Towards Low Carbon Society in Iskandar Malaysia: Implementation and Feasibility of Community Food Waste Composting

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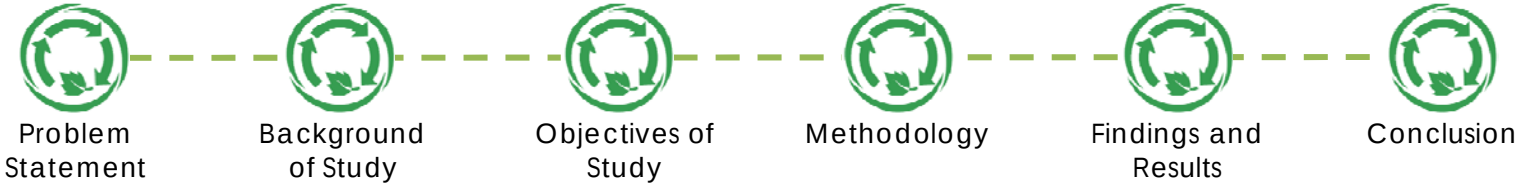


PROBLEM STATEMENT

Consumption Pattern

Economic Development

Industrialisation

Rapid Urbanisation

Environment

Health

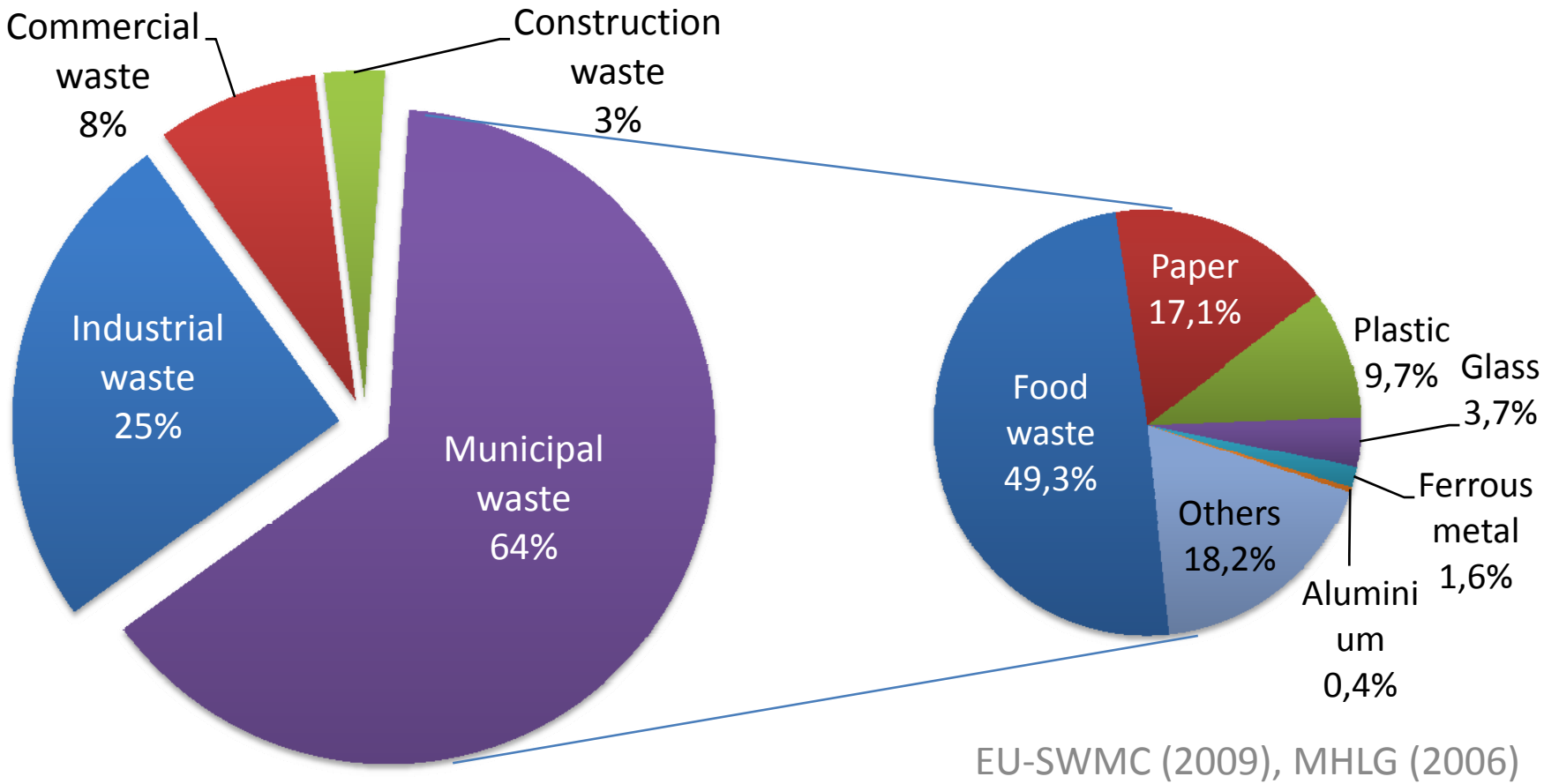
Safety

BACKGROUND OF STUDY

- **Underground Fire in poorly manage landfill**
- **Few Weeks to suppress the burning**

