Net Zero Journey

Case of
Mae Fah Luang Foundation

Thanapong Duangmanee

25 October 2024

Mae Fah Luang Foundation under Royal Patronage

Mae Fah Luang
Art and Cultural Park

Doi Tung
Development Project

Roi Jai Rak
Project

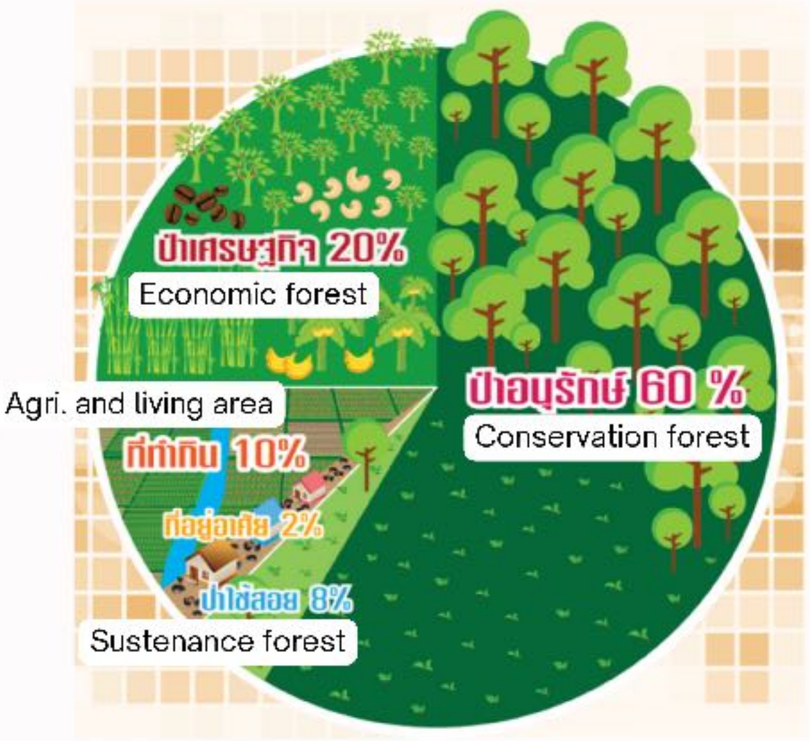
Bangkok Office


สมเดจย่า
facebook.com/SomdejYa
Doi Tung in 1988
ดอยตุง พ.ศ. 2531
Doi Tung in 2024
ดอยตุง ปัจจุบัน

Human and Nature can coexist in harmony

Economic forest

“Doi Tung Model”

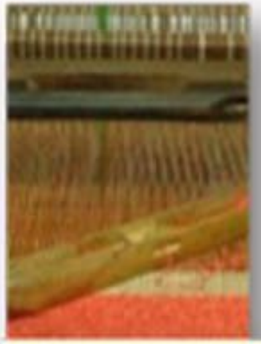


Conservation forest

Sustenance forest

Social Business + Environmental Conservation

DOI TUNG
Lifestyle for Livelihood



UNITED NATIONS
Office on Drugs and Crime

The sale of this product contributes to the achievement of drug free world. Through alternative sustainable development, villagers who once depended on opium production and use can now earn secure legitimate incomes by making these products.

Handicraft

Doi Tung Development Project

Offices, Living areas, Tourism area (museums, gardens, shops), 1 Hotel (DoiTung Lodge), 3 Restaurants, 2 Cafés, 8 Factories (Coffee, Macadamia, Ceramic, Mulberry paper, Dyeing, Weaving, Carpet, and Tissue culture), and 1 Daycare + About 1500 employees + 500-600k of tourists a year

The effect of climate change at Doi Tung







Mission & Activities

- Environmentally Friendly Products
- Circular Economy
- Co-discover/Co-innovate/Co-create

- People - centered Approach
- Education & Healthcare Development
- Occupational Safety

