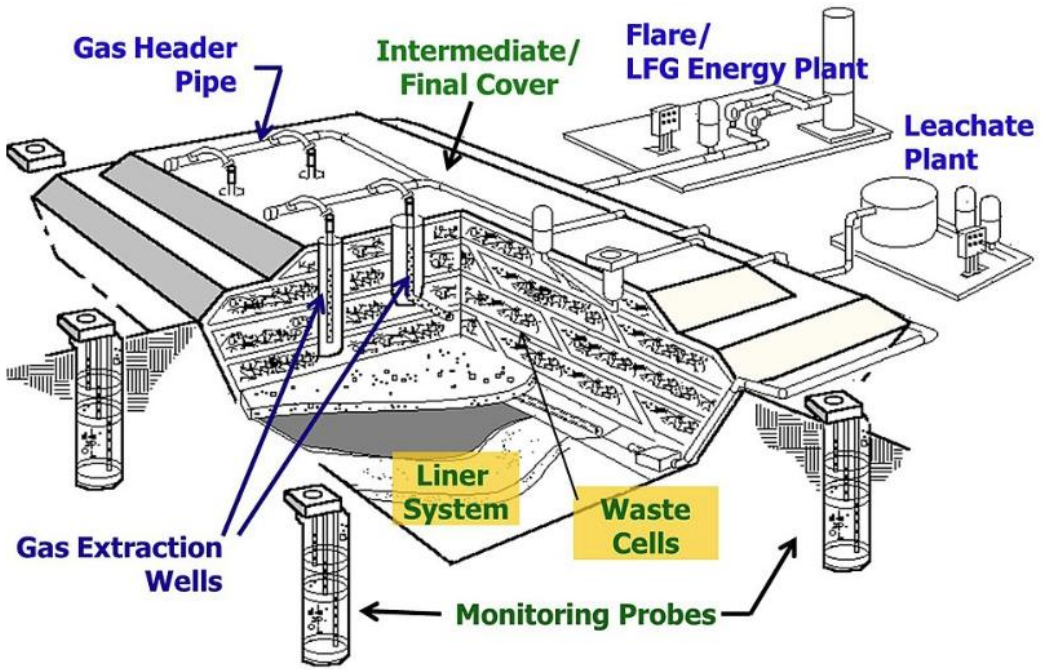
Optimizing Horizontal Landfill Gas Collection Through Design and Construction Innovation

Presenter: Sahar Rahimnezhad
Organisation: Cleanaway Waste Management
Conference: WMRR Conference 2026

The Challenge : Early methane generation before vertical well installation

- *Gas generation begins shortly after waste placement*
- *Vertical wells are often installed later in landfill life*
- *This delay can result in lost gas capture opportunities*
- *Early methane can be lost through fugitive emissions*
- *Lost methane means lost energy and carbon revenue*
- *An interim gas collection solution is required during landfill development*



- *Horizontal: Early capture, lower mobilization, no drilling, suited to active cells*
- *Vertical: Installed later, drilling required, essential long-term infrastructure*

The Approach : Implementing horizontal gas collectors for early gas capture

Why Horizontal Collectors Matter

- Capture methane during active filling
- Reduce fugitive emissions
- Improve odor and migration control
- Increase energy generation and ACCU opportunities
- Cheaper option than verticals

How Horizontal Collectors Work

- Installed progressively with landfill development
- Uniform spacing and coverage
- Perforated HDPE collector within drainage aggregate
- Connected to gas headers
- Operated under applied vacuum

