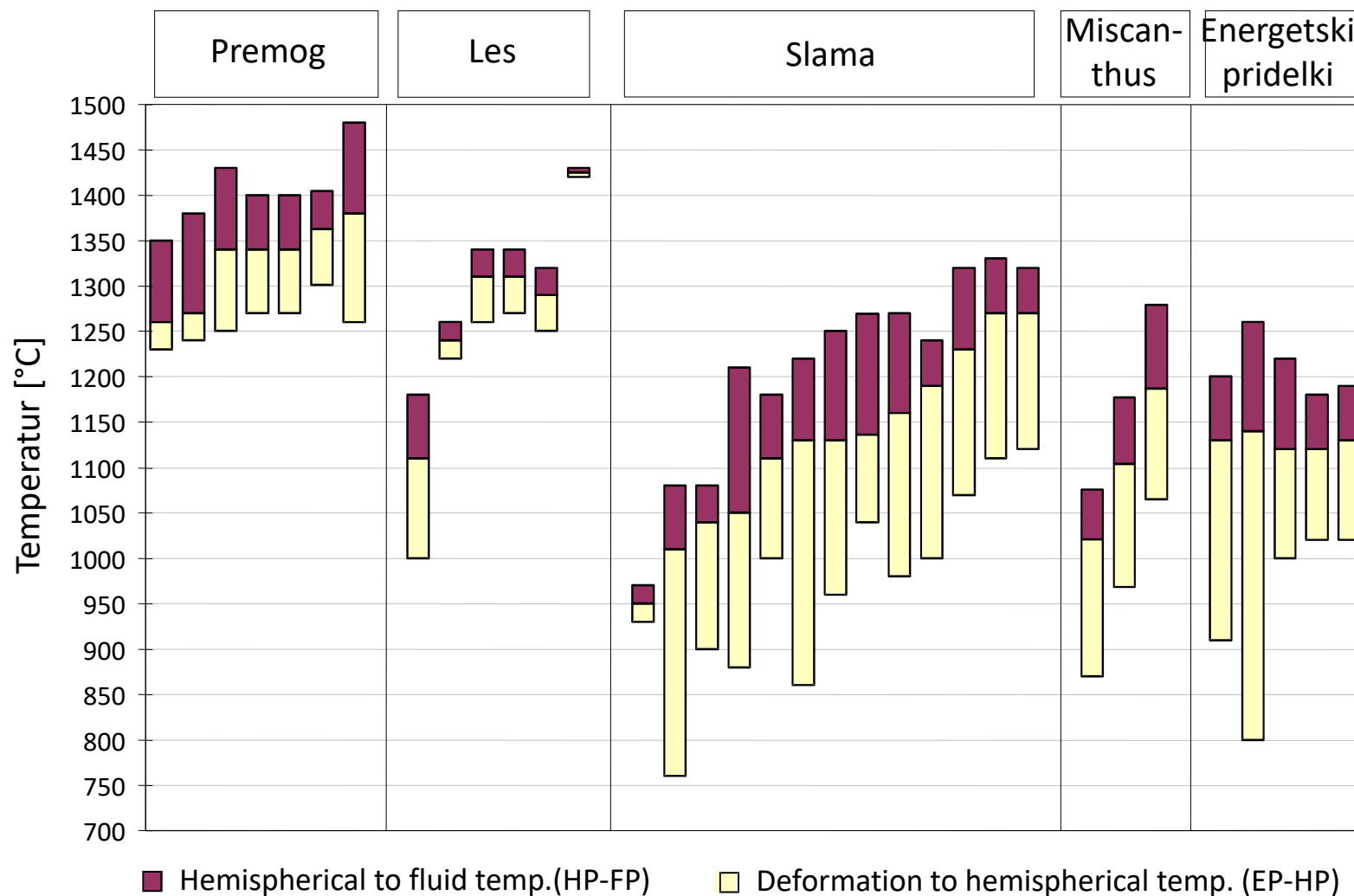


Vol.-% (dry air)		
Dušik	N ₂	78,10
Kisik	O ₂	20,93
Argon	Ar	0,9325
Ogljikov dioksid	CO ₂	0,03 – 0,04
Vodik	H ₂	0,01
Neon	Ne	0,0018
Helij	He	0,0005
Krypton	Kr	0,0001
Xenon	Xe	0,000009