- Restoration of Ecosystem
- Biodiversity Improvement
- Carbon Neutral and Net Zero
- Zero-Waste-to-Landfill

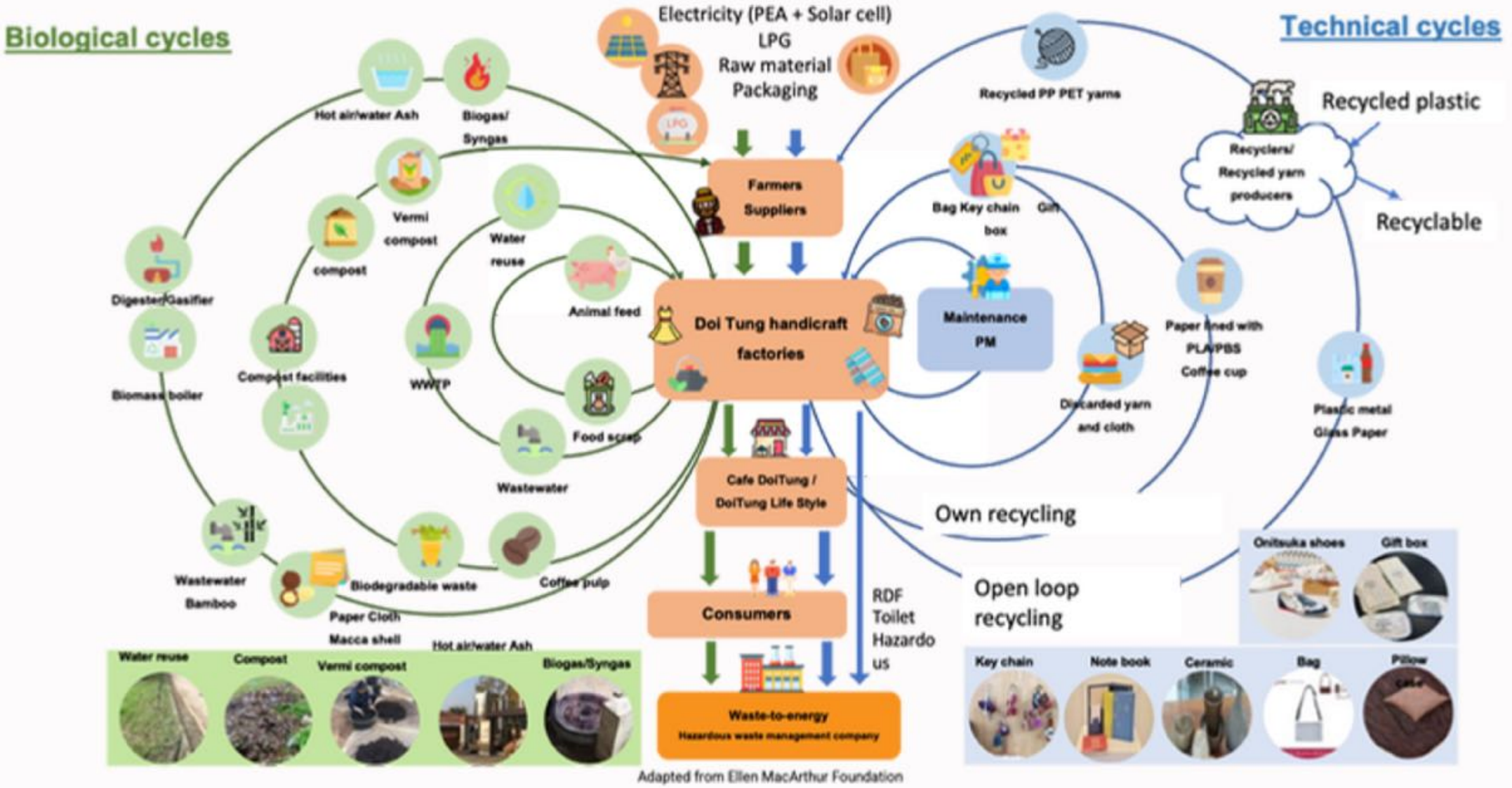
TARGET: REDUCE "3 GAPS"

