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# **Design parameters and operational modes for sustainable landfill in Jordan**

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2<sup>nd</sup> International Conference on Sustainable Solid Waste Management, 12-14 June 2014, Athens

# Outline

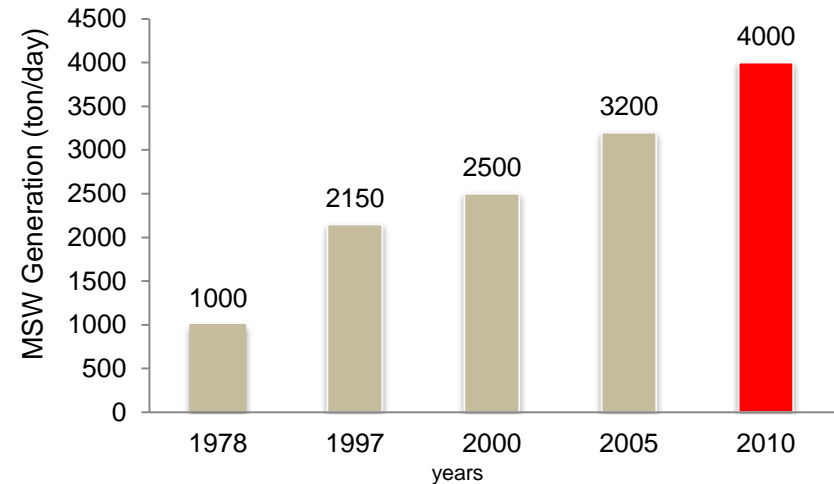
- Background
- Objectives
- Methodology
- Results
- Conclusions & recommendations
- Future outlook



# Background : Solid waste Situation

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- Large increase in population & Economical development
- Limited trained people & shortage of equipment
- Limited financial resources
- Absence of solid waste law

