Decay factor characterisation of selected paper products under optimal landfill anaerobic conditions using bench- and pilot-scale reactors

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1. BACKGROUND

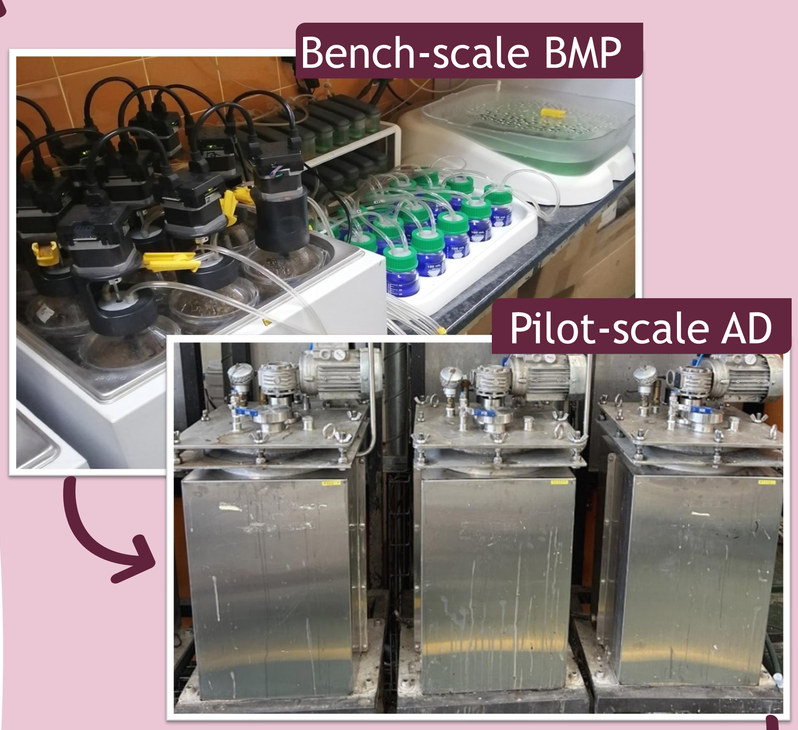
- Decay factors of landfilled waste are required for accurate GHG emission reporting
- South Africa relies on default IPCC values (50%)
- Impacts pulp and paper industries
- Empirical research needed to estimate country-specific waste data

2. AIMS & OBJECTIVES

- Determine maximum biogas production potential via AD experiments
- Calculate decay factors for 8 paper waste streams
- Provide realistic estimate of decay

What is the decay factor?
The portion of degradable organic carbon that is converted to CH_4 and CO_2

3. METHODOLOGY



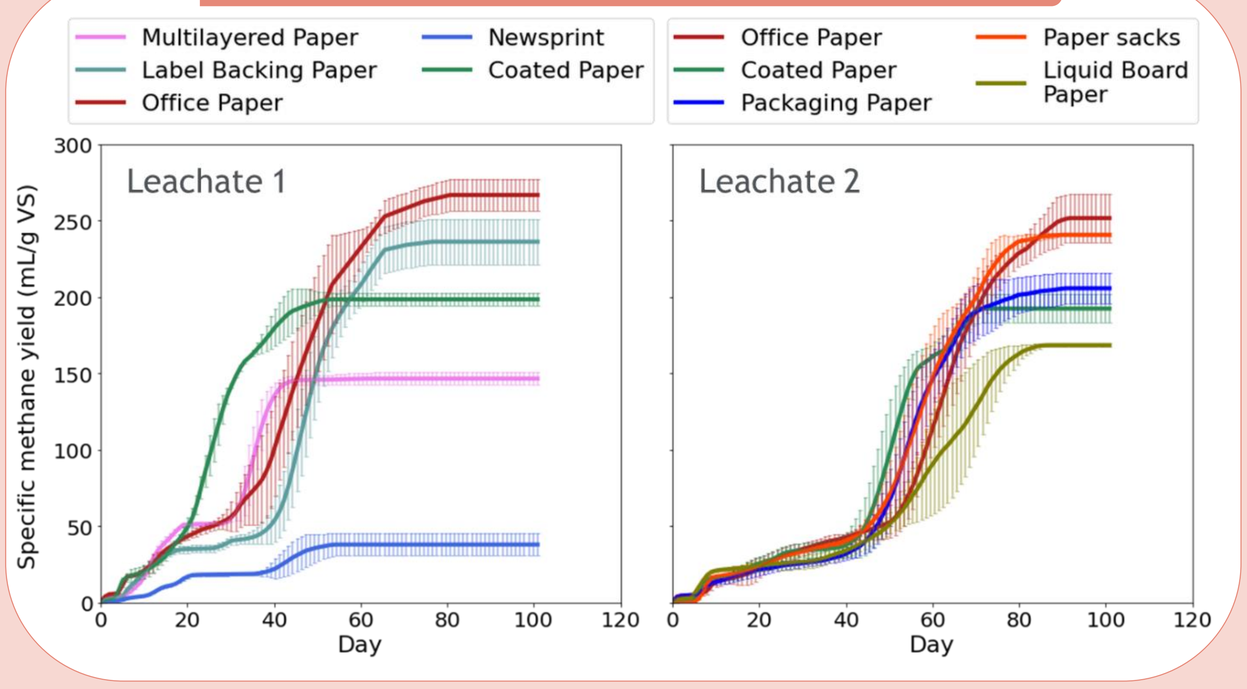
Paper decay

Biogas measurement (CH_4 and CO_2)