BACKGROUND OF STUDY

WASTE COMPOSITION IN MALAYSIA

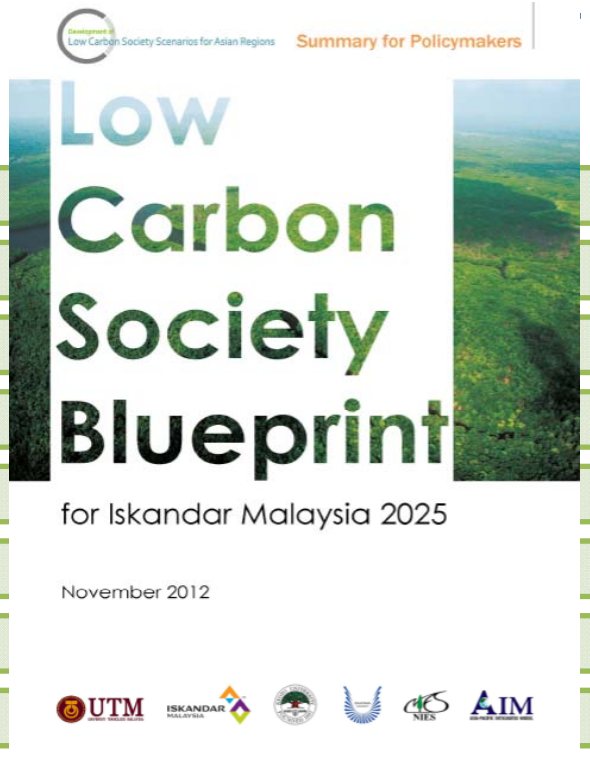


EU-SWMC (2009), MHLG (2006)

BACKGROUND OF STUDY

12 Actions Towards Low Carbon Future (Iskandar Malaysia)

1. Integrated Green Transportation
2. Green Industry
3. Low Carbon Urban Governance
4. Green Building and Construction
5. Green Energy System and Renewable Energy
6. Low Carbon Lifestyle
7. Community Engagement and Consensus Building
8. Walkable, Safe and Livable City Design
9. Smart Urban Growth
10. Green and Blue Infrastructure and Rural Resources
11. Sustainable Waste Management
12. Clean Air Environment

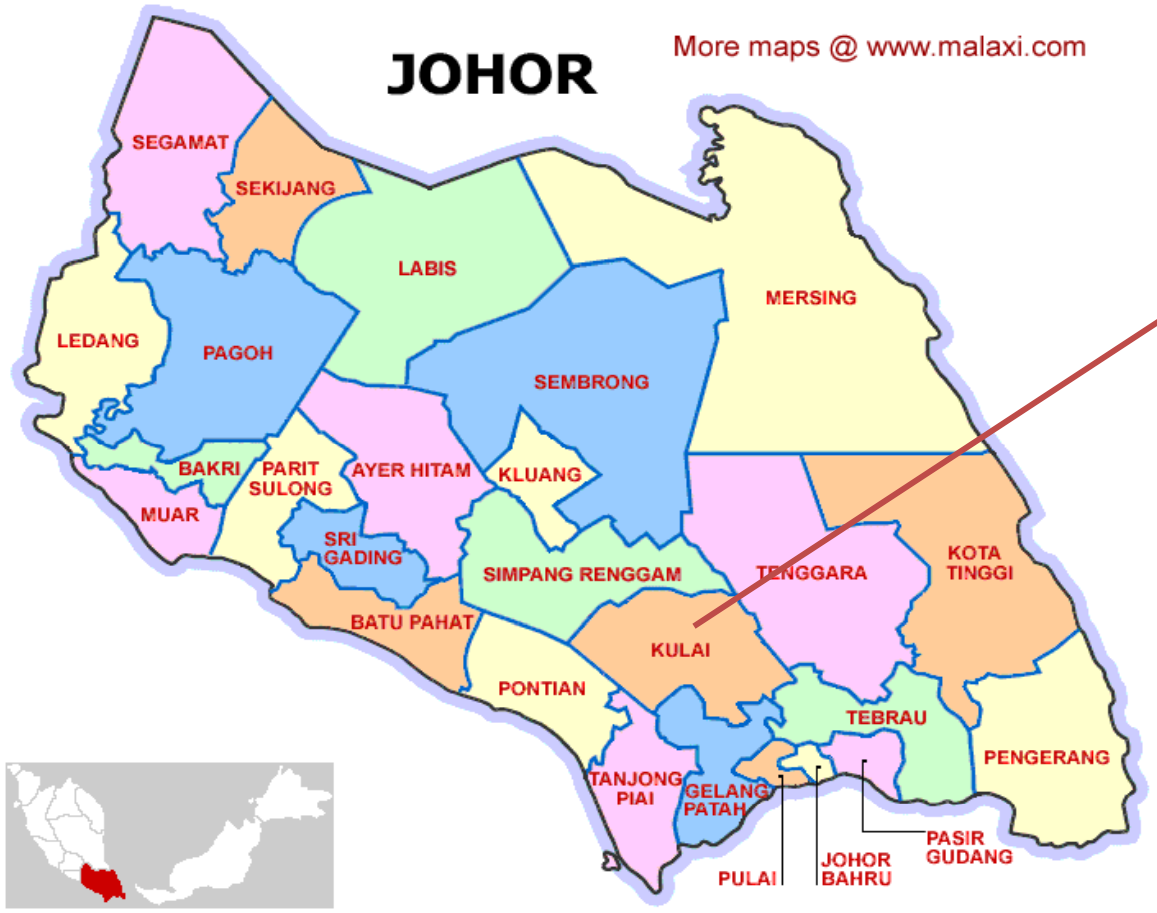


OBJECTIVES OF STUDY

- To implement a community composting prototype in a sub-urban community in Malaysia by evaluating the socio-economic and environmental impacts.
- to showcase effective MSW management and mitigation of GHG emission.

METHODOLOGY

1. Selection of community and composting site



Felda Taib Andak

1000 ft^2, located 7km away from the FTA community, was provided by the FTA LCS committee

METHODOLOGY

1. Selection of community and composting site

Felda Taib Andak

- Special village community driven by oil palm plantation activities.
- One of the100 Felda settlements across different states in Malaysia.
- Residential area with 600 households, palm oil plantation, and a crude palm oil processing industries.