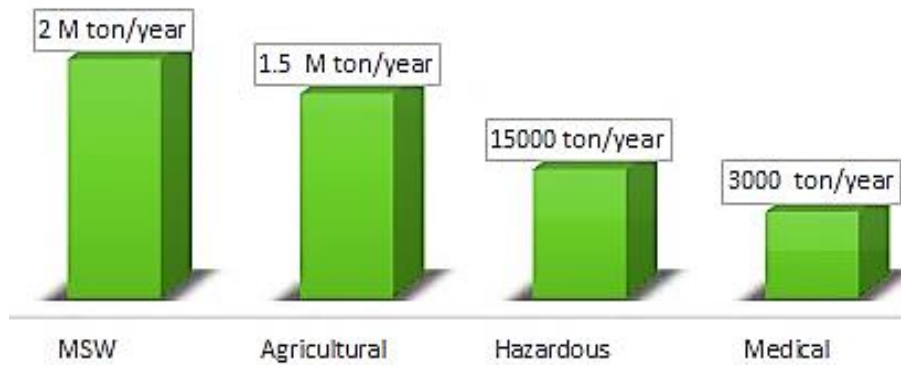


Source : Abu Qdais 2009

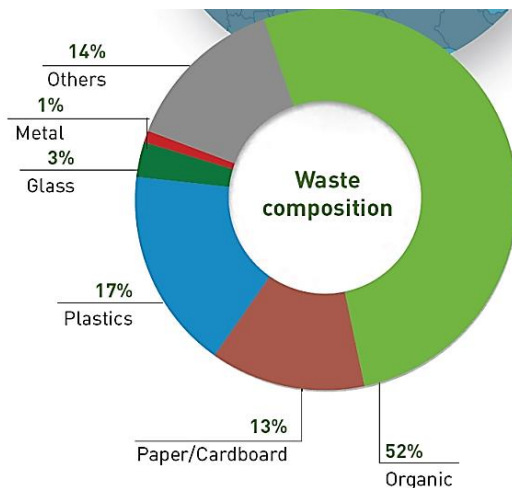
**Poor waste management !**

# Background : Solid waste data & costs

- Solid waste generation

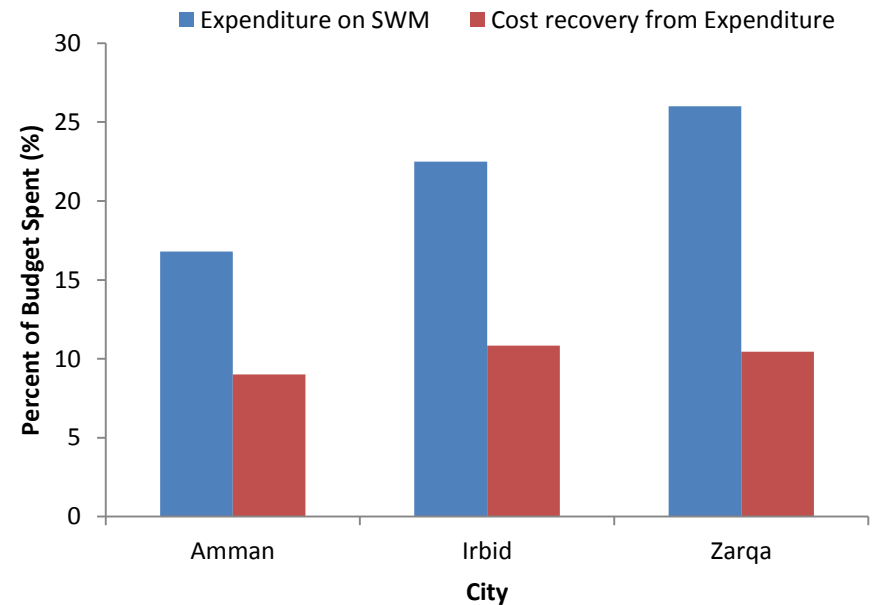


- High recycling potential



Source : [Sweep](#) 2009

- Low cost recovery



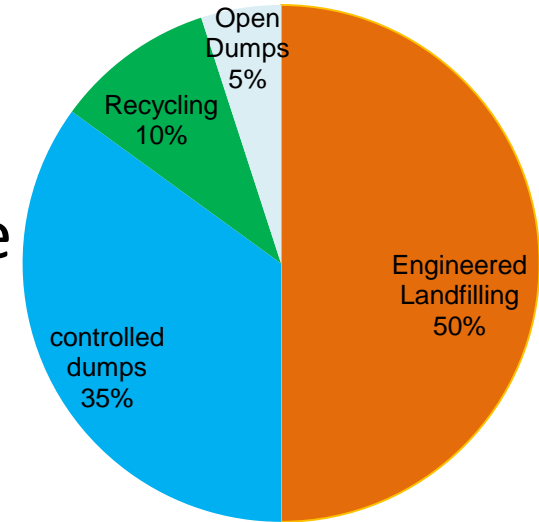
Source: [Country report](#) 2008

# Background : Current waste management system

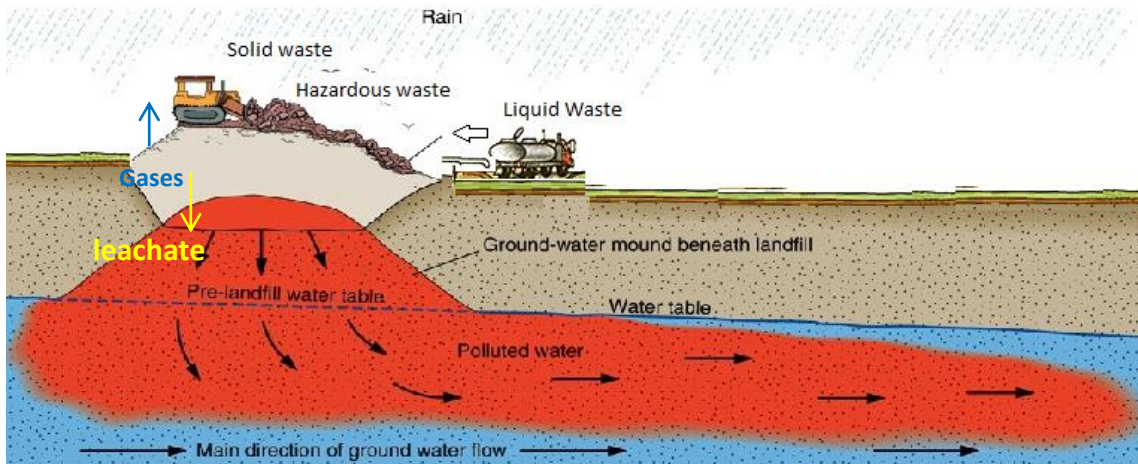


# Background : Method of Disposal

- 20 landfill
- 2 of 20 have leachate and gas system
- Disposal of medical and industrial waste into MSW dumps
- Disposal of wastewater into dumps