Income Gap

Moral Gap

Resource Gap

Circular Economy at MFLF



Adapted from Ellen MacArthur Foundation

Renewable Energy at MFLF

Bangkok office 61.56 kW

Reduce GHG 36 tCO_2/y

259,000 baht/y

Agri. dept. 38.8 kW

Reduce GHG 22 tCO_2/y

156,000 baht/y

Museum 102.75 kW

Reduce GHG 62 tCO_2/y

437,000 baht/y

Gasifier using bamboo charcoal

Reduce LPG 2,200 kg/y GHG 6 tCO_2/y

46,200 baht/y

Biomass burner using macadamia shell

Reduce GHG 60 tCO_2/y

500,000 baht/y

Biogas from coffee wastewater

Reduce LPG 20,000 kg/y GHG 54 tCO_2/y

400,000 baht/y

Biodiesel from waste cooking oil

Reduce diesel 420 L/d GHG 1 tCO_2/y

15,000 baht/y

Energy Conservation at MFLF

Hot water from A/C condensing unit

Hot water from Heat pump

Hot air from Heat pump

Maintenance frequently

VRF A/C system

Zoning of light switches

IE 3 motor replacement

Invest in human capital

Water Conservation at MFLF

Reused for irrigation
Bangkok office

Wastewater decolorization

Reused for floor cleaning

Reused for Macadamia
plantation

Reuse for irrigation
(Doi Tung Lodge - Hotel)

Reused for irrigation
(Factories)

Reused for irrigation
Cultural park

Water quality monitoring at
Doi Tung communities

Zero-waste-to-landfill since 2018

6 Types of waste

(143 t/y)

Recycling

Feed

Washing

Authorized company

Incineration

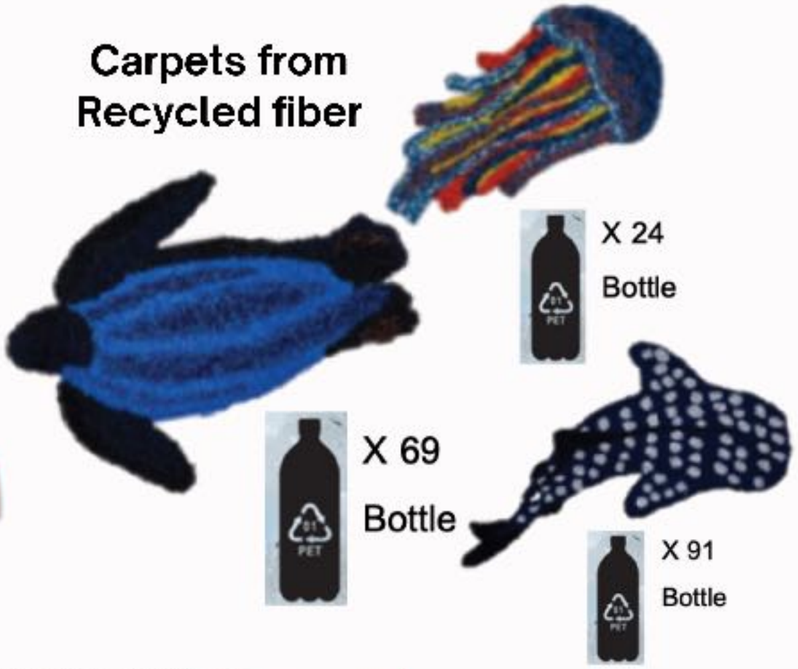
RDF

Circular Economy Products

Keychains from waste

Natural dye products

Magnets from bottle caps



Paper boxes from Coffee cup

Carbon Neutrality can be acheived

1) Find GHG emission inventory

11,707 tCO2e/year

Carbon Footprint for Organization (CFO)