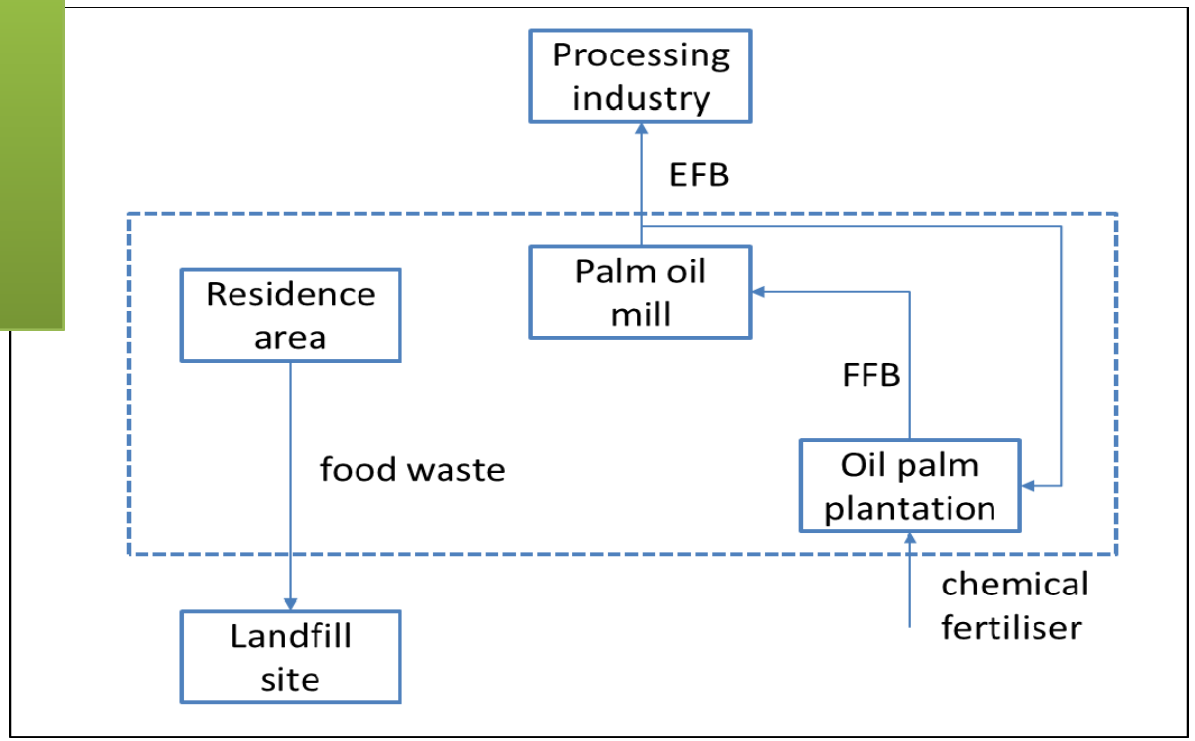
METHODOLOGY

2. Scenario Analysis

SCENARIO 1

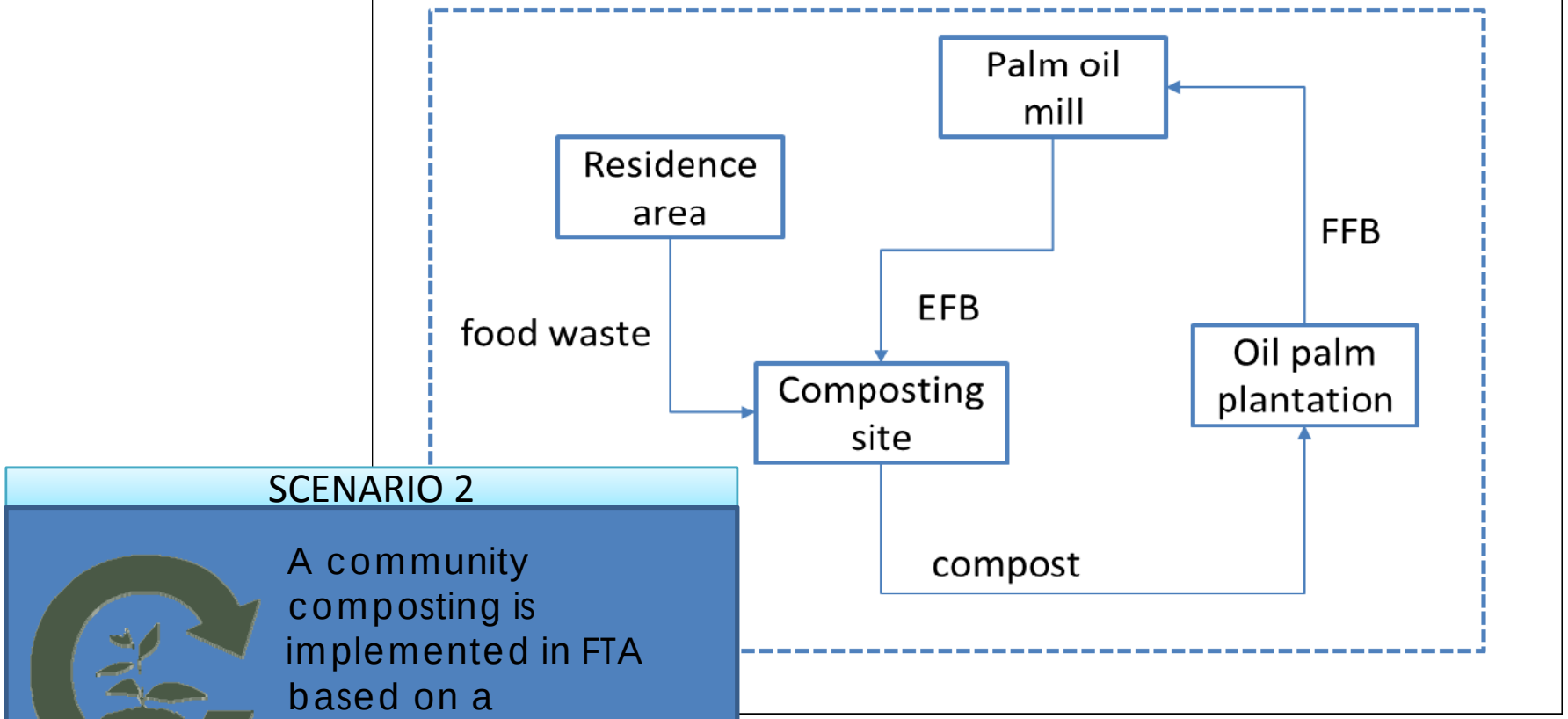
600 households which pays RM 4000/month for tipping fee

Total waste produced is approximately 33.3 ton/month



METHODOLOGY

2. Scenario Analysis



SCENARIO 2

A community composting is implemented in FTA based on a collaborative model

METHODOLOGY

3. Community engagement and workshop sessions




- Build consensus on establishing the composting site as joint project
- Cost co-sharing
- Responsibility identification
- Drafting of memorandum of understanding
- Compost site selection
- Overall implementation from 3R practices, food waste segregation, waste collection till the completion of composting process.