Source : [Sweep](#) 2009



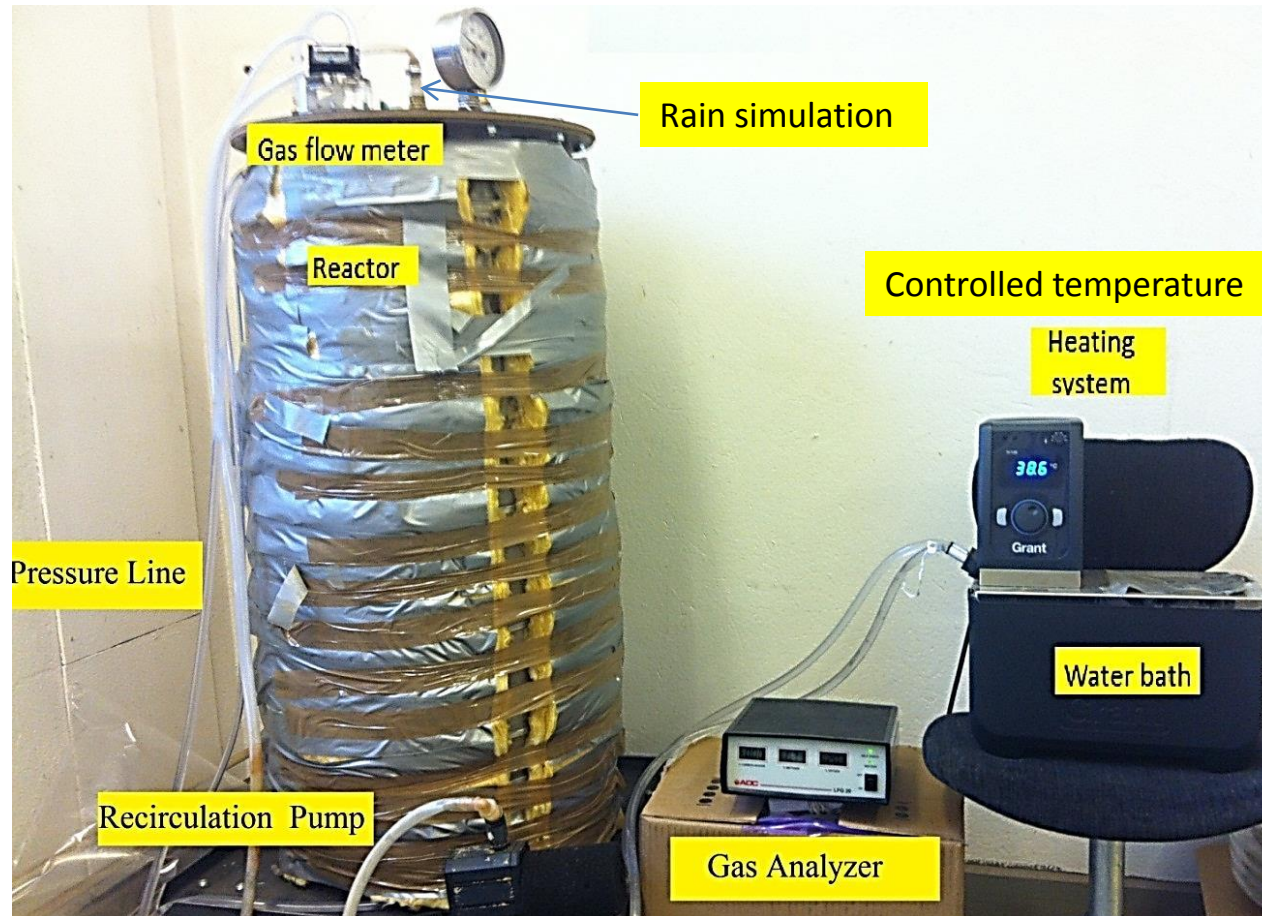
# Objectives

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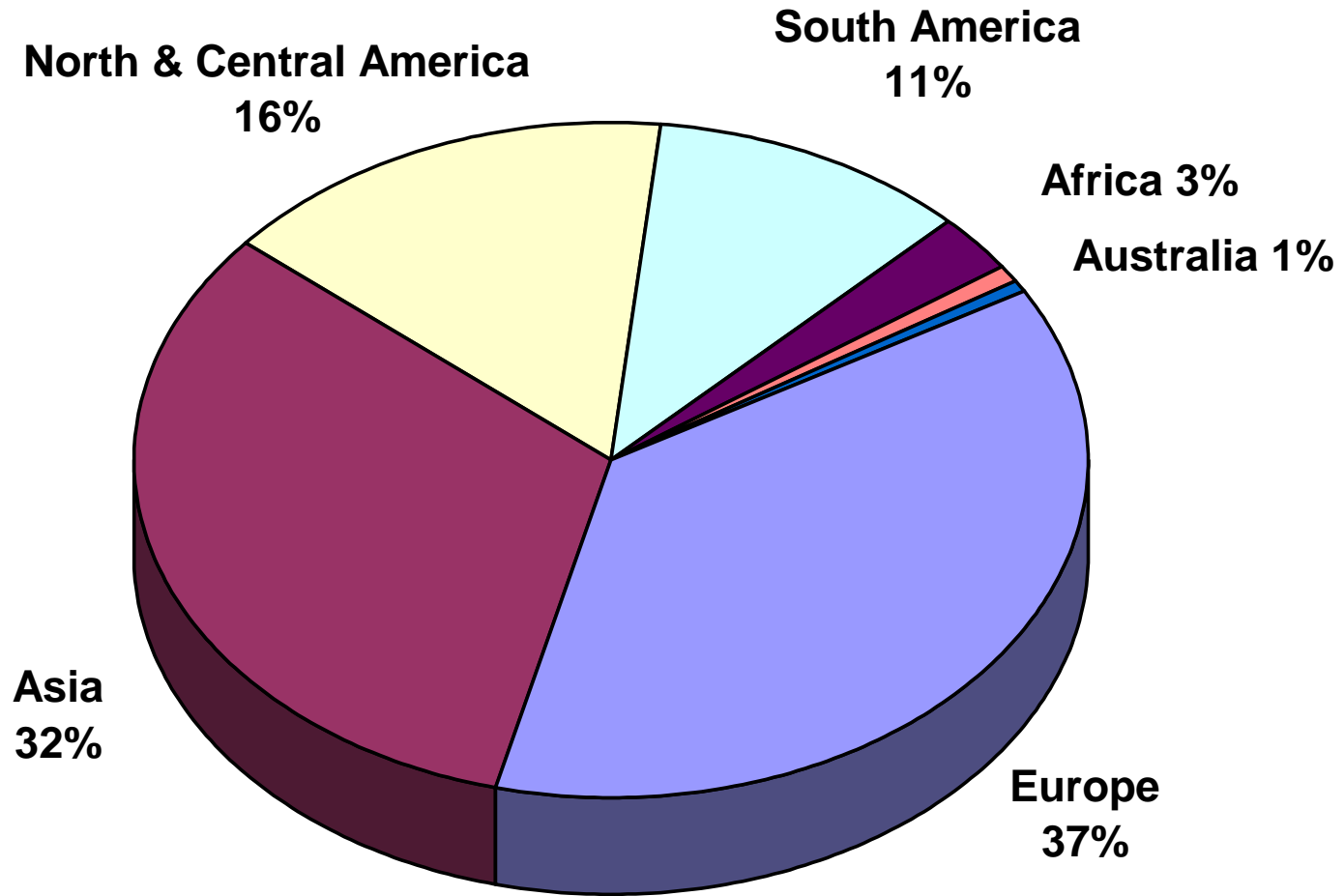
- **Monitor the emission potential from municipal solid waste landfilled in Jordan .**
- **Simulate the influence of climate on the emission potential of landfills located in semi-arid areas.**
- **Recommend new design parameters and operation mods for landfill in semi-arid areas.**