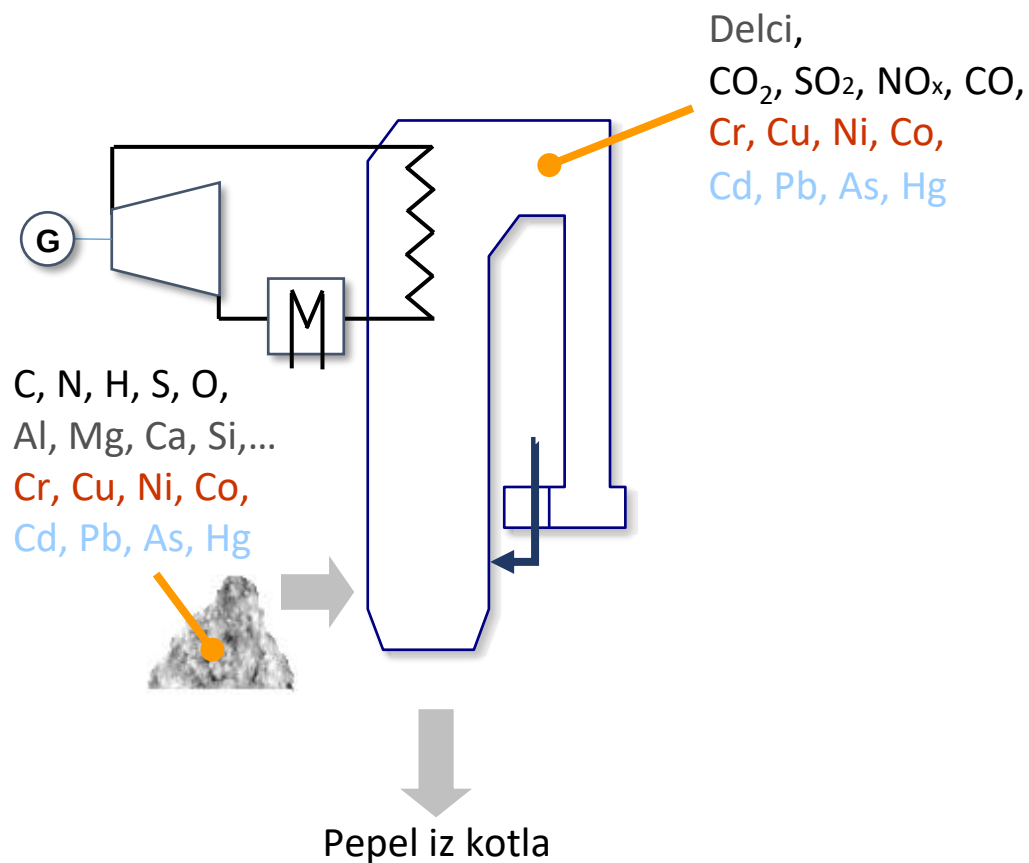
Proces izgorevanja



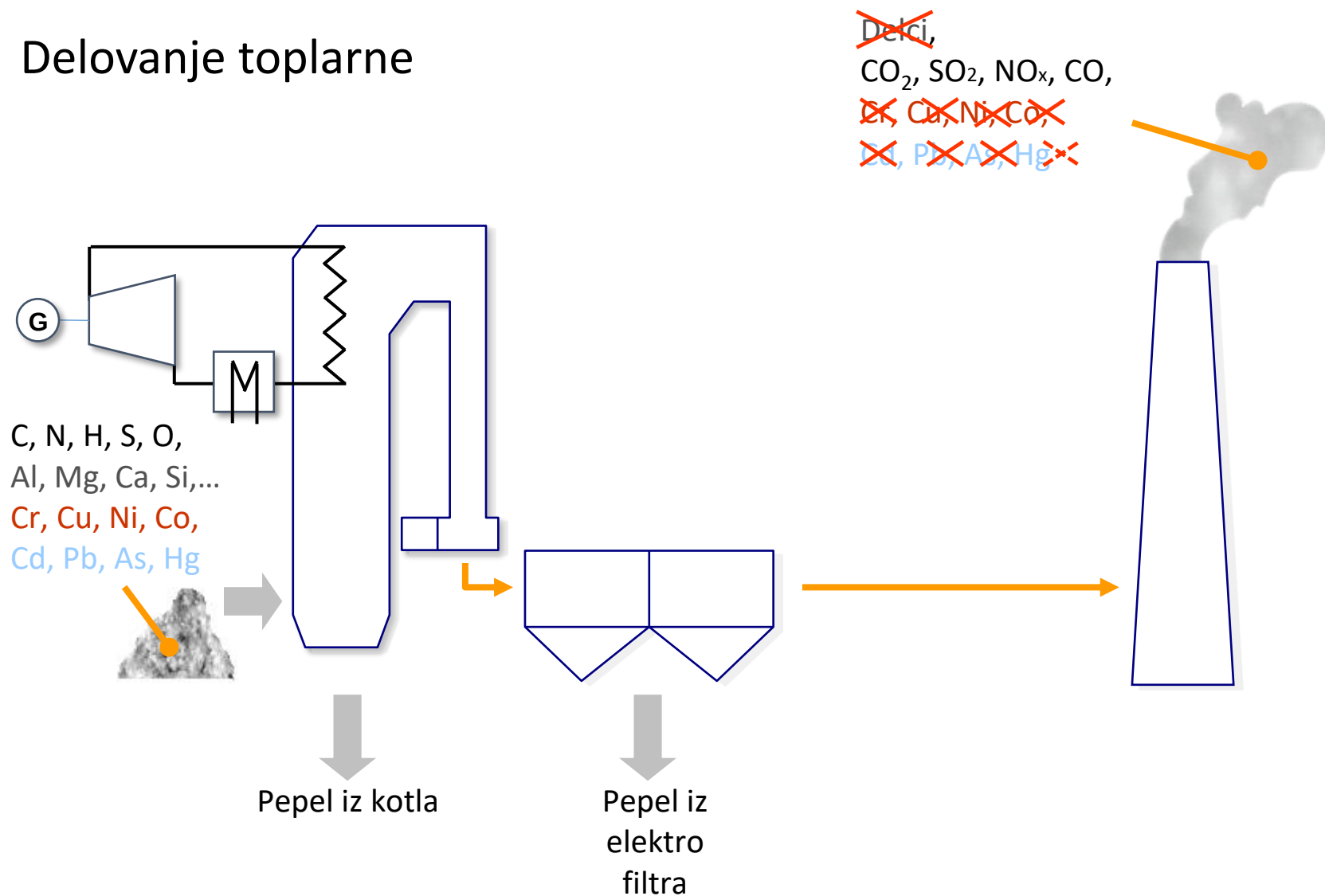
Obnašanje taljenje pepela različnih vnetljivih snovi



