RDF from recycling as feedstock and fuel (Making best use of residues)

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RDF from recycling as feedstock and fuel (*Making best use of residues)*

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  - Cascading as the basis for resource efficiency
  - Combining recycling and quality of SRF as fuel
  - Using gasification of SRF for an additional product level (chemicals)

Energy Research Centre of the Netherlands

Located about 1 hour drive North of Amsterdam.

About 600 people working on:
-solar energy
-wind energy
-bio-energy (incl. waste)
-policy studies (incl. LCA and scenario's 2020 & 2050)

Partly governmental money, but more and more industrial (paid) assignments (required).

Energy from waste in "New Feedstock" follows the cascading approach

Solution for energy generation: only residues or polluted streams

Food or feedstock for food

residue

residue

Feedstock for products

Energy generation

Positive price for owner.

Disposal

Decay in the field (+ nutrients) (--GHG emissions)

Negative price for owner

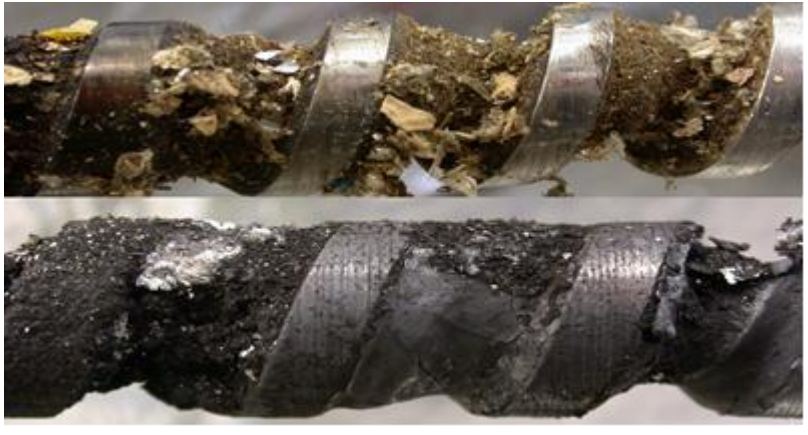
Experience from experimental programs

RDF/SRF variation

For stable procedures in more sensitive installations than a grate, the fuel quality (calorific value, moisture etc.) needs to be fairly constant.

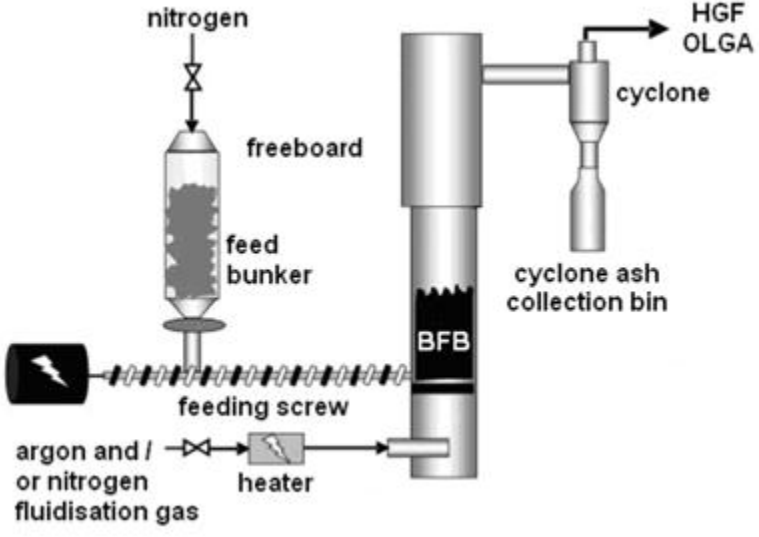
CEN-procedures can help, but product guarantees are much better.