# Methodology : Laboratory work (lysimeter)

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# Anaerobic digestion worldwide

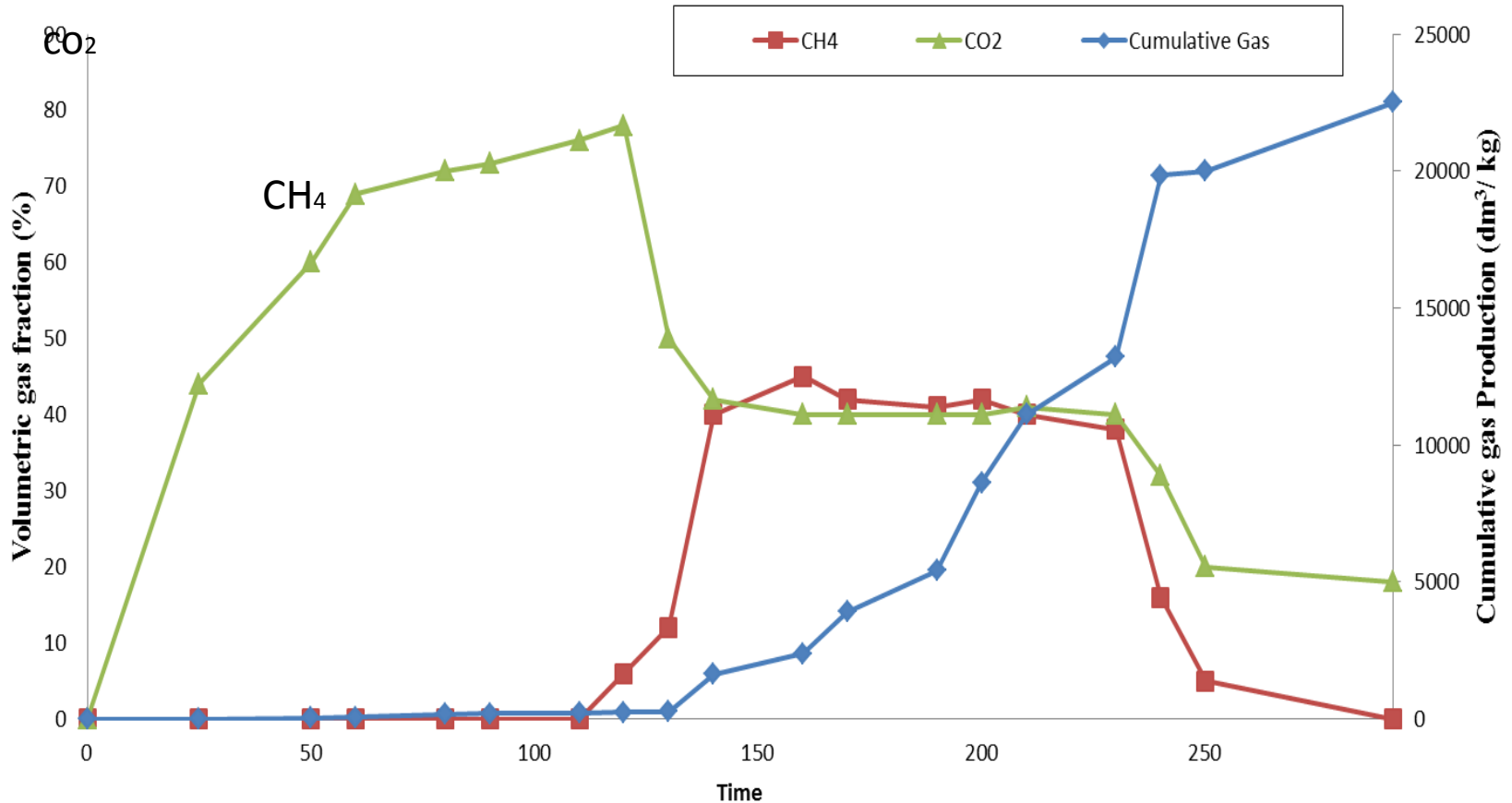


# Process configurations for lysimeter

- Solid Waste used: Municipale