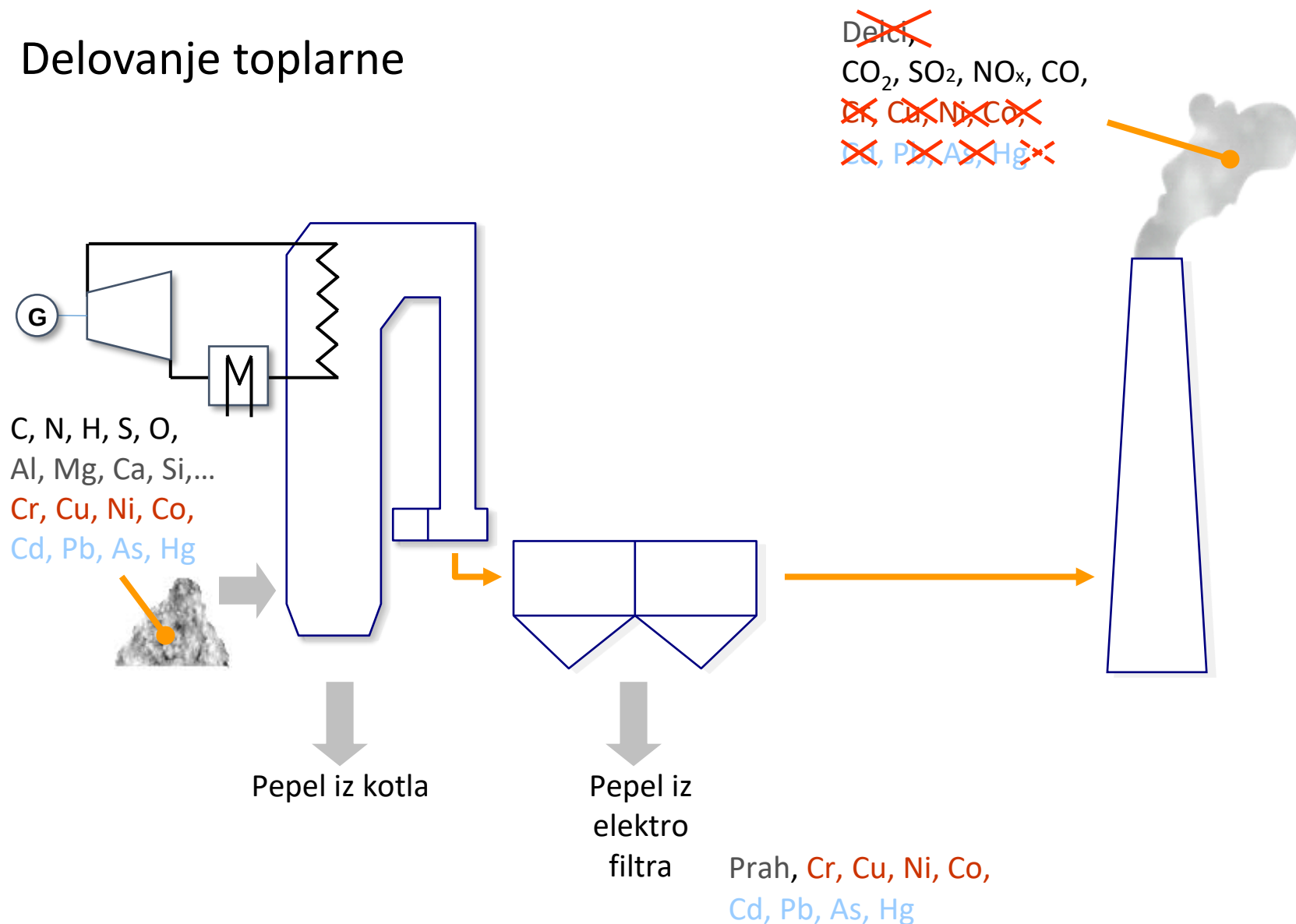
Delovanje toplotarne



Delovanje toplotarne

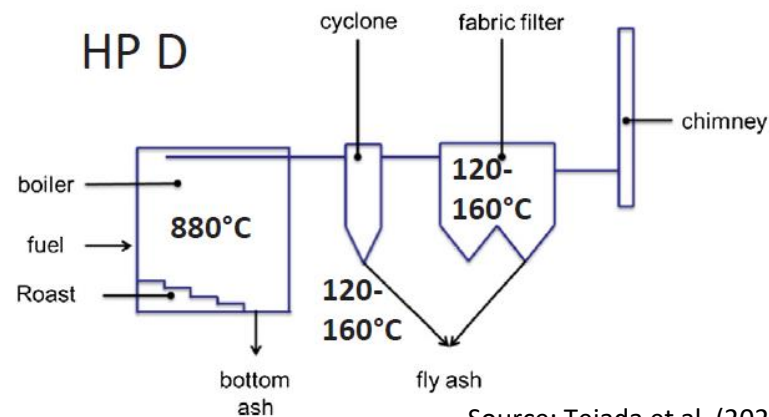
