



OPPORTUNITIES FOR CARBON EMISSION REDUCTION IN SOLID WASTE MANAGEMENT

Agamuthu P. and Fauziah S.H.

Institute of Biological Sciences, Faculty of Science,
University of Malaya

50603 Kuala Lumpur

Tel: 03 7967 6756 Fax: 03 7967 4178

agamuthu@um.edu.my

[Content]

- Introduction
 - Impacts of Global Warming
- Role of Waste Management in Global Warming
- Technology for Remediation
- Conclusions

[Definition of Global Warming]

“ The progressive gradual rise of the earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in global climate patterns. “

Introduction

- Impacts of Global Warming
 - Rise in sea level,
 - Salt-water intrusion,
 - Reduction in productivity,
 - Desertification
 - Pest infestation and diseases outbreak,
 - Extinction of biodiversity
 - etc.

[Greenhouse Gases]

- carbon dioxide (CO₂),
- methane (CH₄),
- nitrous oxide (N₂O), and
- F-gases
- generated at 49 Gt CO₂-Eq year⁻¹ in 2004-2005

[Contribution by the waste sector]

- Approximately 1.4 Gt CO₂-Eq year⁻¹
- approximately 3% of the total anthropogenic GHG emission

[Contribution by Solid Waste Sector]

- landfills and wastewater treatment plants,
- > 90% of the total CH₄ emission throughout the globe
- CH₄ (25 X CO₂ absorbing capacity) increase from 27 million tons (2000) to 5.6 billion tons (2010) in the atmosphere.

[Mitigation Measures]

- Appropriate strategies need to be implemented
- The opportunities through the implementation of carbon reduction technology.

[Applicable strategies]

- 3Rs practice,
- Composting
- Biogassification and
- Biocover application onto landfill

3R (Reduce, Reuse and Recycle)

- Significant reduction in landfilled waste volume
- Generate economic gains
 - Energy generation - biogas
 - Value added products – compost
 - Reduce raw material usage – recyclables

[Recycling]

- Resource recovery
- Reduce raw material usage
- Reduce waste disposed into landfills
- Source separation
- Include: plastic, paper, metal, glass
food/ organic waste etc

Tonnes of carbon saved (metric tonnes of CO₂ Eq)

	Recycling vs landfill	EFW incineration vs landfill	Recycling vs incineration
Mixed MSW	-	0.02	-
Mixed recyclables	0.87	0.22	0.65
Newspaper	0.69	-0.01	0.70
Office paper	1.48	0.79	0.69
Corrugated paper	0.81	0.25	0.56
Aluminium cans	4.28	-0.02	4.3
Steel cans	0.64	0.54	0.10
HDPE	0.42	-0.22	0.64
LDPE	0.55	-0.23	0.78
PET	0.69	-0.24	0.93
Food scrap composting	0.16	0.22	-0.06
Yard waste composting	-0.12	-0.04	0.08

Composting

- Value added product
- ~ 50% of initial material
- Simple technology
- Organic fertilizer
- Easy-maintenance

Biogassification

- Anaerobic digestion
- Smaller ecological footprint compared to composting
- A tonne putrescibles → 130-160m³ biogas
- Significant economic gains
- -ve: Expensive (Proper biogas plant)
Sensitive procedure (obligate anaerobes)

Biocover application to landfill

- enables the oxidation of CH_4 to CO_2 prior to release of landfill gases into the atmosphere
- Utilizes the microbes
- Environmental friendly approach
- Significantly reduces CH_4 emission particularly from non-sanitary landfills

[Conclusion]

- Implementation of appropriate strategies is necessary
- Waste management sector can play crucial part in the reduction of GHG in Malaysia.



THANK YOU