

**REPORT ON CONFERENCE VISIT**  
**9<sup>th</sup> Intercontinental Landfill Research Symposium**  
**Noboribetsu Onsen, Hokkaido, Japan**  
**13 -15 June, 2016**

---

Dr Francis Mani  
Lecturer in Chemistry  
Faculty of Science, Technology and Environment  
University of the South Pacific

## 1. Introduction

The 9<sup>th</sup> Intercontinental Landfill Research Symposium was organized for researchers and landfill operators mostly from three continents, Europe, North America and Asia. Altogether 100 participants participated with approximately 80 oral presentations spread over 3 days. Topics such as landfilling in developing countries, new challenges in Leachate management, leachate treatment and landfill gas were of great relevance and interest not only to continents but for a small pacific island country like Fiji where landfilling waste is becoming more popular in waste management. This conference was organized by international waste working group (iwwg).

I presented the paper titled: “Landfill gas generation and methane recovery at Naboro Landfill, Fiji Islands: A case study from a developing Pacific Island country”. The abstract for the paper is attached with this report. The paper was presented in Day 1 of the conference in session B2: Landfilling in developing countries. The schedule for the conference is also attached with this report. The session was well attended and comprised of some stalwarts in landfill research, who provided some useful suggestions and areas for further research in this region.

## 2. Useful outcomes

Attending this conference was useful because:

- It provided a platform to learn so much about landfill research areas and what the current status is and how these ideas could be incorporated into regional context.
- There were lots of opportunities to network with some prolific researchers in landfill area during lunch and dinners.
- Discussions on landfill gas and leachate characterization data from Naboro landfill was discussed with some specialists such as Professor Debra Reinhart, University of Central Florida, USA, Professor Raffaello Cossu, Chief Editor of Waste Management Journal and Professor Paul Imhoff of University of Delaware, USA.
- Got verbal assurance from two professors who could be potential examiners for my two MSc students doing research on naboro landfill and will be submitting their thesis soon.
- Professor Paul Imhoff was interested in methane flux data and there is an exciting possibility to work in collaboration to analyze the data with a model and to do an extensive field measurements.
- I was invited to become a member of the international waste working group as they were really interested to know how pacific island countries manage their waste.

### 3. Conclusion

My participation in this 3 days conference was indeed productive. Our landfill research at USP was noted and generated a lot of interest amongst the audience. New ideas in landfill research were unveiled and academics with similar interests were identified. Undoubtedly the conference provided a great networking experience, which could result in strong collaborations in future.

### Acknowledgement

I would like to thank the Dean of FSTE, Dr Angeela Jokhan for her support and the University of the South Pacific for their commitment in staff development. My sincere gratitude to the Associate Dean, Dr Bibhya Sharma for approving this conference leave in his capacity as the Acting Dean. I would also like to sincerely thank my co-authors for their contributions. Finally, I would like to thank the EU PACE-NET PLUS initiative for funding this project.

### Abstract

Landfill gas generation and methane recovery at Naboro Landfill, Fiji Islands: A case study from a developing Pacific Island country.

F. MANI\*, R. GRONERT\*\*, M.HARVEY\*\*\*, M. MAATA\*, S. CHAND\*

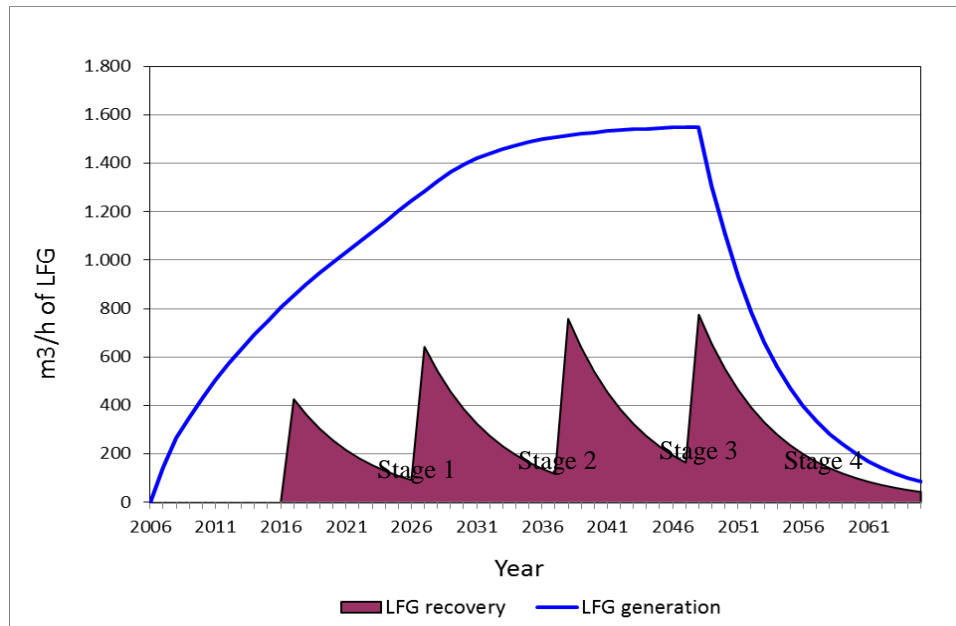
*\*School of Biological and Chemical Science, Faculty of Science, Technology and Environment, University of the South Pacific, Suva, Fiji Islands.*

