

Optimizing gas capture and odour management using normalised modular infrastructure

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Woodlawn Eco-Precinct

- Crisps Creek Intermodal
- Bioreactor Landfill
- Leachate Treatment Plant
- Bio-Energy
- Mechanical Biological Treatment Facility (MBT)
- Aquaculture
- Agriculture
- Solar Farm
- Wind Farm



Woodlawn Eco-Precinct



Woodlawn Bioreactor Landfill

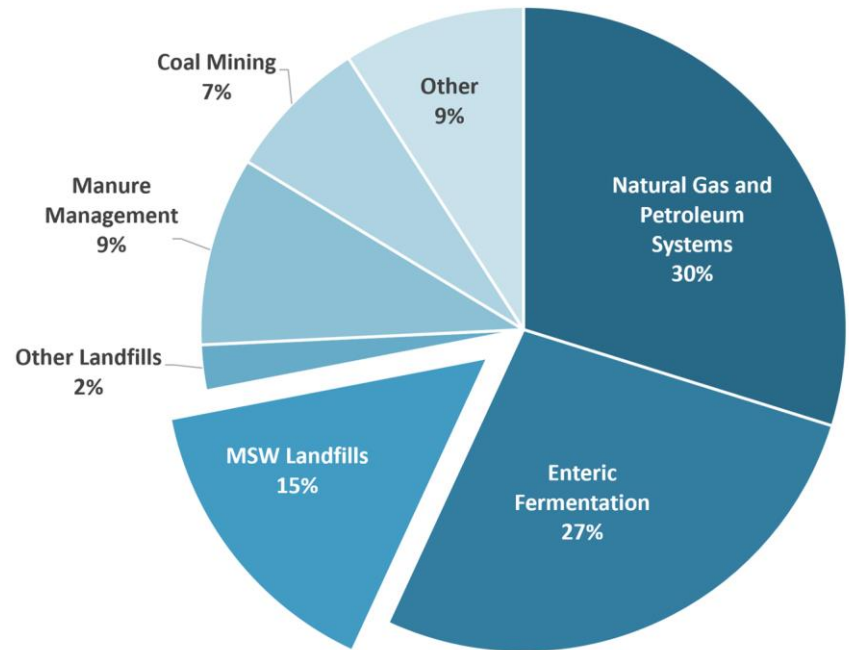
- Total capacity 33.4 million m³
- 30% of Sydney municipal solid waste
- Daily input around 3,000 - 3,500 t
- 8.5 million tons waste till Dec.2020
- Projected service life to 2055



Landfill Gas (LFG) - Source of greenhouse gas emission

- Greenhouse gas emissions
 CH_4 has 22-36 times higher global warming potential than CO_2
- Odour
 Volatile fatty acids (VFA) and H_2S can be produced from the anaerobic digestion process