- ENGAGEMENT WITH RECYCLER
- PROF FUJIWARA, OKAYAMA UNIVERSITY





VISIT TO SITE
(before construction)

25.9.2014

3R CAMPAIGN & COMPETITIONS

- 3R Campaign
- Waste Segregation Competitions among 10 blocks of residents
- Co-organise with IRDA

1.11.2014

Construction of Site (USD6000)

7 Km from the Community, in a Oil palm Plantation

LAUNCH OF PROJECT

- By UTM Vice Chancellor, Prof Datuk Ir. Dr Wahid bin Omar
- Representatives from Felda HQ, IRDA, and University Community Transformation Centre (Ministry of Education)
- Attendees: 300 (from Community), 40 (from UTM), 20 from the Media and UCTC MOE

11.12.2014

PUBLICITY

Jadi komuniti contoh kampung rendah karbon

Felda Taib Andak jadi perintis jana pendapatan penduduk melalui kitar semula

Wahid menyempurnakan projek penanaman buluh madu di Felda Taib Andak, semalam.

22 NASIONAL

JUMAAT 12 DISEMBER

FELDA Taib Andak bersih

» Kampung Rendah Karbon pertama di Malaysia

Oleh Zuraidah Mohamed
zmohamed@bharian.com.my

Kulaijaya

FELDA Taib Andak, di sini, yang didiami kira-kira 14,000 penduduk diiktiraf sebagai Kampung Rendah Karbon pertama di negara ini menerusi pelbagai projek yang dilakukan dengan usaha sama Universiti Teknologi Malaysia (UTM).

Naib Canselor UTM, Prof Datuk Wahid Omar, berkata 12 aktiviti dijalankan di FELDA berkenaan sejak tahun 2009 merangkumi program guna semula, pengurangan dan kitar semula (3R), aktiviti berbasikal serta penghasilan baja kompos bagi menjana pendapatan sampingan penduduk.

Katanya, turut dilaksanakan ialah penanaman tumbuhan organik, kawalan pencemaran udara, kitaran semula hujan, zon bebas pembakaran terbuka, pemuliharaan sungai, tapak pejalan kaki, projek penjimatan tenaga di masjid dan penanaman pokok buluh madu.

Wahid berkata, 100 pokok buluh madu ditanam di penempatan berkenaan sejak awal tahun ini berikutan keupayaan tumbuhan itu menyerap karbon dengan lebih berkesan.

"Berdasarkan kajian, pokok buluh madu yang ditanam di kawasan seluas satu hektar mampu menyerap sehingga 5.1 tan karbon dalam tempoh setahun.

Tanam pokok skala besar

"Justeru, kami merancang menanam pokok berkenaan dalam skala besar pada April tahun depan sempena Hari Bumi.

"Kita mengalu-alukan sumbangan dan tajaan untuk menjayakan program berkenaan," katanya pada sidang media selepas majlis pelancaran Kampung Rendah Karbon di FELDA Taib Andak, di sini, semalam.

Projek Kampung Rendah Kar-

Buluh Madu

NATIONAL NEWS:
Sinar harian, Nasional
& Astro Awani

- TO PROMOTE Felda Taib Andak as Low Carbon Society

COOPERATION WITH CRUDE PALM OIL FACTORY

- SOURCE OF BIOMASS FOR COMPOSTING
- 2.4ton/MONTH OF EFB (EMPTY FRUIT BUNCH, shredded form)
- USD3/TON (If need in big quantity)

21.1.2015

WORKSHOP: Food Waste Segregation

- **Involved 124 houses in Seelong area**
- **Detailed instruction + Demo**
- **Attended by 30 households**

