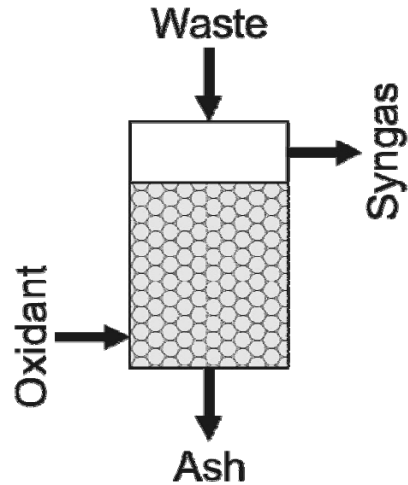
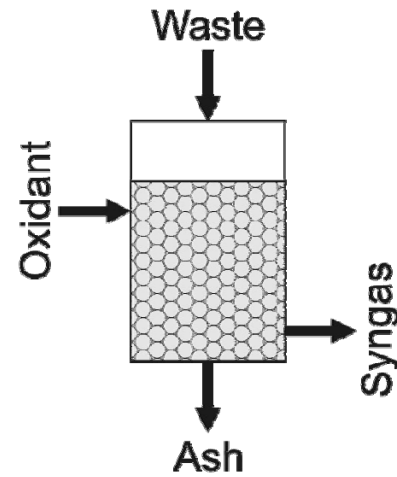