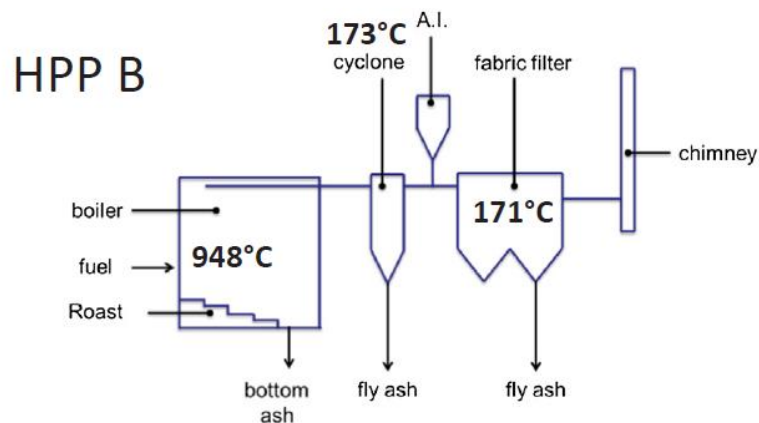
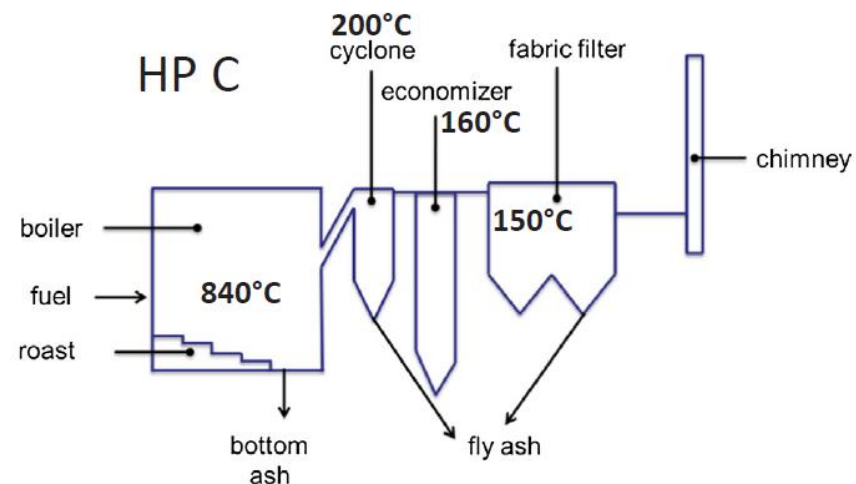
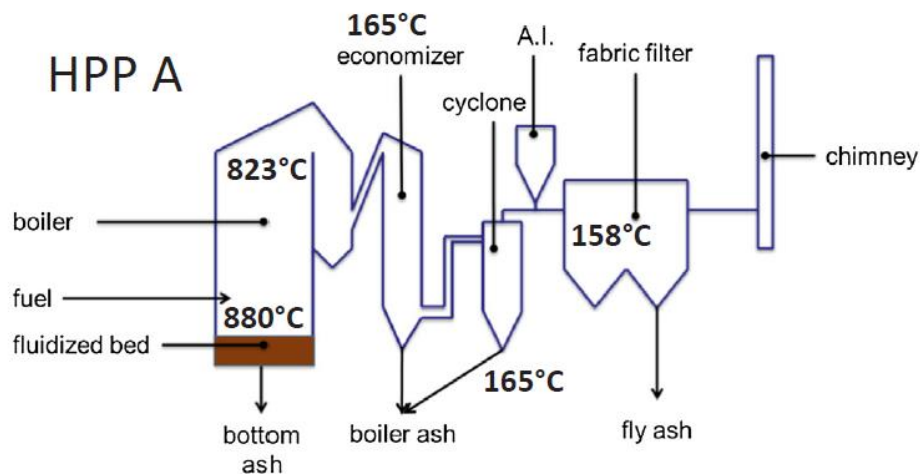