Scope 1: Direct
- Fuel
- Transportation
- Production
- Fertilizer
- Refrigeration
- Extinguisher
- Wastewater treatment

Scope 2: Indirect
- Electricity

Scope 3: Indirect
- Purchase goods and services

2) GHG Reduction activities

Already reduce approx. 500 tCO2e/year

Methods:
- Policies
- Set target / Eco-efficiency
- IWAY / ISO 14001 / Green Industry
- Green Office (5S) / Green hotel

Energy and Environmental conservation:
- Change behavior
- Equipment change
- Heat pump
- Zero-waste-to-landfill
- Food waste reduction

Renewable energy:
- Solar cell
- Biomass / Biogas/ Syngas
- Biodiesel

3) Offsetting

Doi Tung carbon credit
419,513 tCO2e

Thailand Voluntary Emission Reduction (T-VER)

T-VER

11,707 tCO2e/year

-11,707 tCO2e/year

Carbon Neutral Organization

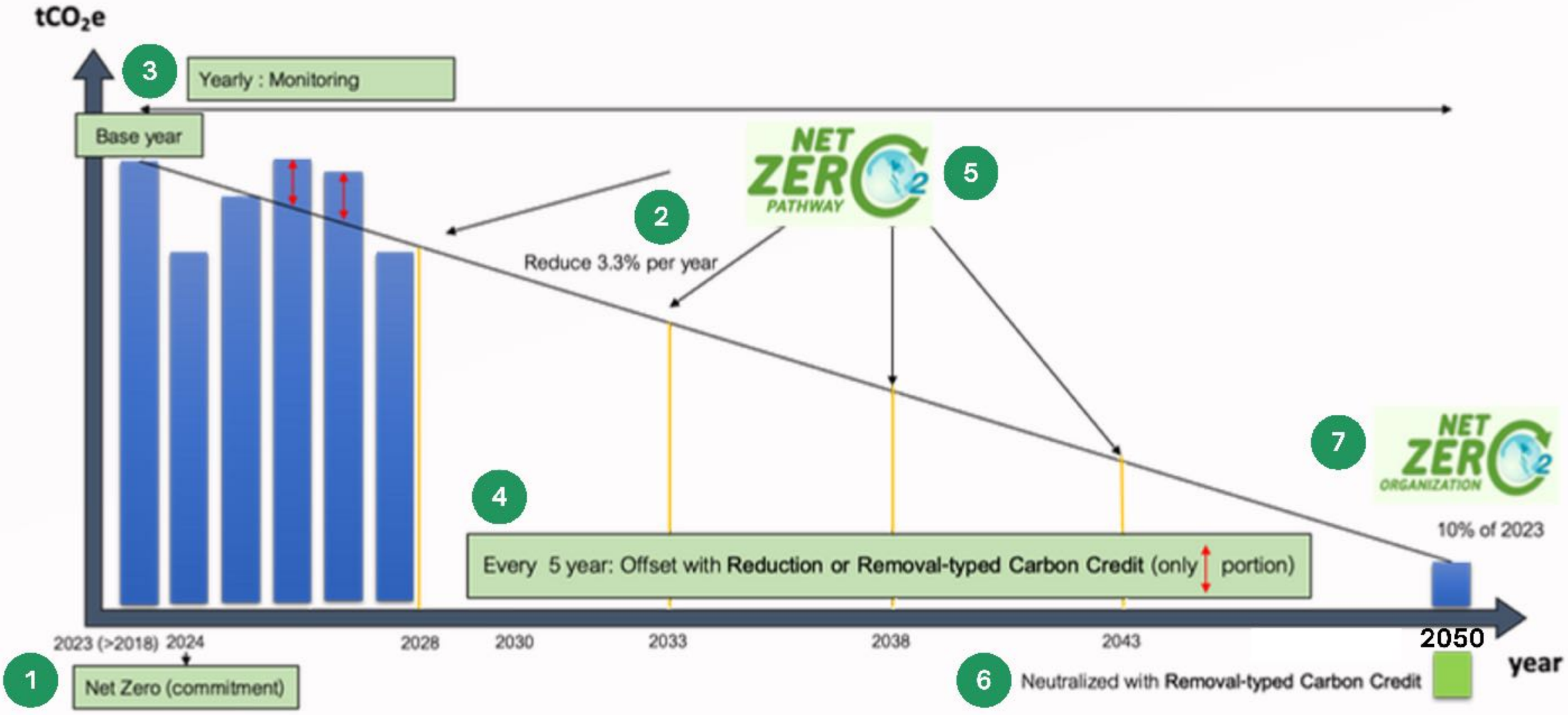
carbon neutral

Criteria for TGO Net Zero program

What to commit

Year	2026-2030	2031-2040	2041-2050
SCOPE 1+2	GHG reduction plan to over >95% of GHG Scope 1+2		
SCOPE 3	Plan to reduce GHG Scope 3 that is significant	Plan to reduce GHG >67% of all Scope 3	Plan to reduce GHG >90% of all Scope 3

How to become Net Zero organization?



33 Organizations already committed

Energy

QTC ENERGY PCL.

BAFS

ptt

Construction

PACIFIC PIPE

AFC
บริษัท แอร์โรเฟลกซ์ จำกัด