GASIFICATION PROCESS. MODES OF ORGANISATION

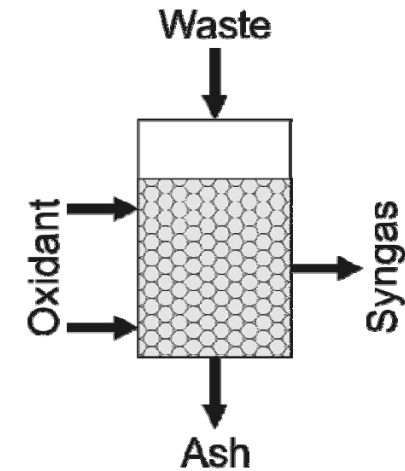
UPDRAFT
FIXED OR BOBBLED BED



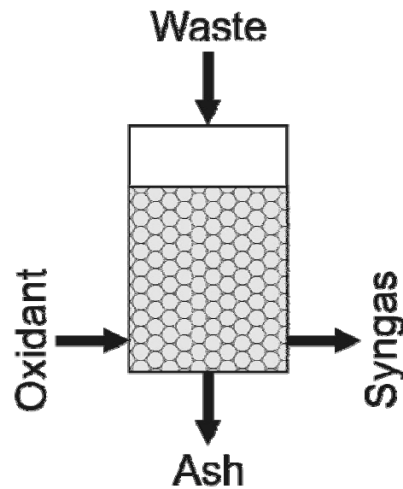
DOWNDRAFT
FIXED BED



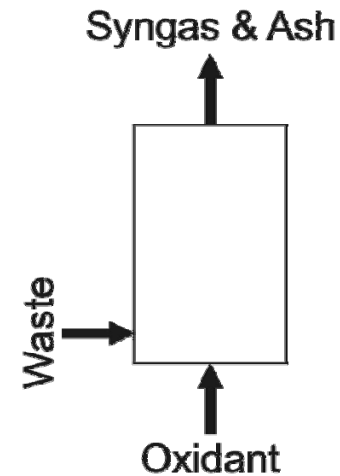
COMBINED




CROSSDRAFT

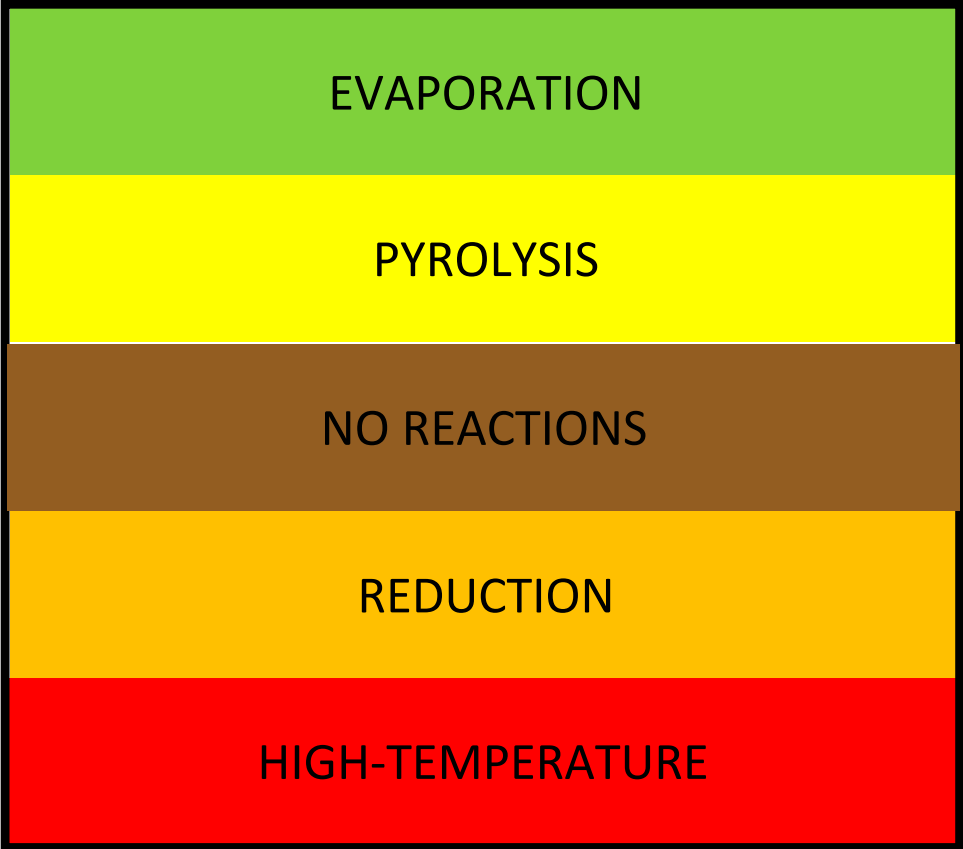


UPDRAFT