Delovanje toplotarne



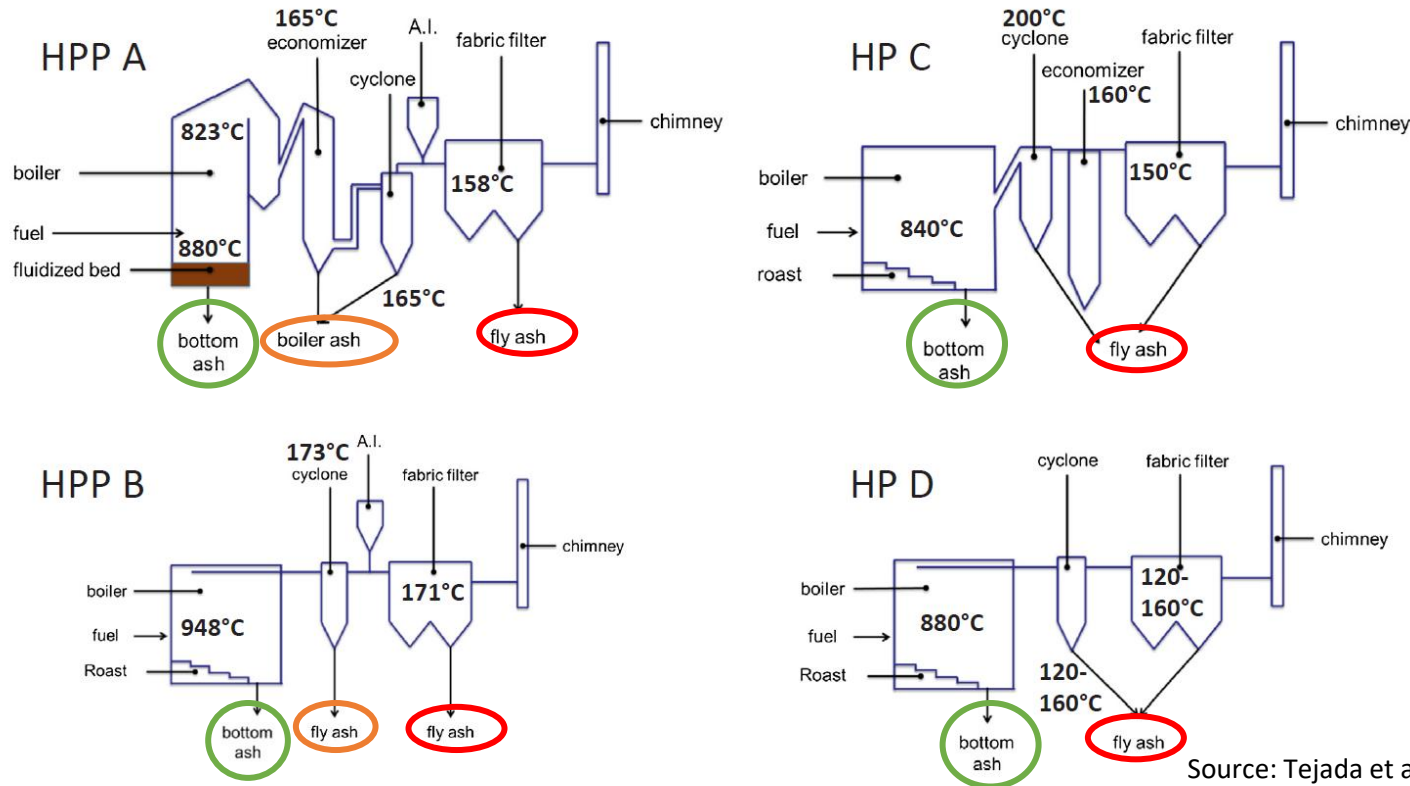
- Odlaganje
 - Stroškovno intenzivno
 - V nasprotju s „krožnim gospodarstvom“
- Uporaba
 - Dodatek k gradbenim materialom
 - Popravilo dragocenih stvari
 - **Gnojilo / sprememba tal**