AEROFLEX CO., LTD.

TPP
THAI PREMIUM PIPE CO., LTD.
บริษัท ไทยพรีเมี่ยมไพพ์ จำกัด

Auto & Auto Parts

ISUZU

FPI

senior Aerospace

BTKK

Bank

krungsri
กรุงศรี

Apparel

Wacoal

Gov.

NET ZERO

อบก
TGO

Food & Beverage

APF GROUP

บริษัท ไทย สปิริต อินดัสทรี จำกัด
THAI SPIRIT INDUSTRY CO., LTD.

TROPICAL THAILAND

TPN Food Packaging
COMMITTED TO EXCELLENCE

HAADTHIP

Thai Coconut
Thai Coconut Public Company Limited

Healthcare

OLIC
A member of Fuji Pharma Group

SRITRANG GLOVES THAILAND

ธนบุรี ทวีวัฒนา
THONBURI THAWIWATTHANA

Real Estate & Hospitality

GRAND HYATT ERAWAN BANGKOK

Knight Frank

MDX

มูลนิธิแม่ฟ้าหลวง ในพระบรมราชูปถัมภ์
Mae Fah Luang Foundation under Royal Patronage

Electronic

KCE ELECTRONICS
Public Company Limited

Ntec

SAKC

TCT

Agri

TEGH

WSUI

Commitment

เป้าหมายการลดก๊าซเรือนกระจกใน 5 ปี

มูลนิธิแม่ฟ้าหลวง ในพระบรมราชูปถัมภ์ มีเป้าหมายในการลดก๊าซเรือนกระจกในขอบเขตที่ 1 ขอบเขตที่ 2 และขอบเขตที่ 3 ร้อยละ 17 ภายในปี 2028 เมื่อเทียบกับปีฐาน 2023 (เป้าหมาย 5 ปี) และมุ่งสู่การปล่อยก๊าซเรือนกระจกสุทธิเป็นศูนย์ภายในปี 2050

คำมั่นสัญญาในการลดก๊าซเรือนกระจก

มูลนิธิแม่ฟ้าหลวงฯ มีความมุ่งมั่นในการพัฒนากระบวนการทำงาน การใช้พลังงานและทรัพยากร และลดการปล่อยและเพิ่มการดูดกลับก๊าซเรือนกระจกอย่างต่อเนื่อง เพื่อมุ่งสู่การปล่อยก๊าซเรือนกระจกสุทธิเป็นศูนย์ ในปี 2050