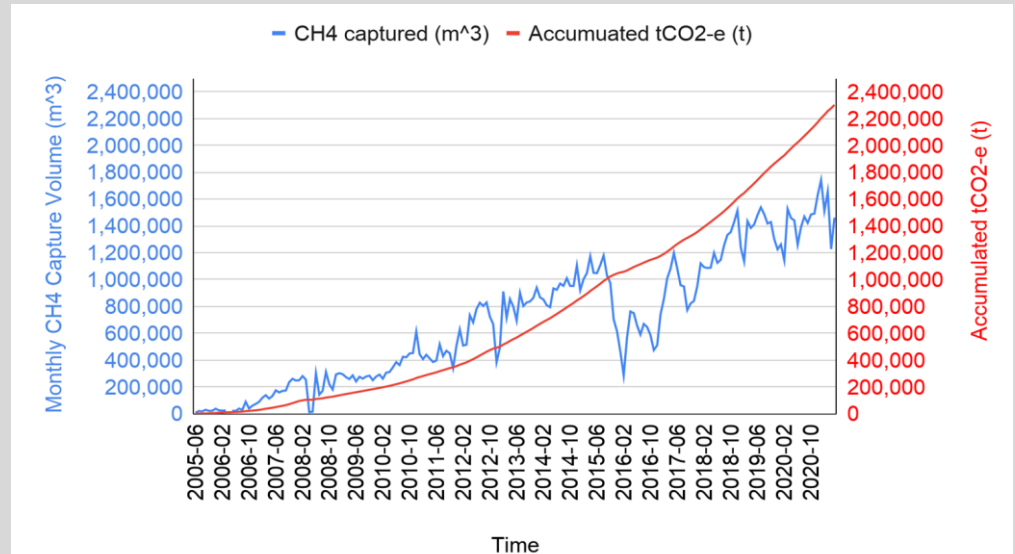
2019 U.S. Methane Emissions, By Source



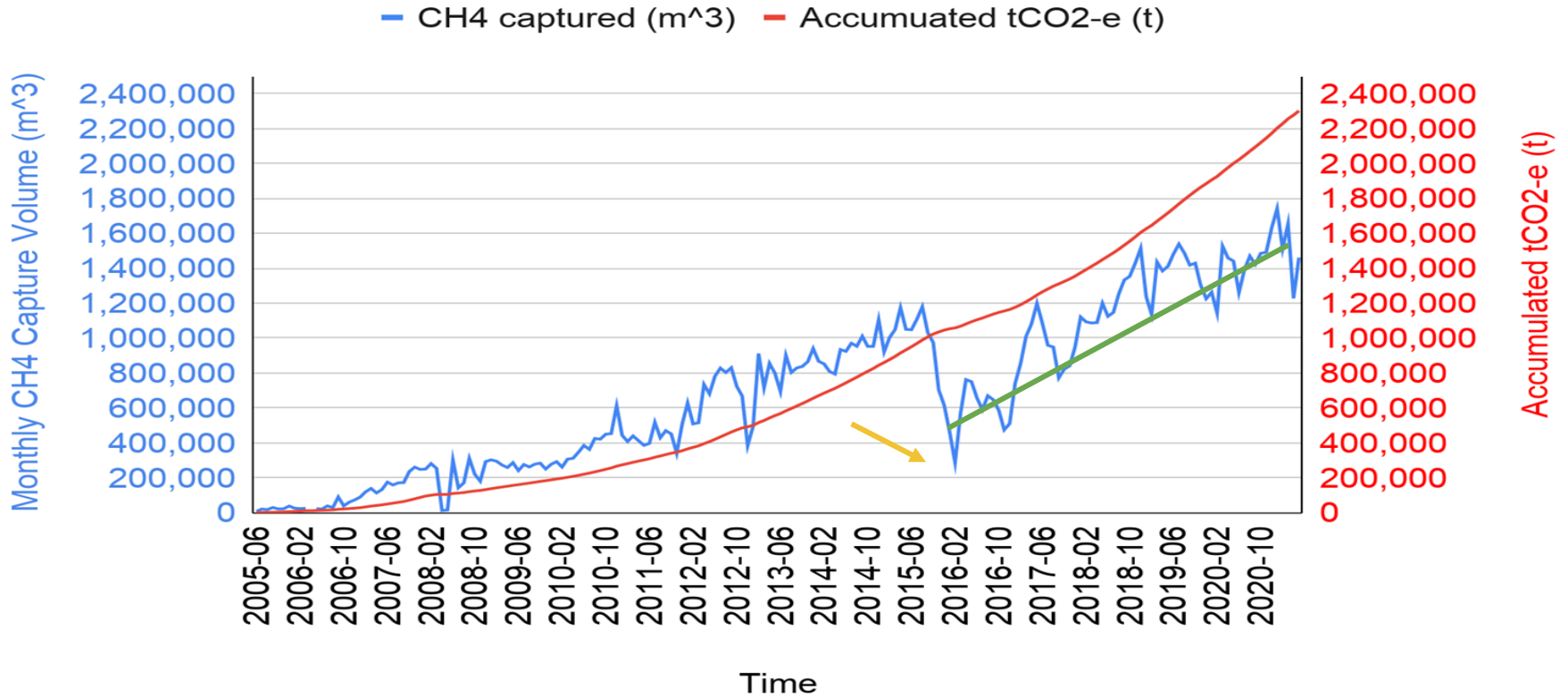
Note: All emission estimates from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019*. U.S. EPA, 2021.