Presejanje različnih frakcij pepela iz HE na lesno gorivo



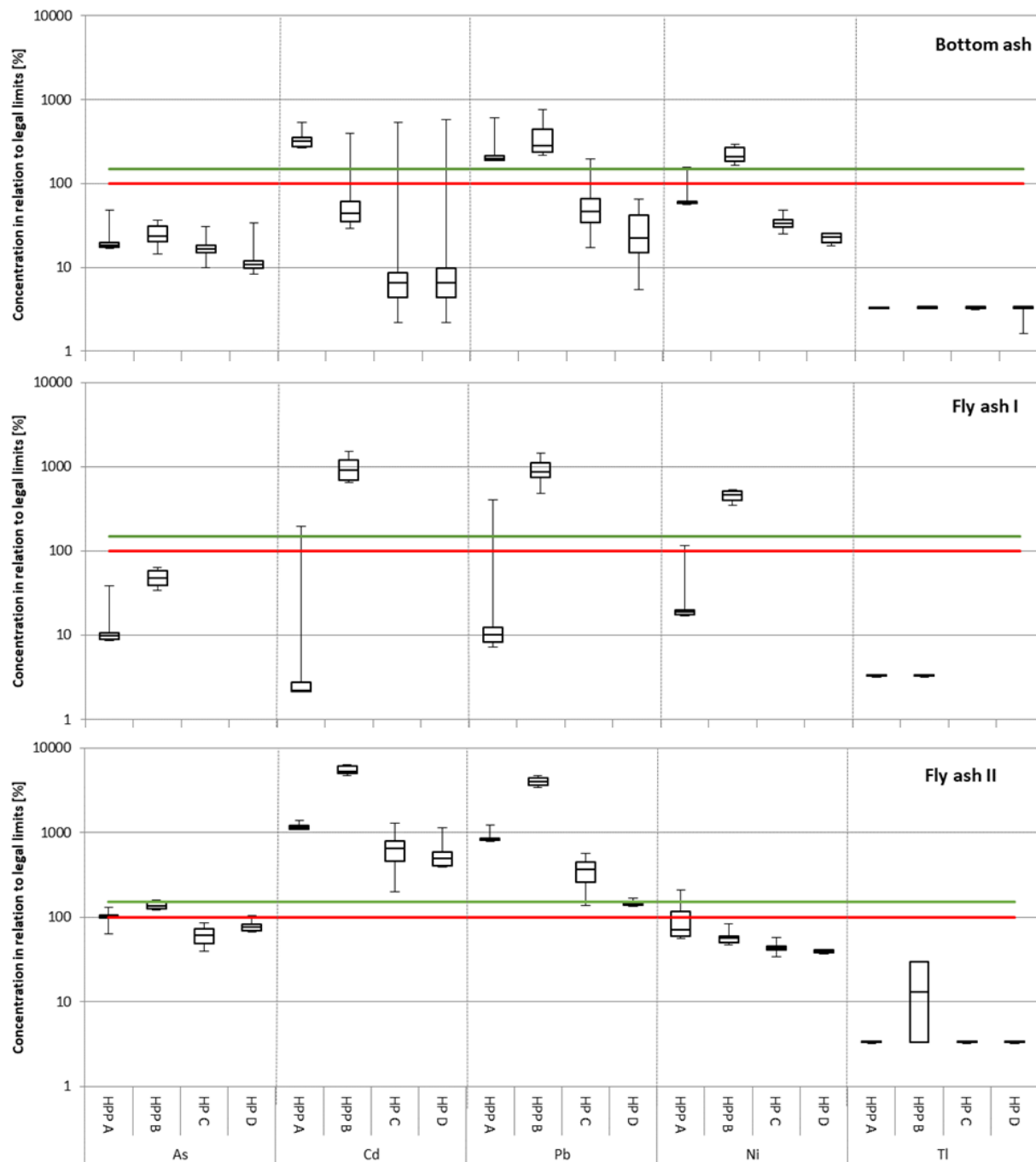
Source: Tejada et al. (2020)