Decay factor characterisation

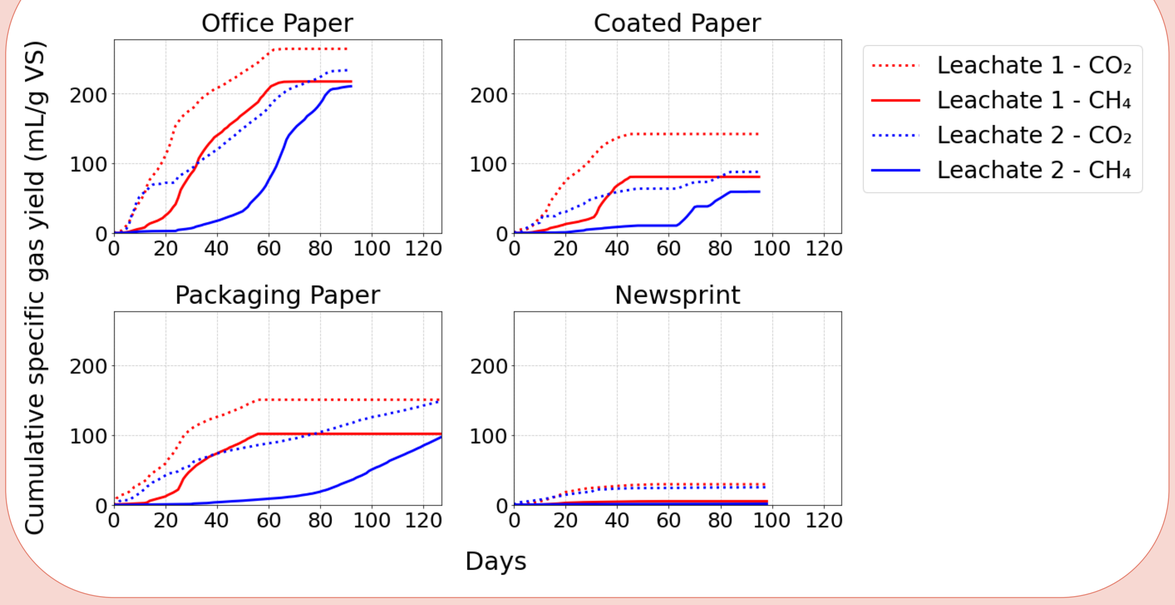
4. RESULTS

Bench-scale biomethane production (BMP)

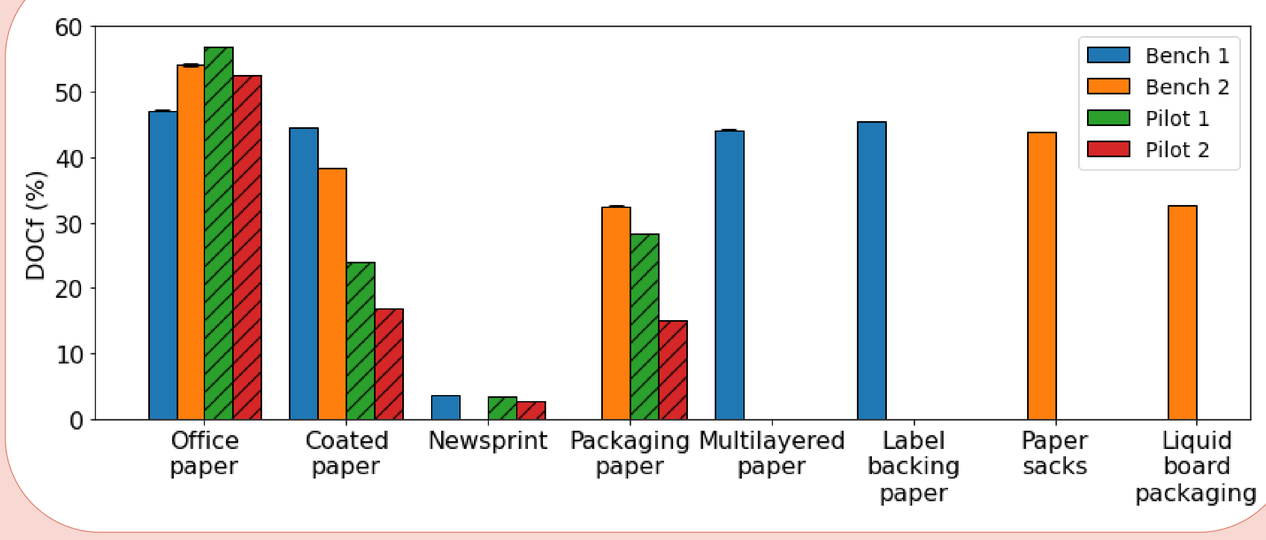


- Gas yields dependent on paper compositions and leachate quality
- Higher holo-cellulose in papers showed higher biogas yields (eg. Office paper)
- Higher lignin content papers showed lower biogas yields (eg. News-print)
- Leachate batches influenced initial lag phases in CH_4 production
- Additives (eg. Silicons, waxes) affect accessibility to biodegradable portion of papers

Pilot-scale gas production



Decay factors (carbon losses)



- Observed range of decay factors: 3.1% (Newsprint) to 54.7% (Office Paper)

5. CONCLUSIONS

- Current IPCC 50% decay factor may not be appropriate
- Material-specific factors needed for accurate GHG estimates
- Scale effects must be considered in emissions calculations
- More accurate factors better inform LCAs and GHG emission factors

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