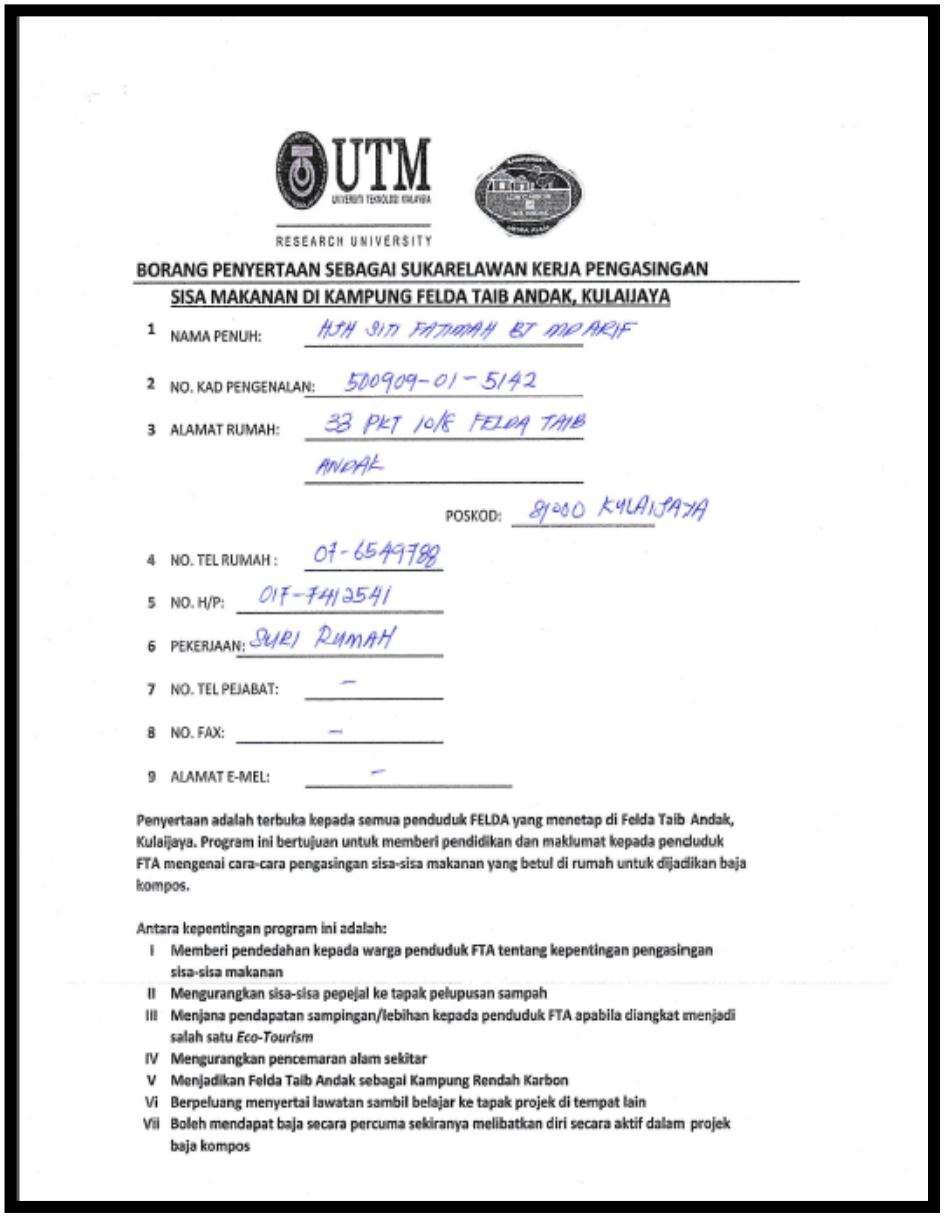
9.2.2015

By Chair, FTA LCS

TRAINING ON FOOD WASTE SEGREGATION

- Attended by 30 residents of Seelong Block
- **The 1st collection for food waste: 11.2.2015**
- **35 Households joined as Volunteer for food waste segregate**
- **35 members joined Felda Taib Andak LCS (FTA-LCS)**

Volunteer Form for Food waste Segregate



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BORANG PENYERTAAN SEBAGAI SUKARELAWAN KERJA PENGASINGAN SISA MAKANAN DI KAMPUNG FELDA TAIB ANDAK, KULAIJAYA