Feeding problems



Typical feeding problems are due to:
-low density of fluff fuel
-compaction of material with a large fines-fraction
-large or irregular shaped particles
-melting or smearing of plastic particles in case heating up is too slow

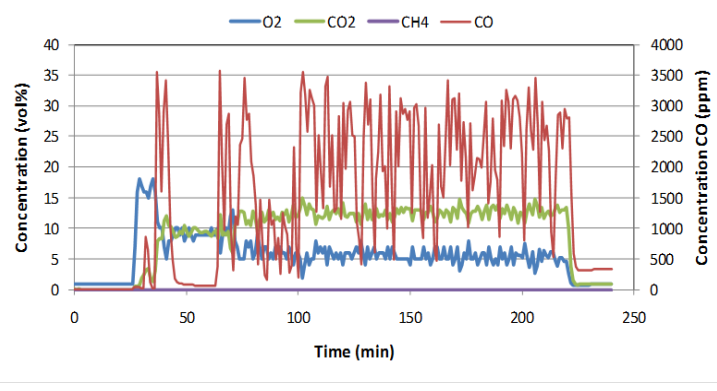
Experimentel work on combustion and gasification

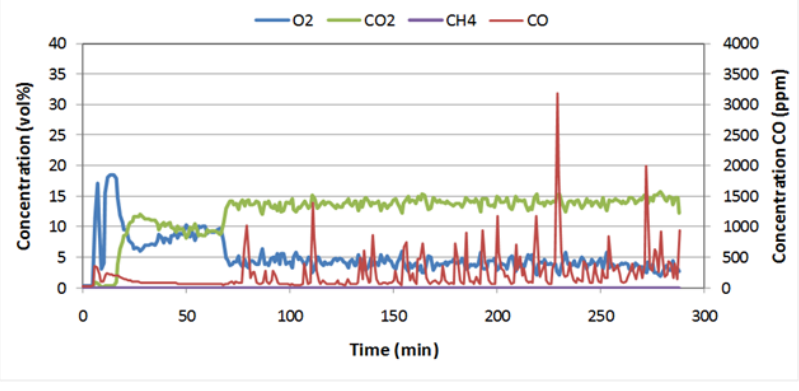


ECN has good experimental facilities, as the lab-scale fluidsed bed, which can be used under pyrolysis/combustion and gasification conditions.

Main results from combustion

- Feeding problems are solved when co-firing with; Biomass, lignite, sludge and/or paper residue.



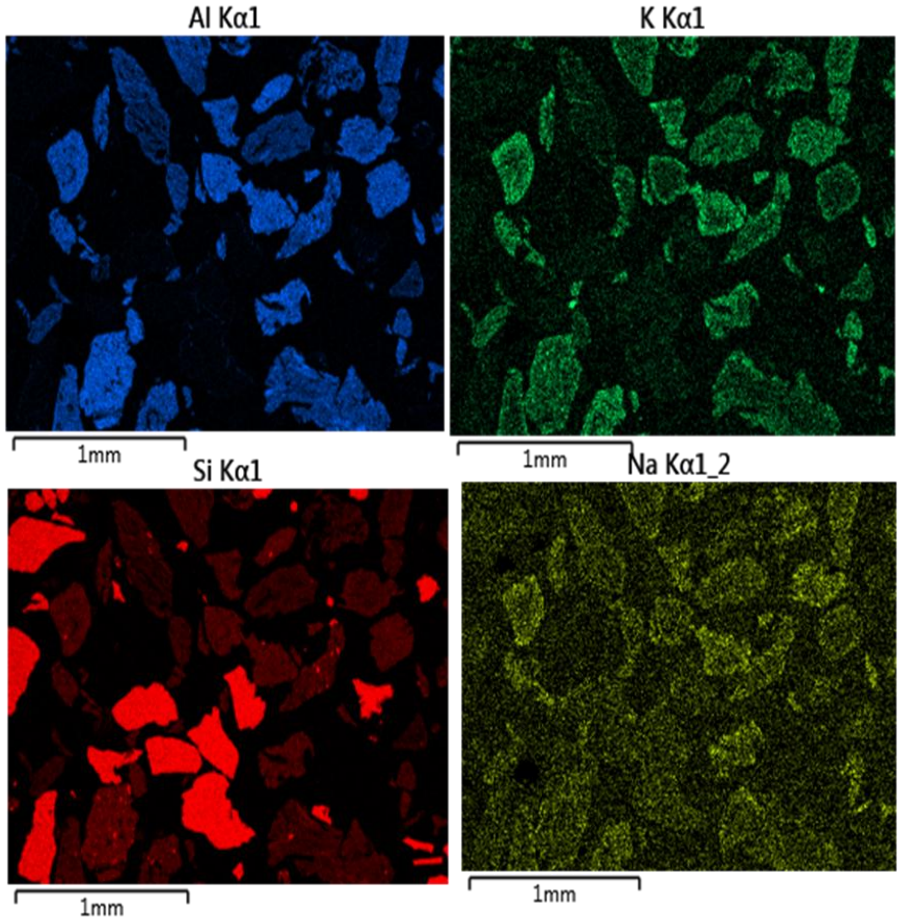


Left: gas concentration when combusting packaging waste. Right: same packaging waste with 10% paper sludge. Feeding much smoother. Note CO peaks (scale right).