- The way of operation: Batch
- The temperature: Mesophilic (35°C)
- Simulated rainfall
- Leachate recycling

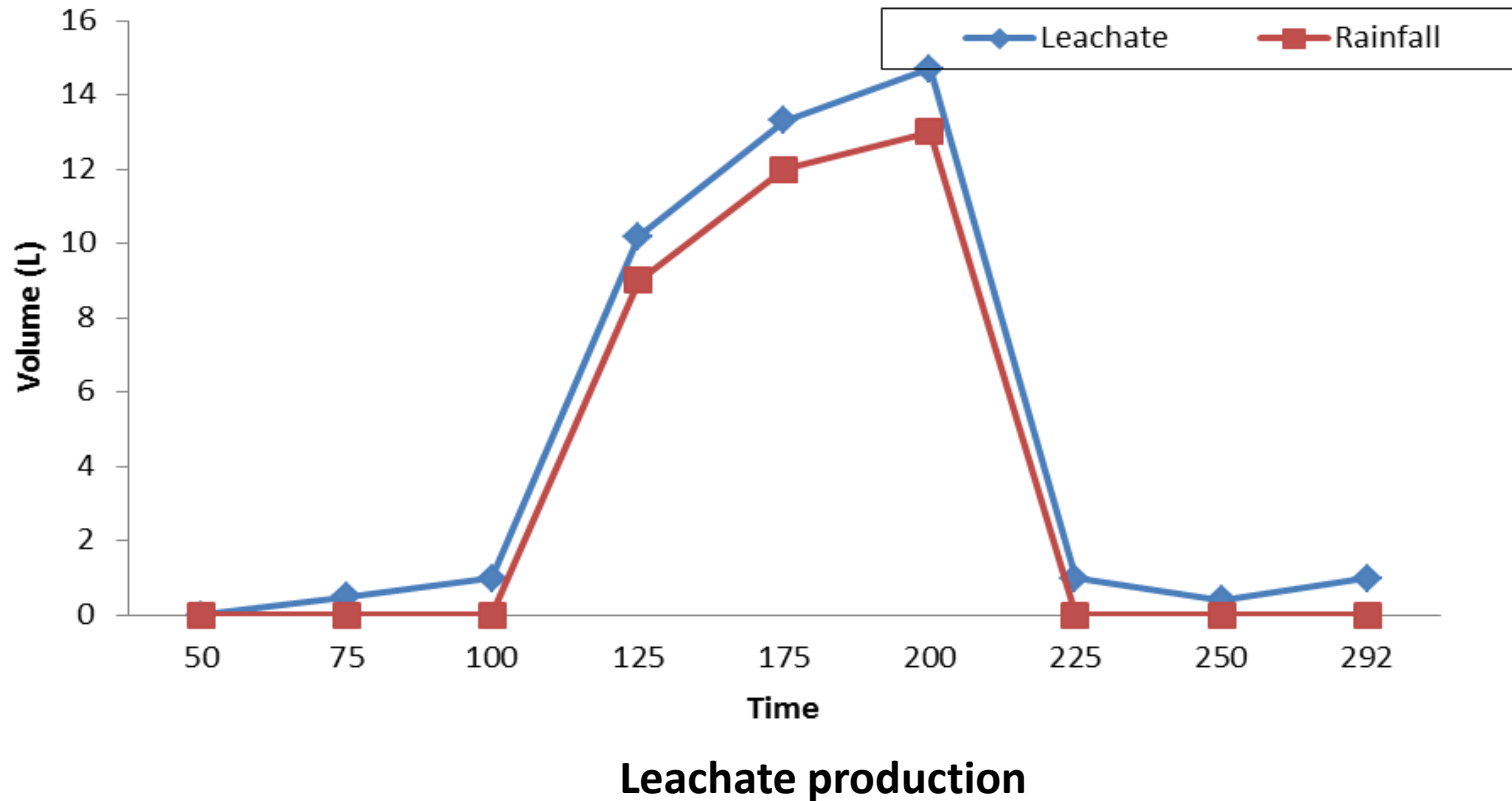
# Results: Laboratory work (anaerobic lysimeter)