1 NAMA PENUH: HJH SITI FATIMAH BT MD ARIF

2 NO. KAD PENGENALAN: 500909-01-5142

3 ALAMAT RUMAH: 33 PKT 10/K FELDA TAIB ANDAK

POSKOD: 81200 KULAIJAYA

4 NO. TEL RUMAH : 07-6549788

5 NO. H/P: 017-7412541

6 PEKERJAAN: SURI RUMAH

7 NO. TEL PEJABAT: -

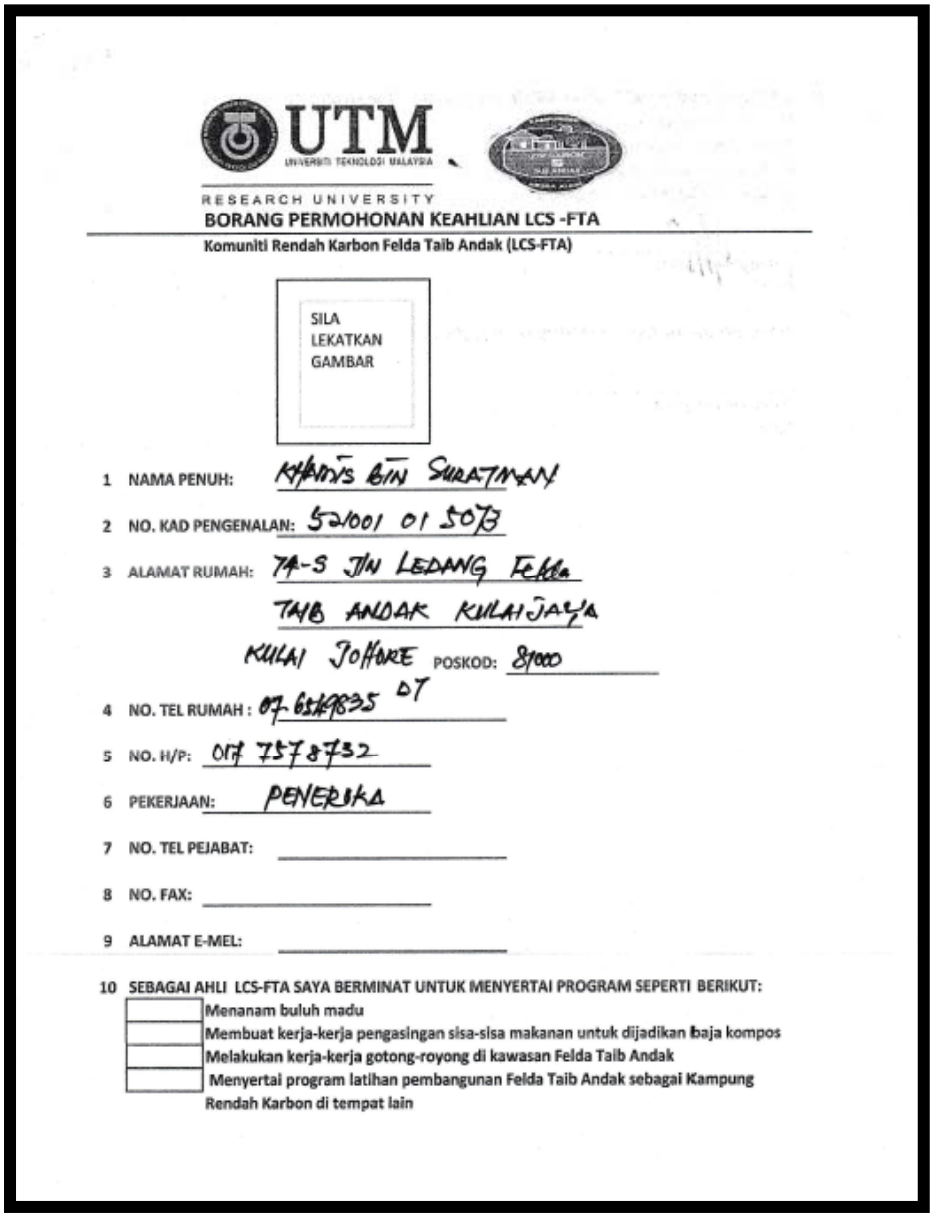
8 NO. FAX: -

9 ALAMAT E-MEL: -

Penyertaan adalah terbuka kepada semua penduduk FELDA yang menetap di Felda Taib Andak, Kulaijaya. Program ini bertujuan untuk memberi pendidikan dan maklumat kepada penduduk FTA mengenai cara-cara pengasingan sisa-sisa makanan yang betul di rumah untuk dijadikan baja kompos.

Antara kepentingan program ini adalah:

I Memberi pendedahan kepada warga penduduk FTA tentang kepentingan pengasingan sisa-sisa makanan
II Mengurangkan sisa-sisa pepejal ke tapak pelupusan sampah
III Menjana pendapatan sampingan/lebihan kepada penduduk FTA apabila diangkat menjadi salah satu *Eco-Tourism*
IV Mengurangkan pencemaran alam sekitar
V Menjadikan Felda Taib Andak sebagai Kampung Rendah Karbon
Vi Berpeluang menyertai lawatan sambil belajar ke tapak projek di tempat lain
Vii Boleh mendapat baja secara percuma sekiranya melibatkan diri secara aktif dalam projek baja kompos



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BORANG PERMOHONAN KEAHLIAN LCS -FTA

Komuniti Rendah Karbon Felda Taib Andak (LCS-FTA)

SILA LEKATKAN GAMBAR

1 NAMA PENUH: KHAIRIS BIN SURATMAN

2 NO. KAD PENGENALAN: 521001 01 5073

3 ALAMAT RUMAH: 7A-S JLN LEDANG Felda TAIB ANDAK KULAIJAYA KULAI JOHORE POSKOD: 81000

4 NO. TEL RUMAH : 07-6549835 DT

5 NO. H/P: 017 7578732

6 PEKERJAAN: PENERIKA

7 NO. TEL PEJABAT:

8 NO. FAX:

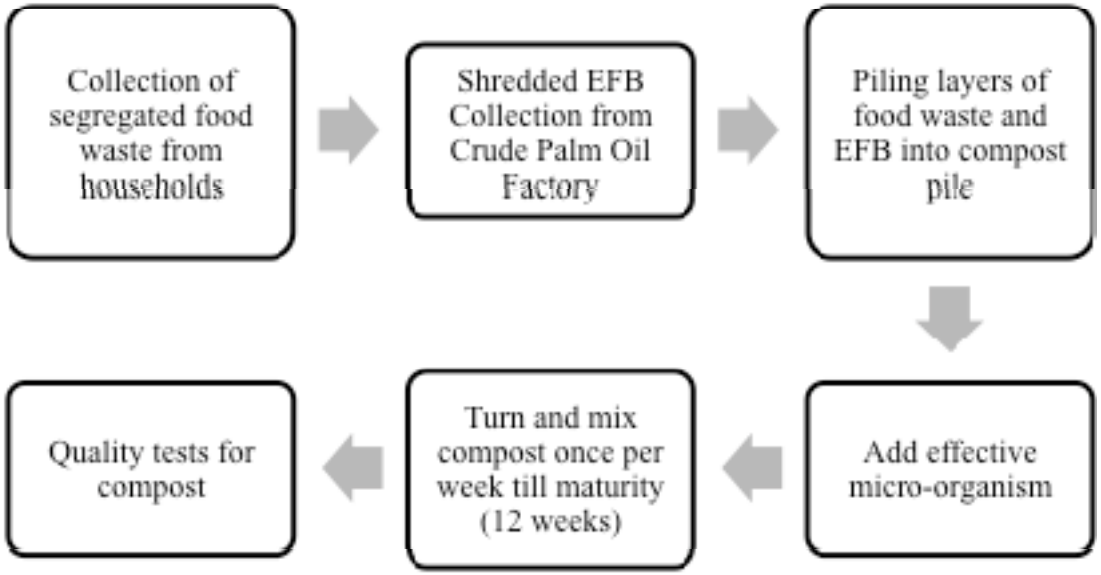
9 ALAMAT E-MEL:

10 SEBAGAI AHLI LCS-FTA SAYA BERMINAT UNTUK MENYERTAI PROGRAM SEPERTI BERIKUT:

- [ ] Menanam buluh madu
- [ ] Membuat kerja-kerja pengasingan sisa-sisa makanan untuk dijadikan baja kompos
- [ ] Melakukan kerja-kerja gotong-royong di kawasan Felda Taib Andak
- [ ] Menyertai program latihan pembangunan Felda Taib Andak sebagai Kampung Rendah Karbon di tempat lain

METHODOLOGY

4. Data Collection



A typical routine of the composting process is followed by collecting the food waste segregated by 30 residents in Block Seelong (10/8) and shredded EFB waste (up to 2t/mth) was supplied by the CPO factory

IN OPERATION

12.2.2015

Food waste collection (60kg/day average) from 30 households

Mixed food waste and shredded palm Empty Fruit Brunch (EFB)