Effect of 10% paper sludge on Cl and S in the gas phase

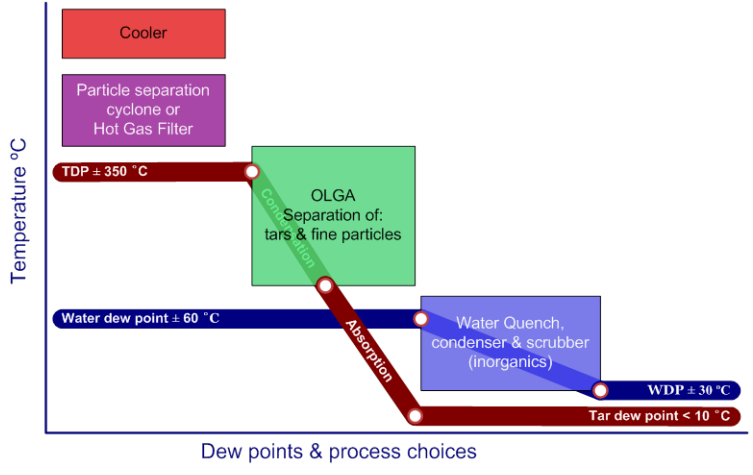
Experiments at 850 C	Cl	SO x
	mg/mn3	ppm (mol)
SRF with biomass= QualA	208,1	61,6
mix 1:90% lignite + 10% sew.sludge	102,1	94,9
mix 1 with 10%QualA	230,0	164,3
mix 1 with 25%QUALA	100,9	90,6
introduction of papersludge		
90% qualA + 10% Papersludge	112,2	< 1
80% mix 1+ 10% qualA+ 10%papersludge	42,6	<1