Key Horizontal Challenges

- Condensate
- Settlement
- Access and maintenance

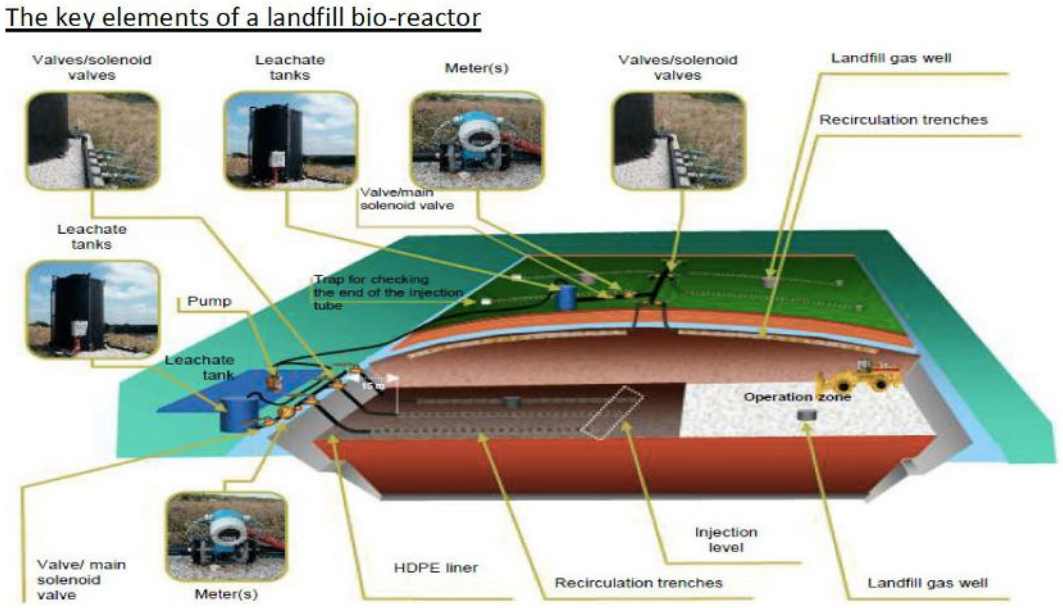
Design 1: *Leachate Recirculation and Methane Recovery*

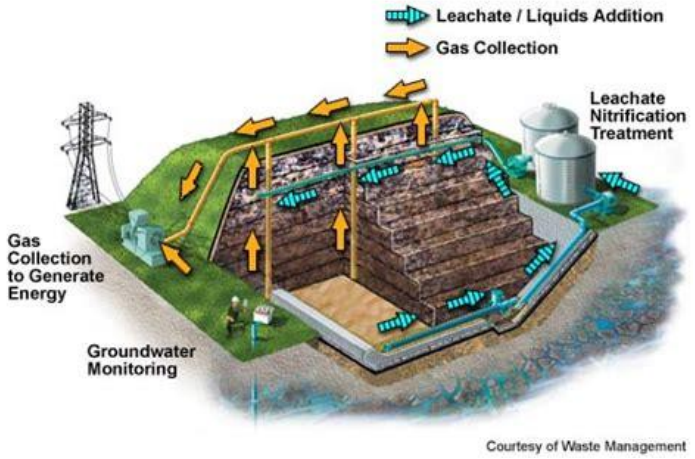
Key Improvement

- ***Installed perforated horizontal collectors at controlled grades***
- ***Enabled effective condensate drainage***
- ***Implemented leachate recirculation***

Outcomes

- ***Promotes continuous condensate drainage***
- ***Reduces blockage risk***
- ***Extends collector service life***
- ***Improves long-term extraction efficiency***





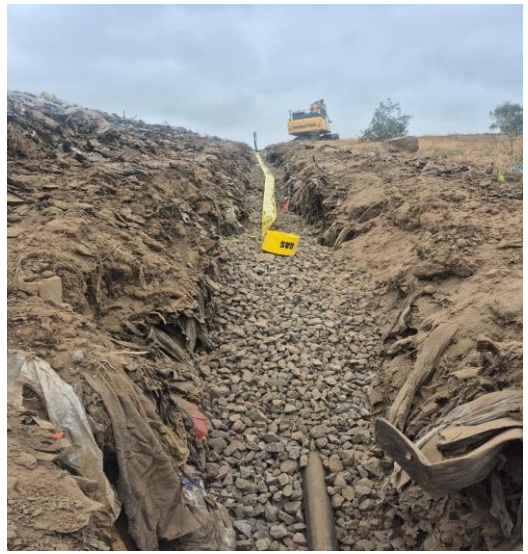
Bioreactor Landfills → Leachate Recirculation → Increased Moisture → Enhanced Biodegradation → Increased Methane Generation → Gas Capture via Horizontal Collectors