Screening of different ash fractions from wood-fueled HPPs

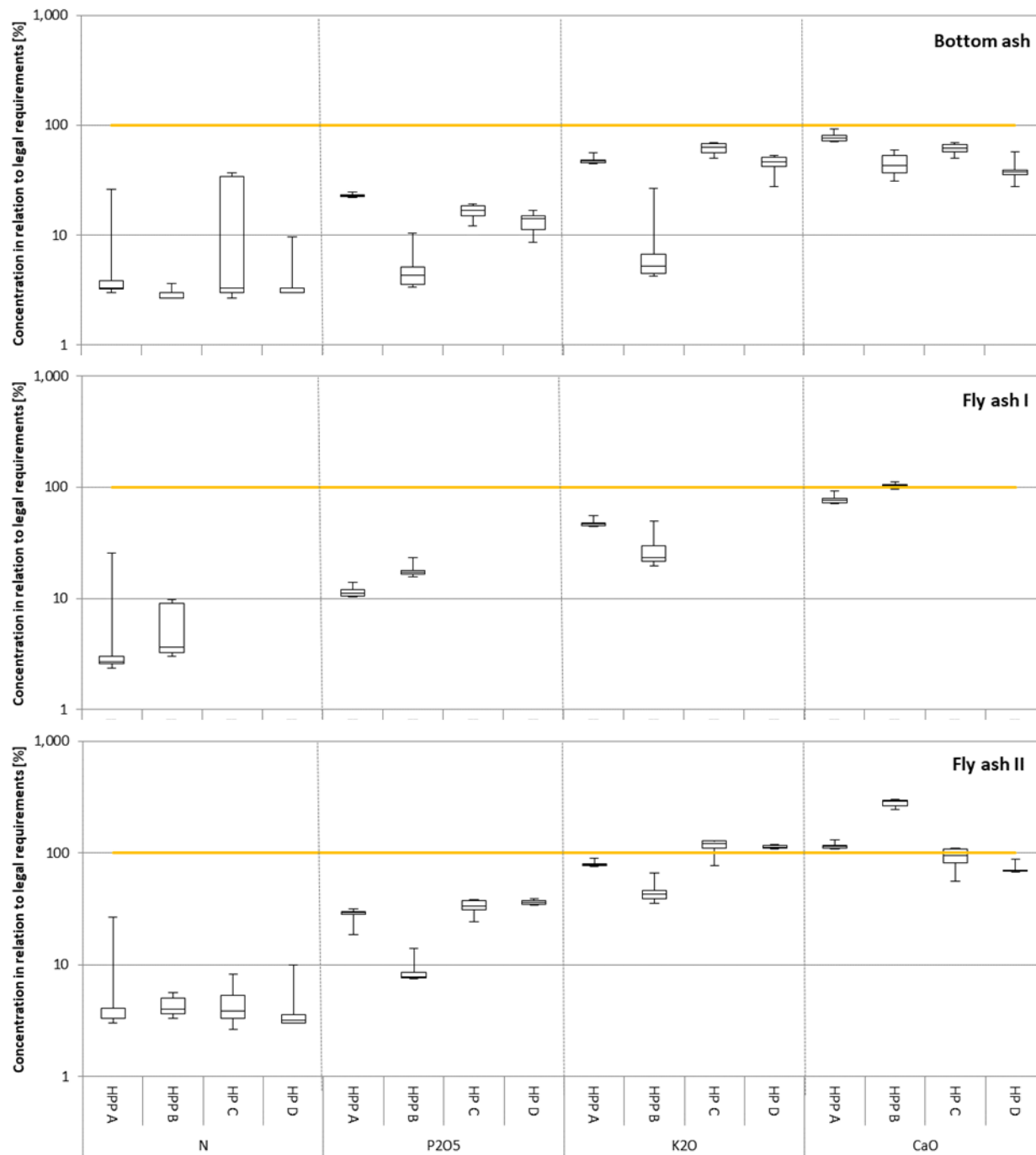


Potential application as a fertilizer is defined by the German fertilizer ordinance:

- Bottom ash: „Combustion chamber ash“ may be used
- Boiler/cyclone ash: Utilization possible
- Fly ash: Ash from „last filter unit“ is excluded from use



Ocena različnih
frakcij pepela glede
na zakonske meje za
Koncentracije TE



Nutrient concentrations in ash fractions compared to requirements for licensed multinutrient fertilizers

Hvala za vašo pozornost!