Layers of compost was completed and sealed with canvas to avoid wild animals

COMPOSTING WORK

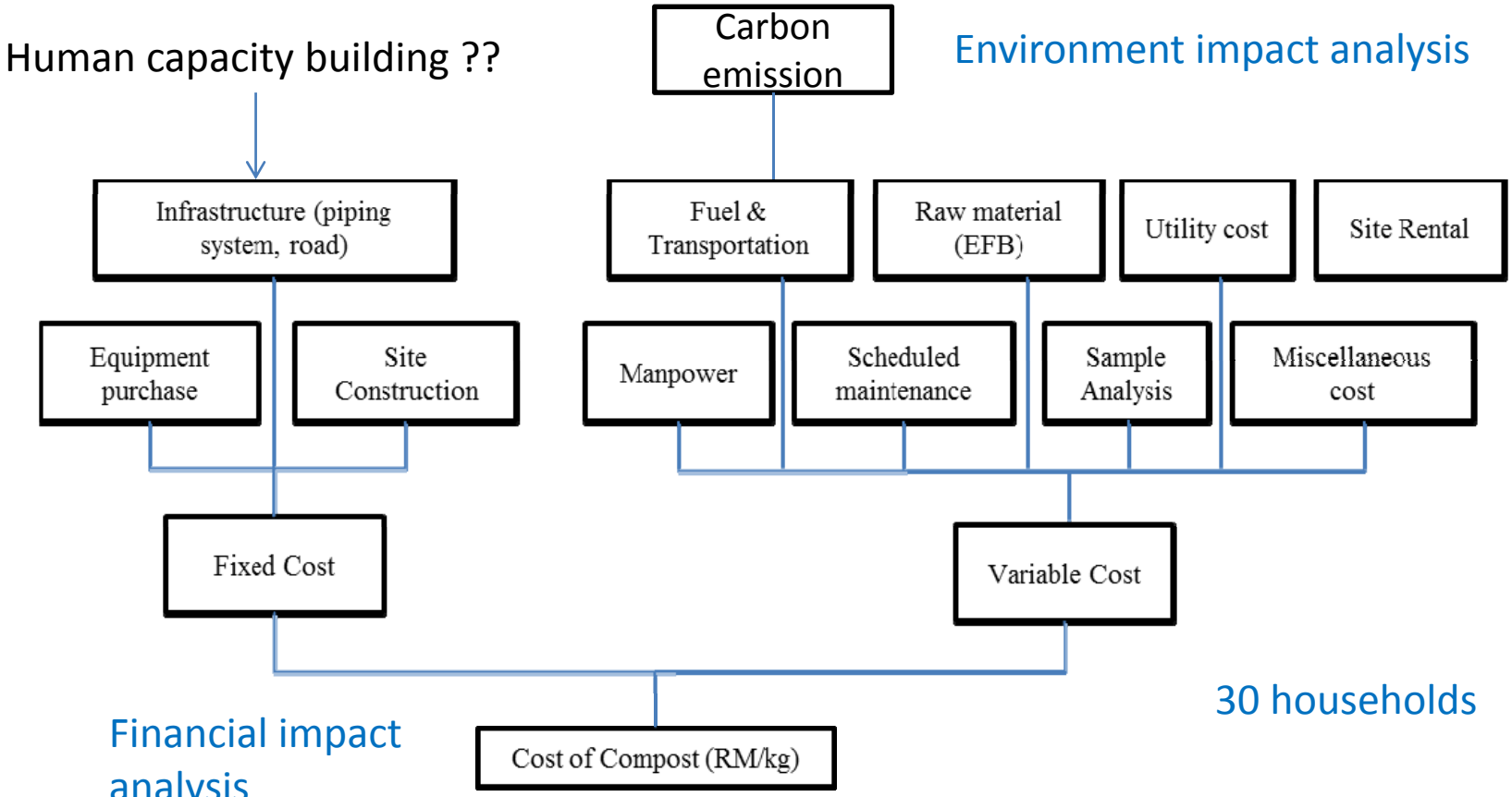
Weighing of Food Waste

EFB collected from FGV Kulai Factory

- **The prepared first piles of compost containing food waste and shredded EFB**

METHODOLOGY

4. Data Collection



FINDINGS AND RESULTS

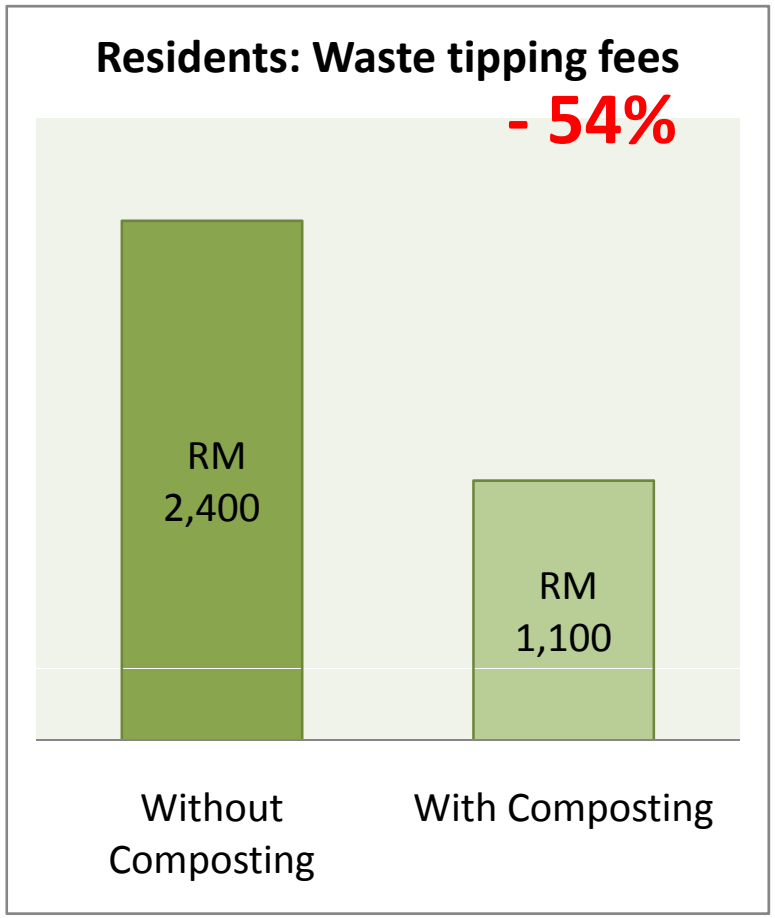
Cost items	RM/yr	Remarks
Capital Expenses		
Site Construction	952	RM 19,032 for 20 years
Infrastructure	150	RM 3,000 for 20 years
Engagement and Workshop sessions	700	RM14,000 was spent during the 1-yr project with intensive activities
Total Capital Expenses	**1,802**	Capital cost was normalised for 20 years
Operating Expenses		
Maintenance	1,000	For transportation vehicles, site, miscellaneous.
Utility	0	No electricity is required. Rain water harvesting to collect the water.
Manpower	36,000	1 site manager and 2 workers
Raw material	240	RM10/t of EFB; 2t/mth
Miscellaneous	5,148	Canvas, EM, and garden tools
Compost Analysis	18,871	For compost quality testing for C/N ratio, pathogen test, proximate analyses and germination tests
Transportation cost & fuel	12,000	Actual cost is estimated as RM2000/month, although in this study RM6,000 was spent as the cost was co-shared with the community
Total Expenses for Scenario 2 (RM)	**75,161**	
Total compost produced (t/yr)	18	Production rate: 1.5t/mth
Cost of compost (RM/t)	4,175	
Cost of compost (RM/kg)	**4.18**	(about 1 euro/kg)