Effect of Al-Silcate ash-minerals when co-firing SRF with lignite



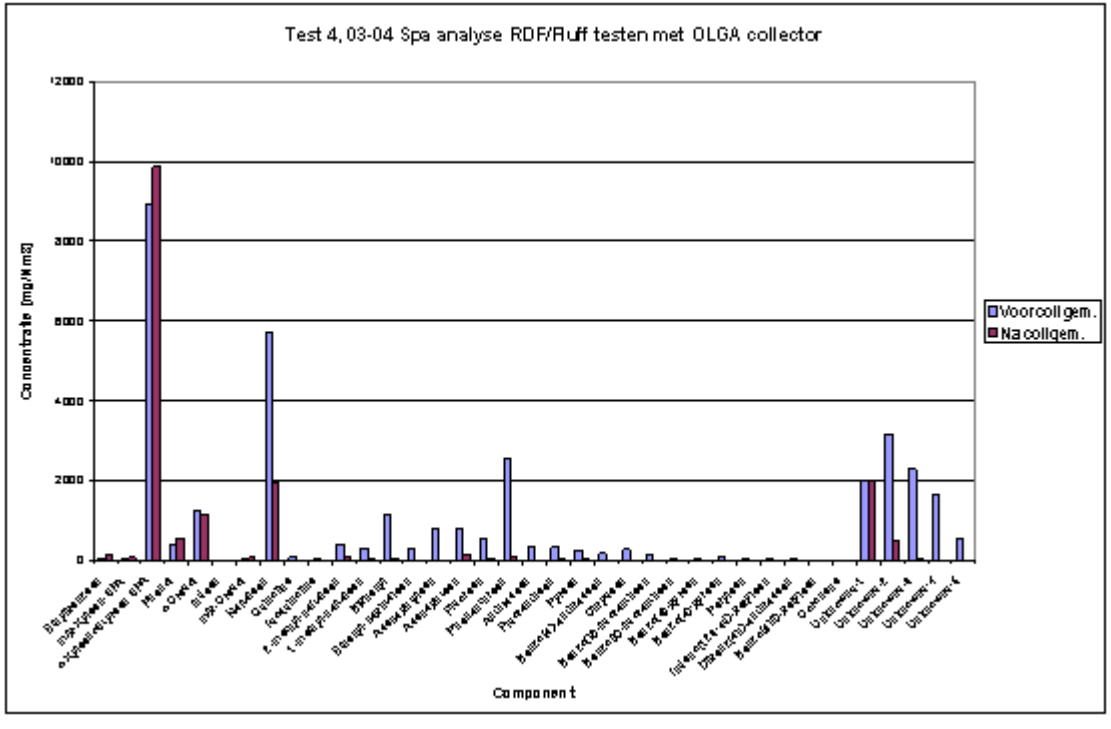
Gasification of SRF/RDF

- Positive:
  - A burnable gas from waste as a replacement for fossil gas use
  - Possible chemicals to be harvested from the gas: ethylene, benzene, Toluene, styrene?
- Negative: the tar problem needs to be solved.



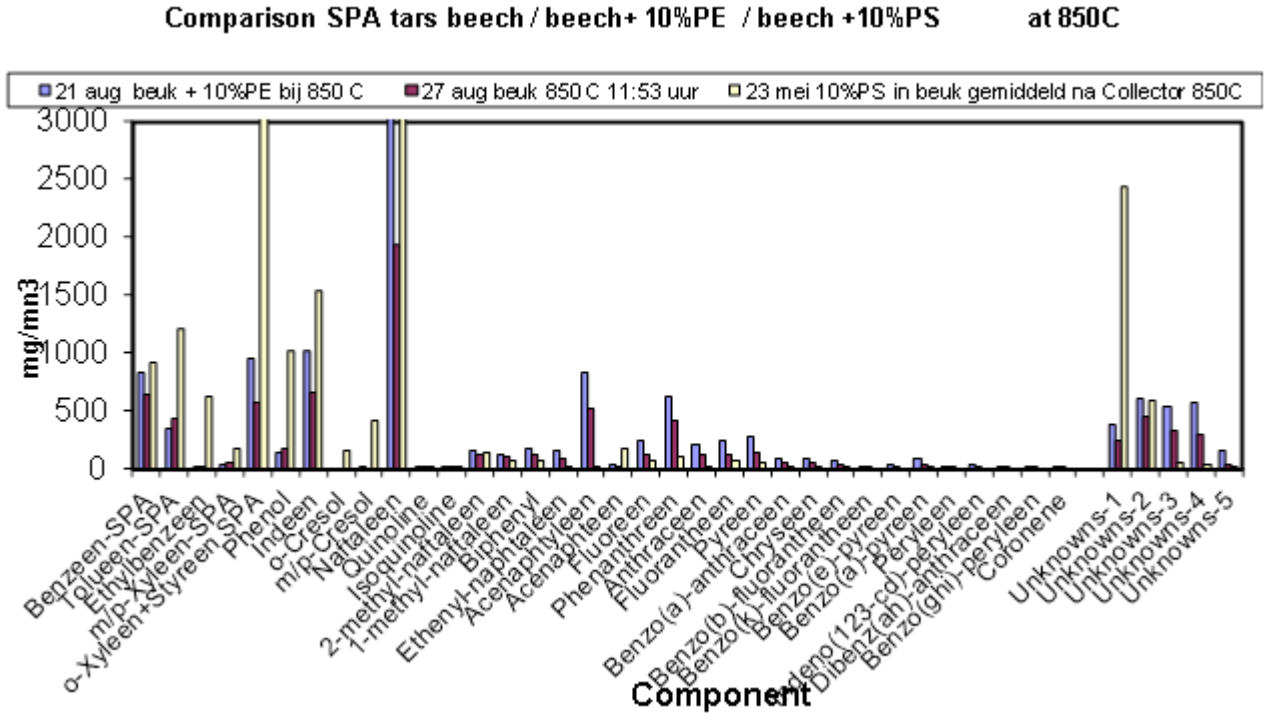
The tar fingerprint from RDF

- OLGA was developed for tar removal from gasification of wood to wash out the medium class and heavy class tars.