*\*\* NV Afvalzorg, Nauerna 1, Assendelft, The Netherlands.*

*\*\*\*National Institute of Water and Atmospheric Research, Wellington, New Zealand*

The Naboro landfill in Suva, the capital city of Fiji Islands, is a sanitary engineered landfill, consisting of a compacted clay protective liner and leachate collection system. The waste is selectively placed, compacted and then covered with soil. The landfill was commissioned in 2005 and is currently receiving an average of 70,000 tonnes of waste annually. The municipal solid waste deposited in the landfill undergoes anaerobic decomposition and the methane gas generated escapes into the atmosphere, adding to the national greenhouse gas inventory. Currently there are no methane recovery and biogas utilisation technology in place or methane flaring at the Naboro landfill site. A feasibility study was carried out recently and based on the model output and field experiments, it was noted that methane recovery and utilisation could be a viable option although there could be some challenges associated with it.

According to the waste characterization data supplied by the landfill operator it was noted that 83% is house hold waste, 11% is garden waste and 5% is food waste and 1% construction and demolition waste. Based on the type of waste deposited and the tropical weather condition it was calculated using the model that approximately 800 m<sup>3</sup>/h of methane is generated in 2016. Figure below shows the landfill gas generated at the Naboro landfill from stage 1 to stage 4.



Due to tropical humid weather condition and waste rich is organic waste that decomposes rapidly results in the yearly average emission of 74% of total methane generated despite methane recovery via vertical wells installed at the end of each stage. The emission equates to 47,000 tons of CO<sub>2</sub> equivalent per year despite methane recovery. The emission can be reduced if the methane generated could be extracted using vertical recovery wells half way through each stage rather than at the end of each stage and as a consequence a slight decrease in yearly average emissions of 41,000 tons of CO<sub>2</sub> equivalent were noted. Another approach is to lay horizontal wells as the waste is compacted in the active cell and this could increase the efficiency of landfill gas extraction. The model result indicate that the use of horizontal wells reduces the yearly average emission to 55% of total methane generated. This highlights the fact that approximately 45 % of the methane generated could be harnessed and could be utilized to generate energy using gas engines. However a large fraction of the methane generated is still lost as emission to the atmosphere and this can be further reduced by enhancing the oxidising capacity of the soil cover. The methane oxidation in cover soil was measured to be 10.3% by measuring the CH<sub>4</sub>-CO<sub>2</sub> ratios in the static chamber measurements. The experimental value is close to the IPCC default value of 10%. The paper will discuss other challenges associated with methane recovery at Naboro landfill particularly with landfill gas management.

**Conference Schedule:**

## ICLRS2016 TIME SCHEDULE

Date	Time	Room A	Room B
June 12 Sun	16:00-18:00	Registration	
June 13 Mon	9:30 - 10:00	Opening session	
	10:00- 12:00	A1 <b>Role of landfill as a sink in the circular economy concept</b> Chair: R.Cossu & R.Raga	B1 <b>Landfill cover</b> Chair: L. Andreas
	12:00 - 13:00	Lunch	
	13:00 - 14:00	Poster session	
	14:00 - 16:00	A2 <b>LANDFILL AERATION: Status quo and future developments</b> Chair: M. Ritzkowski &	B2 <b>Landfilling in Developing Countries</b> Chair: Y. Tojo
	16:00 - 16:15	Break	
	16:15 - 18:15	A3 <b>New challenges in Leachate management</b> Chair: R.Cossu & M.Lavagnolo	B3 <b>Landfill inspection by use of various tools</b> Chair: T. Matsuto
	19:00 - 21:00	Dinner (Hotel buffet)	
June 14 Tue	9:00 - 11:00	A4 <b>Landfill aftercare completion I: potential indicators for completion</b> Chair: H.Scharff	B4 <b>Performance and prospect of MBT to landfill in Asia</b> Chair: T. Ishigaki
	11:00 - 12:00	Poster session	
	12:00 - 13:30	Lunch	
	13:30 - 15:30	A5 <b>Landfill aftercare completion II: decision making</b> Chair: H.Scharff	B5 <b>Artificial containment of landfill for hazardous inorganic substances</b> Chair: M.Yamada
	15:30-15:45	Break	
	15:45 - 17:45	A6 <b>Ash Leaching</b> Chair: J. Kumpiene	B6 <b>Landfill gas</b> Chair: A. Lagerkvist
	18:30 - 20:30	Dinner in Murooran (Bus leave 18:00)	
June 15 Wed	9:00 - 11:00	A7 <b>Leachate Treatment</b> Chair: D. Reinhart	B7 <b>Facultative-hybrid landfill reactors</b> Chair: R.Cossu & D.Yue
	11:00 - 11:30	Closing Session	