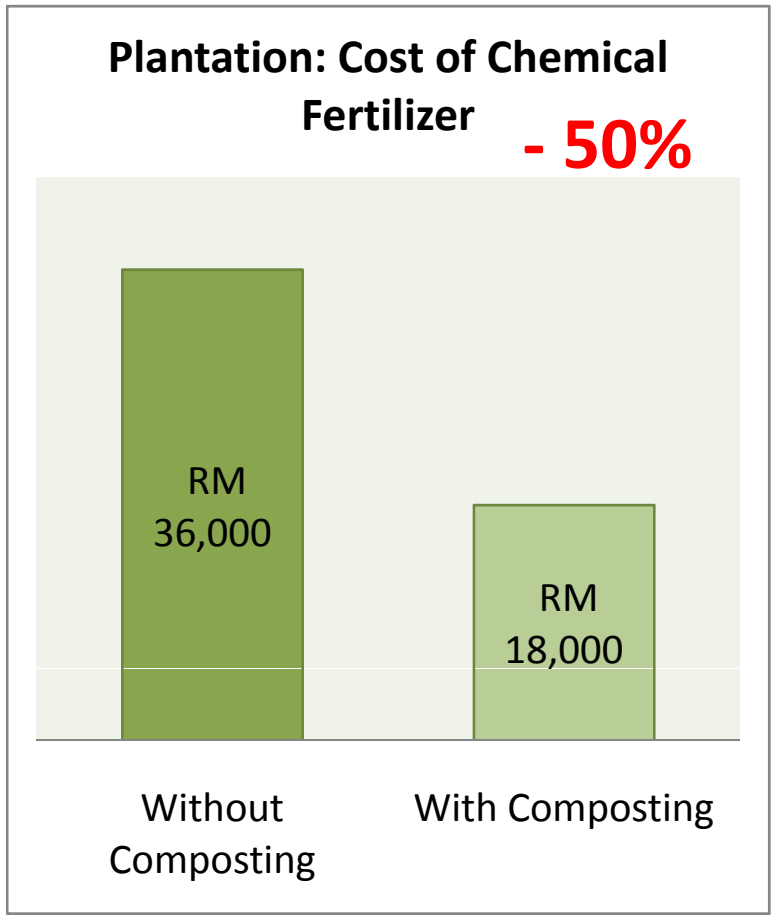
Economic analysis

	Scenario 1	Scenario 2
Residents		
Amount of domestic waste (t/yr)	24	24
Organic waste (%)	60	60
Organic waste segregated for composting (%)	0	90
Total waste to landfill (t/yr)*	24	11
Waste tipping fees (RM/yr)	2,400	1,100
Oil palm plantation		
Amount of purchased chemical fertiliser (t/mth)	3	1.5
Amount of purchased chemical fertiliser (t/yr)	36	18
Application of compost (t/mth)	0	1.5
Application of compost (t/yr)	0	18
Purchase of chemical fertiliser (RM/yr)	36,000	18,000

Expected Economic Benefits in Felda Taib Andak

waste to wealth





FINDINGS AND RESULTS

Environmental Impact Assessment

SCENARIO 1

Items	Value
Methane correction factor, MCF (fraction)	0.6
Fraction of degradable organic carbon in the waste, DOC (weight fraction)	0.15
Fraction of DOC that decomposes , DOC_f (weight fraction)	0.5
Fraction of methane in landfill gas, F	0.5
Stoichiometric factor, SF	16/12
Methane generation potential, Lo (t CH_4/t waste)	0.03
Methane generation potential, Lo (kg CH_4/t waste)	30
CO_2 generation potential from landfill site (kg CO_2e/t waste)	630
CO_2 generation potential from transportation (kg CO_2e/t waste)	844
Total GHG emissions potential (kg CO_2e/t waste)	1,474

FINDINGS AND RESULTS

Environmental Impact Assessment

SCENARIO 2

Items	Value
Diesel consumption due to transportation (l)	150
CO_2 emissions due to diesel consumption (kg CO_2)	402
Petrol consumption due to transportation (l)	100
CO_2 emissions due to fuel consumption (kg CO_2)	231
Total emission due to transportation (kg CO_2e)	633
CO_2 generation potential for transportation (kg CO2e/t waste)	422
CO_2 generation potential for composting process (kg CO_2e/t compost)	88
Total GHG emissions potential (kg CO_2e/t compost)	510

FINDINGS AND RESULTS

Environmental Impact Assessment

Scenario 1 (landfill) = 1,474 kg CO_2e/ t waste

65%

Scenario 2 (composting) = 510 kg CO_2e/t waste

The *GHGs emissions from composting process is mainly based on the data obtained from the literature.*
Detailed environmental impact need to be further evaluated by collecting on-site emissions data over longer period of time.

CONCLUSION

- Successfully transfer the technology and knowledge to the community where the good practice of 3R (reduce, reuse and recycling) was also introduced.
- Capacity building for future waste management project
- Future direction- Secure funding to upgrade the composting project and other waste management project
- Future direction- spin off the model to other FELDA community

ISWM-TINOS 2015

THANK YOU

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