## Gas production

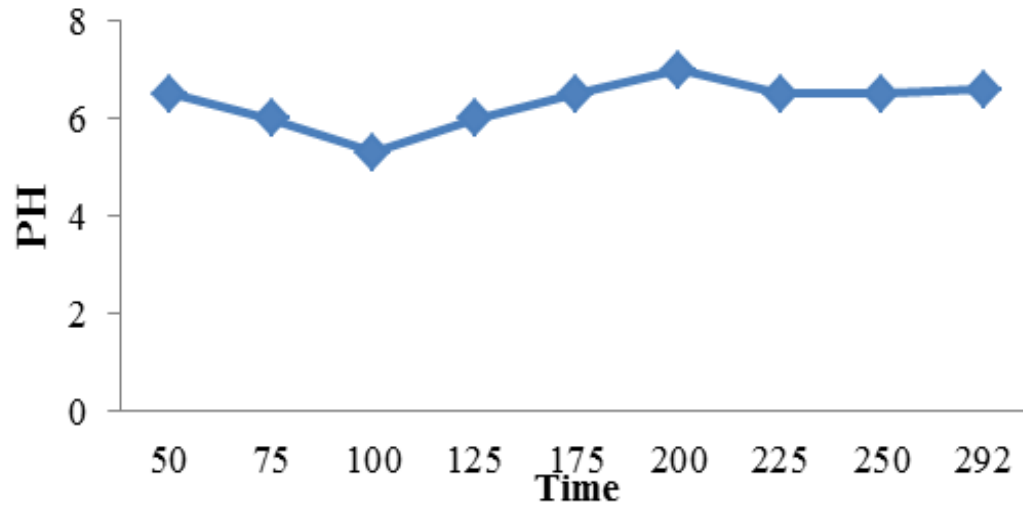


# Results: Laboratory work (anaerobic lysimeter)

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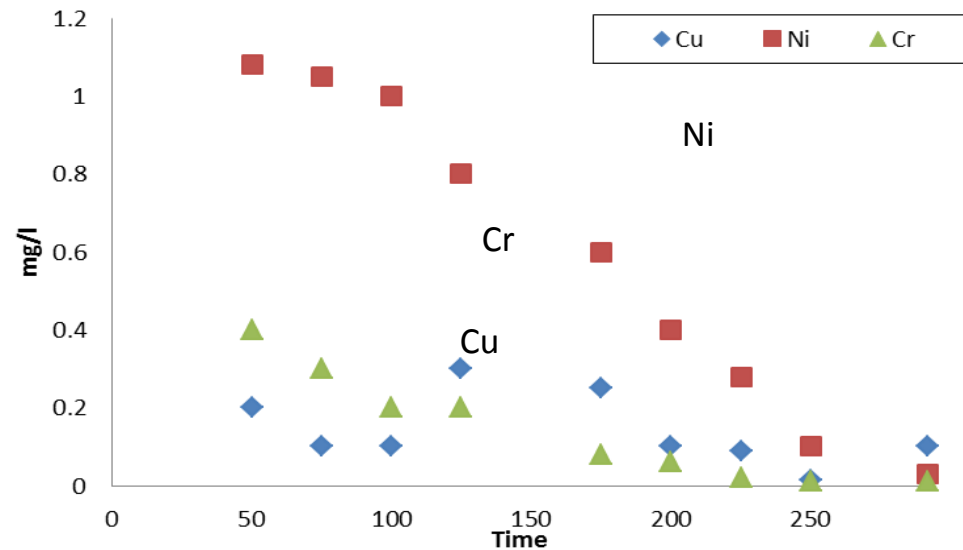