ENTRAINED FLOW



UPDRAFT MODE OF GASIFICATION PROCESS

Coal or waste




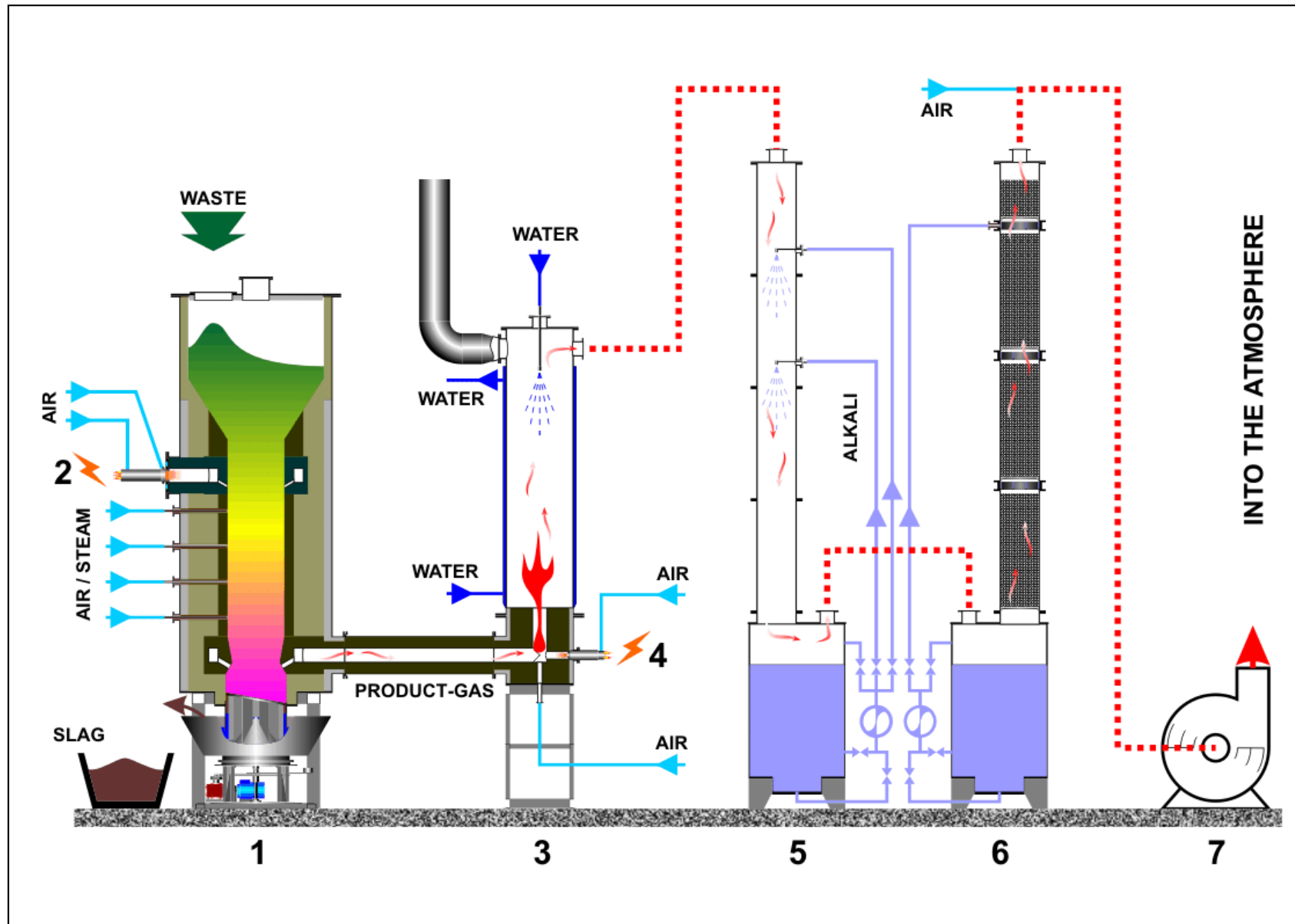
 SYNGAS

OXIDANT




ASH

SOLID WASTE PLASMA GASEIFICATION



1- GASIFIER; 2- MAIN PLASMA TORCH; 3- AFTERBURNER; 4- PLASMA TORCH (FLAME ON DUTY); 5- SPRAY TOWER; 6- PACKED-BED SCRUBBER;