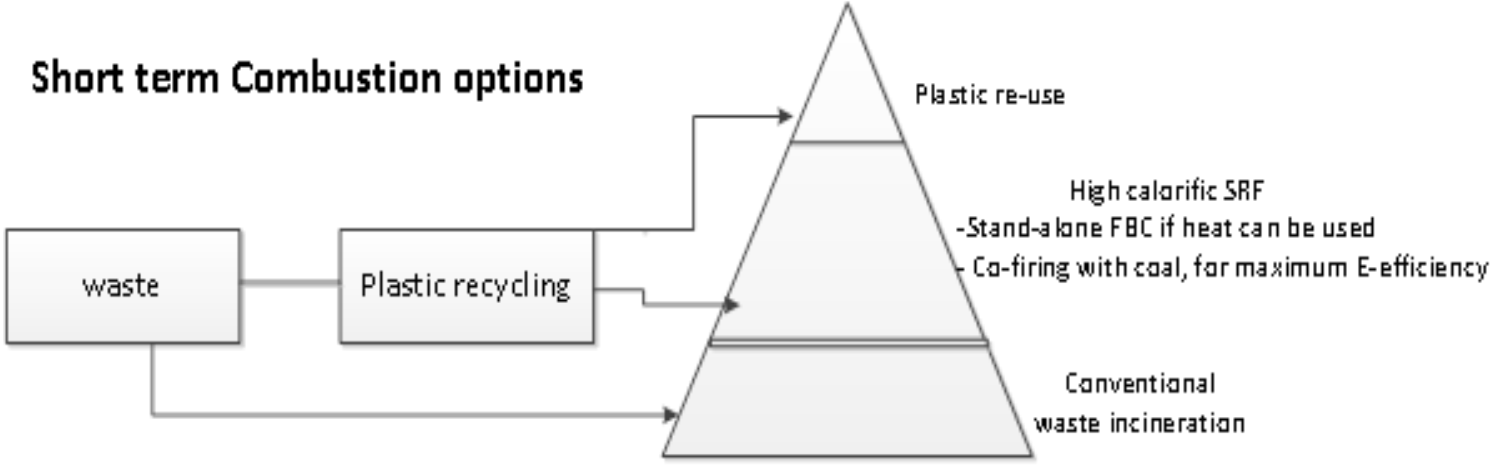
Tar Fingerprint

- The tar fingerprint of RDF is largely determined by the plastic components.

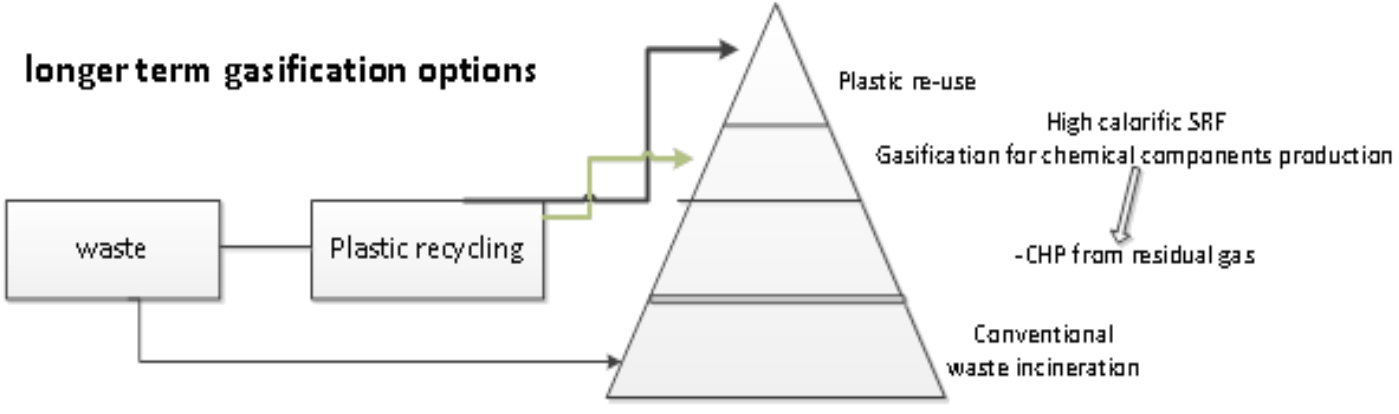


Future strategy

Relatively short term



Longer term future



Gasification of plastics can provide chemicals such as: Benzene, Toluene and Xylene
Possibly ethylene or other half products (building blocks) for the chemical (polymer) industry.

The remainder of the gas can be used for high pressure steam in industry (replacing fossil gas or oil) or syngas e.g. to methanol.


Make it feasible
Make it reality
Make it bloom !

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