Design 1: *Leachate Recirculation and Methane Recovery*











Bioreactor Landfills → Leachate Recirculation → Increased Moisture → Enhanced Biodegradation → Increased Methane Generation → Gas Capture via Horizontal Collectors

Design 2: Parallel Connection with Aggregate Trenches

Why Parallel Connections?

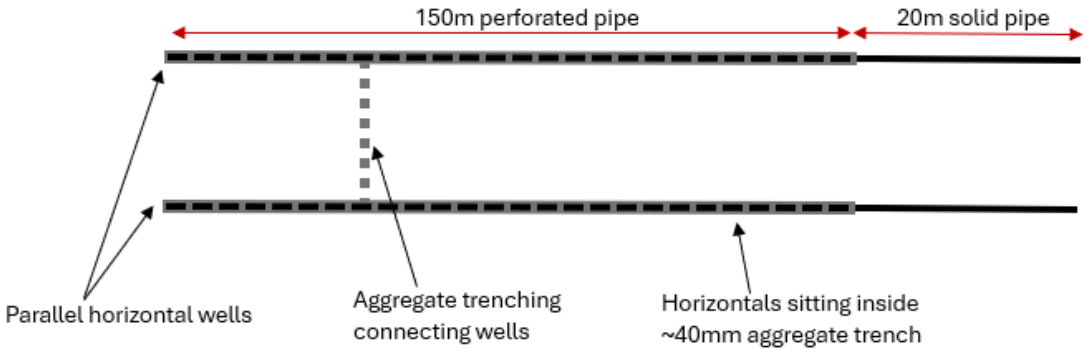
If a collector becomes blocked:

- ***Vacuum remains available to adjacent collectors***
- ***Gas extraction continues through parallel pathways***
- ***Minimal impact on overall field performance***



Key Benefits

- ***Improved system resilience***
- ***Reduced operational disruption***
- ***More consistent gas capture***
- ***Greater long-term collection efficiency***



Design 3: *Horizontal Collectors for Batter Emission Control*

Problem

High-emission landfill batters often sit outside the influence of conventional gas collection infrastructure.

Solution

Installation of horizontal collectors to capture methane and reduce surface emissions.

Outcomes

- ✓ ***Lower fugitive emissions***
- ✓ ***Improved gas field coverage***
- ✓ ***Enhanced environmental performance***
- ✓ ***Increased gas capture efficiency***





Results & Benefits

- *Gas capture increased*
- *Additional ACCUs generated*
- *Cost effectiveness*
- *Reduced condensate issues and maintenance*
- *Faster commissioning compared with waiting for vertical wells*
- *Improved landfill surface access and operations*

Benefits include : Faster construction with lower cost, earlier revenue generation (golden time), higher methane recovery, increased electricity export, RNG potential and carbon abatement.

Key Takeaways

Leachate Recirculation and Methane Recovery

Leachate recirculation enhances waste biodegradation and methane generation, while horizontal collectors support efficient gas recovery.

- *A bioreactor landfill approach accelerates waste stabilisation while increasing methane recovery opportunities.*

Parallel Connection with Aggregate Trenches

Parallel connections improve system resilience by maintaining gas extraction when individual collectors experience blockage or operational issues.

- *Parallel connections maintain gas collection performance even when individual collectors experience condensate blockage or operational issues.*

Horizontal Collectors for Batter Emission Control

horizontal collectors provide effective emission control in high-emission batter areas where conventional gas infrastructure is impractical.

Final Message

There is no single solution to optimising landfill gas capture. Success comes from combining innovative collection techniques, practical field design, and targeted emission control strategies to maximise recovery and minimise environmental impact.



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Thank You

Q/A

Sahar.Rahimnezhad@Cleanaway.com.au