# Results: Laboratory work (anaerobic lysimeter)



pH

## Metals



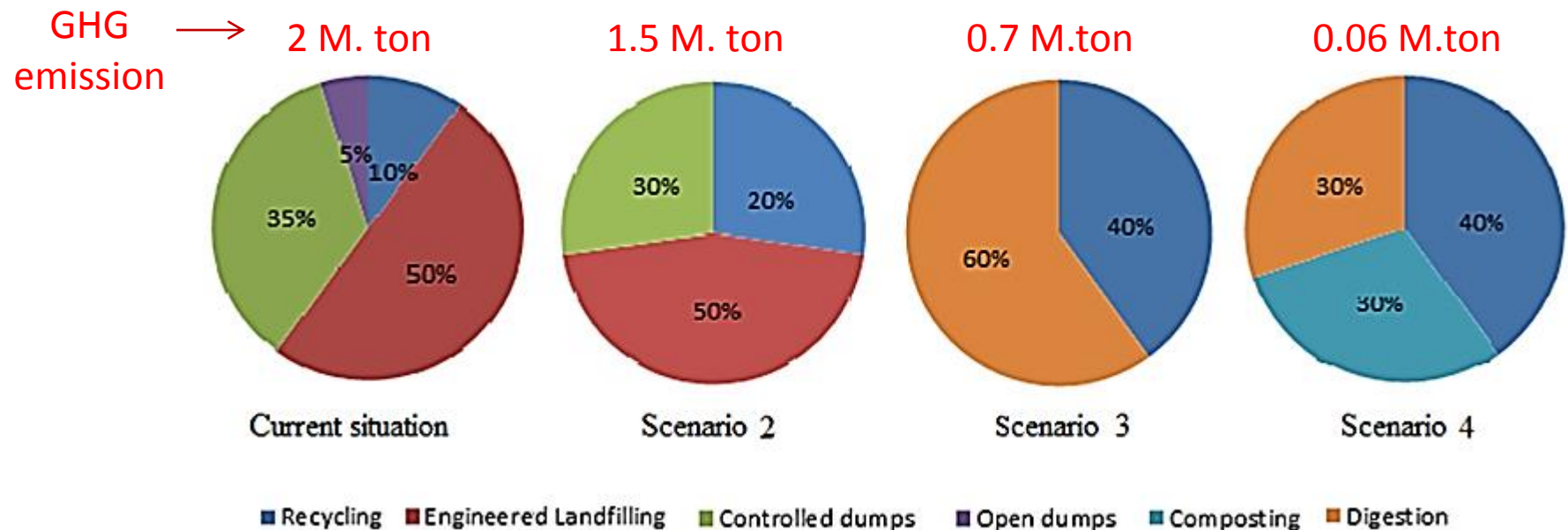
# Conclusion:

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- Source separation is not easy to start nowadays in Jordan
- The current regulation stand against developing SWM
- Anaerobic digestion is a very efficient waste treatment process
- It produces bioenergy (heat, electricity, fuel, gas)
- **A great environmental biorefinery !**

# Recommendations:

- Shifting towards sustainable waste management!



Comparison of different waste management strategies

Emission Environment Energy Resources Jobs

## Outlook: Future research

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- A mass balance of carbon and metals in the lysimeter and compare with real landfills.
- Economic and feasibility study!

Thank you!



# Anaerobic degradation