LFG capture in Woodlawn Bioreactor

- Recent monthly data:
 - LFG capture 2.7 million Nm³ with 56% of CH₄
 - 4.5 GWh electricity generation
- Equivalent to reducing about 68,000 cars on the street
- Total CO₂ capture since 2005 - 2.3 million t CO₂-e

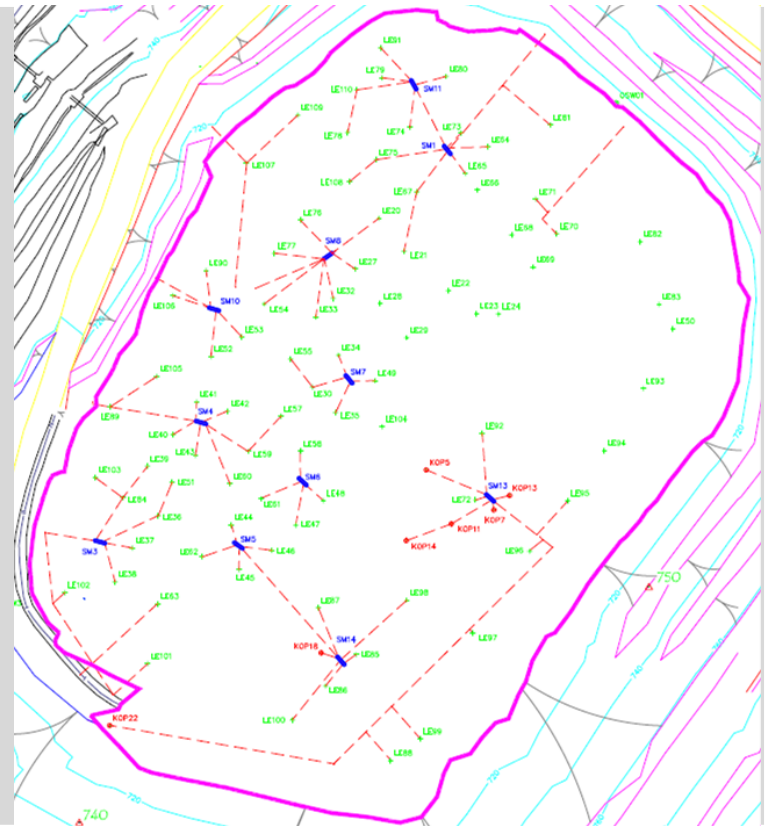


LFG capture in Woodlawn Bioreactor



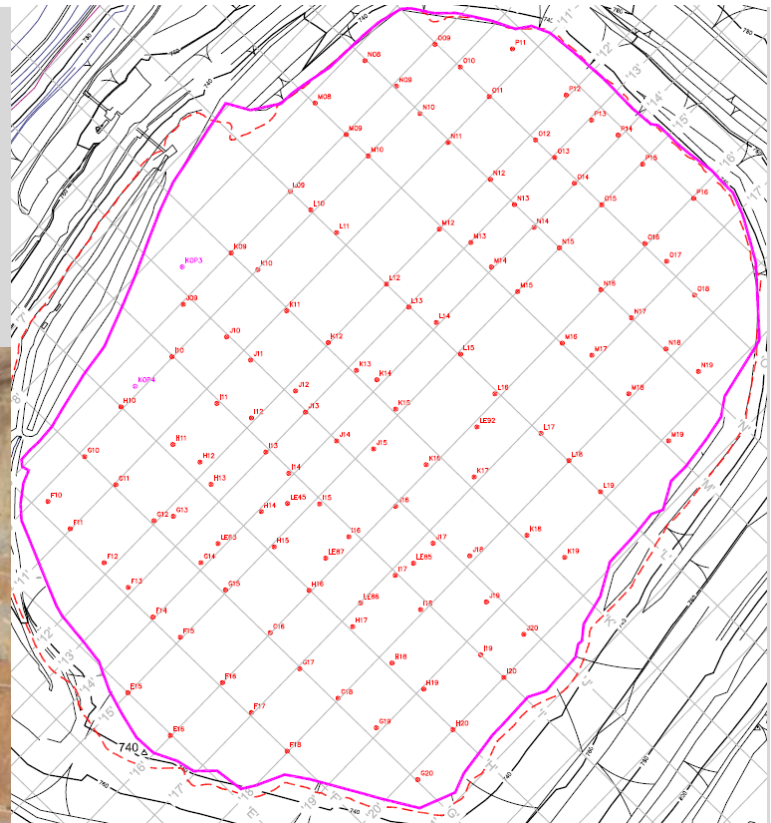
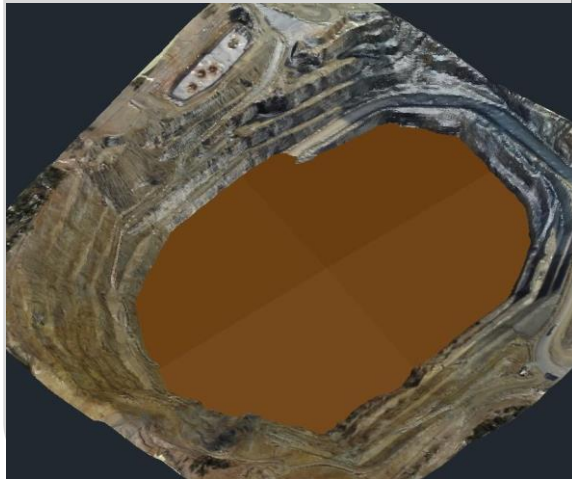
Previous LFG system and the problems

- Deep perforation
- Spider-main system
- flat finish surface



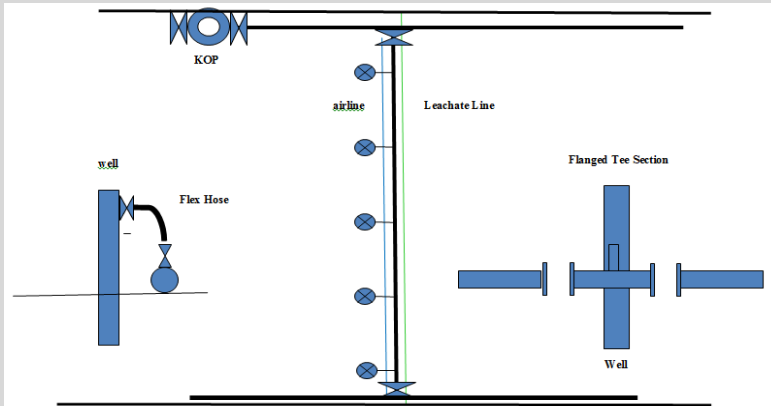
New LFG system concept and implementation

- Perforated gas wells 2m below finish surface.
- Grid system
- Finish surface with pyramid shape



Normalised modular LFG system

- Wells directly connect to main header
- Each section between 2 wells can be removed and reused
- Ring main with multiple exit pathways
- Strategical tipping plan



Woodlawn - current LFG Capture system

- About 130 LFG extraction wells
- More than 8 km of LFG pipe (ø250mm & ø400mm)
- Similar length of pipes for compressed air and leachate
- Flowrate about 4000 m³/h, with CH₄ content above 50%



Modular biofiltration system for odour control

Biofiltration system

- Fugitive gas emission
- OH&S concern
- Odour problem



Woodlawn - Bio-Energy Plant

- Providing the suction power for the LFG capture and use LFG for electricity generation
- 7 x 1.065 MW Generators
- 24/7 operation
- In the process of installing more generators
- Recent average generation 4.5 GWh/month
- Meet power demand for about 5,300 Australians



Woodlawn – Aquaculture and Aquaponics

- Waste heat from Bio-Energy generators to maintain the water temperature above 26 °C
- 3.5 t of Barramundi produced each year



Thank you very much!



Questions or Queries
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