Contact information

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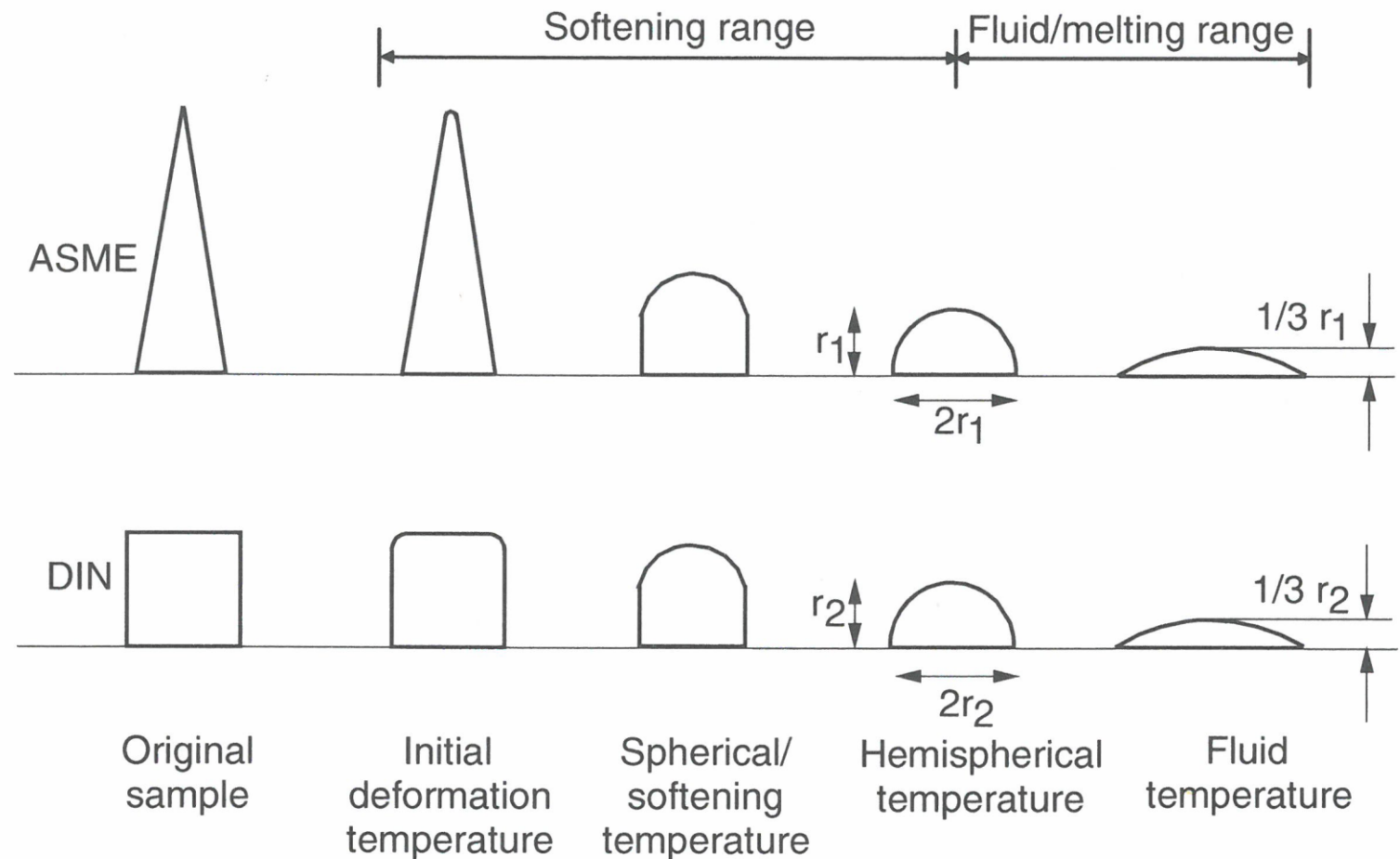
University of Applied Forest Sciences, Rottenburg
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www.holzenergie-bw.de

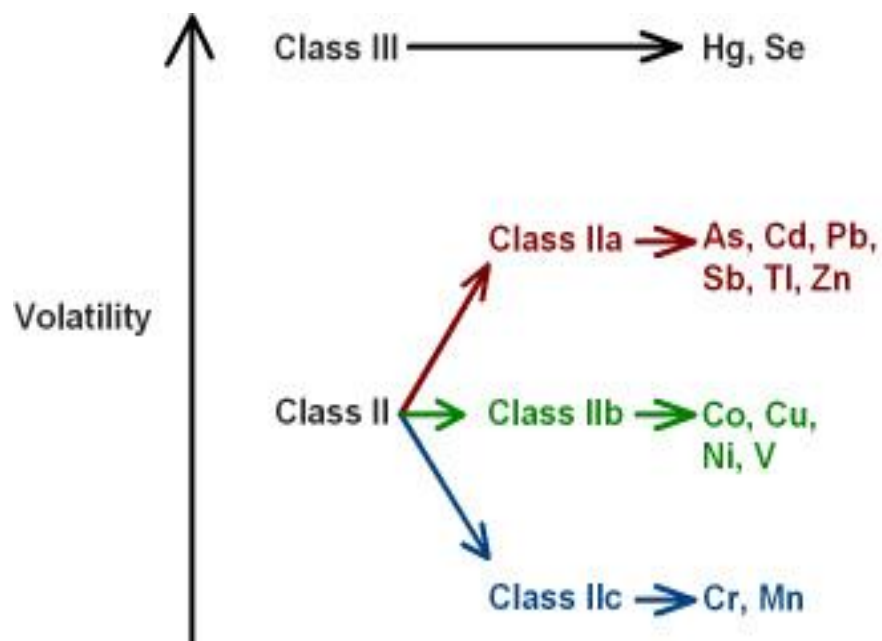
Phone: +49 (0)7472/951-122

Address: Schadenweilerhof, D-72108 Rottenburg am Neckar

Obnašanje taljenja pepela različnih vnetljivih snovi



Odlaganje elementov v sledovih



Classification according to [Meij]