European Parliament STOA 22 /3/2011

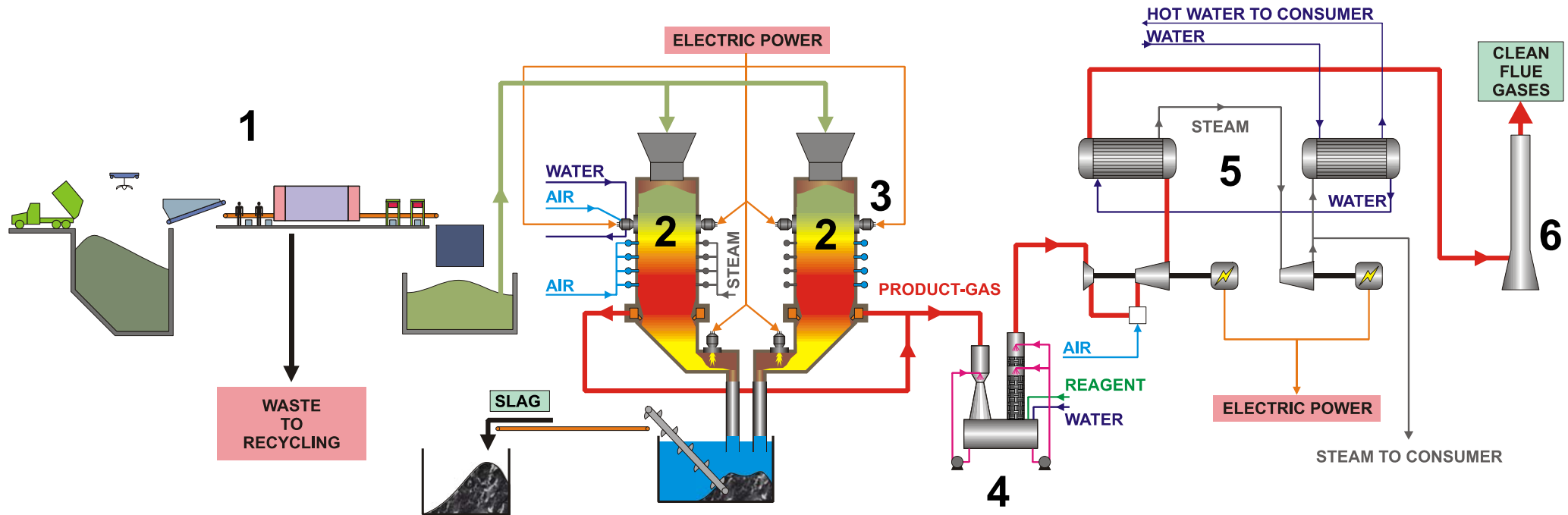
EMRS/UPMC

EMRS FALL MEETING
Varsaw 13-15 sept 2010



Ph. Rutberg. Polytechnic State Saint Petersburg University

Future coal- SOLID WASTE PLASMA GASIFICATION



- 1- WASTE SEPARATION AND PREPARATION
- 2- GASIFIER
- 3- PLASMA TORCH
- 4- PRODUCT-GAS COOLING AND TREATMENT SYSTEM
- 5- COMBINED HEAT AND POWER STATION
- 6- STACK

COAL PLASMA GASEIFICATION PLANT

| PARAMETER | | Units | VALUE |
|---|----------|---------------------|--------|
| SYNGAS SPECIFIC YIELD | | m ³ /kg | 2.10 |
| SYNGAS LOWEST CALORIFIC VALUE | | MJ/m ³ | 10.50 |
| SPECIFIC ENERGY EXPENDITURE ON COAL | | kW·h/kg | 1.20 |
| COAL PART IN TOTAL PRODUCTIVITY FOR SYNFUELS PRODUCTION | | | 0.64 |
| SYNFUELS SPECIFIC OUTPUT | | kg/t | 219.80 |
| ANNUAL PRODUCTIVITY ON | SYNFUELS | 10 ³ t/a | 500.00 |
| | COAL | 10 ⁶ t/a | 3.57 |
| ELECTRIC POWER OF POWER STATION | | MW | 550.00 |
| CAPITAL COSTS | | 10 ⁶ € | 582.56 |
| ANNUAL COSTS | | 10 ⁶ € | 120.08 |
| ANNUAL SALES PROCEEDS | | 10 ⁶ € | 252.91 |
| ANNUAL PROFIT | | 10 ⁶ € | 129.81 |
| PAYBACK PERIOD | | years | 5.48 |

PLASMA GASEIFICATION: RESEARCH INSTALLATION

| PARAMETER | UNITS | VALUE | |
|-----------------------|--------------------|------------|-------------|
| | | EXPERIMENT | CALCULATION |
| ENERGY CONSUMPTION | MJ/kg | 2.3 – 2.2 | 2.1 |
| SYNGAS YIELD | m ³ /kg | 2.5 – 2.4 | 2.4 – 2.3 |
| SYNGAS COMPOSITION | H ₂ | 28.2 | 23.9 – 24.6 |
| | CO | 27.0 | 30.1 – 29.0 |
| | CO ₂ | 6.8 | 5.5 – 6.3 |
| | N ₂ | 35.7 | 36.9 – 36.5 |
| | H ₂ O | 2.1 | 3.1 |
| | O ₂ | 0.3 | — |
| | Ar | — | 0.4 |
| CALORIFIC VALUE | MJ/m ³ | 5.9 | 5.8 |
| CHEMICAL EFFICIENCY | % | 80 | 77 – 76 |
| CONDENSATE YIELD | g/kg | 128 – 179 | 146 – 180 |
| AIR FLOW RATE | kg/kg | 1.4 – 1.3 | 1.4 – 1.3 |