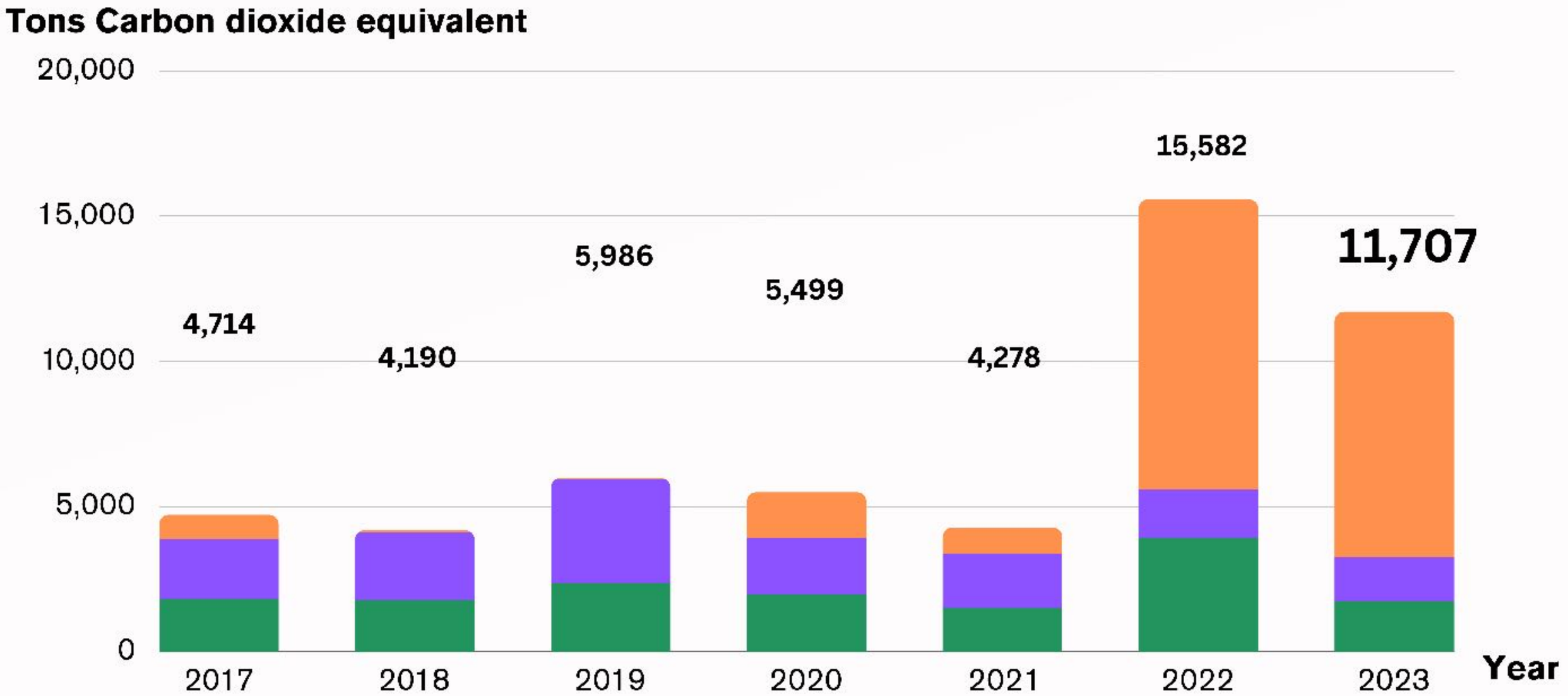
KPI for MFLF 2024

An organization that has Net Zero Pathway

1	2	3
Conduct GHG reporting	Appoint GHG committee	GHG reduction plan cover 30% of GHG Scope 1+2 and 3 that is significant

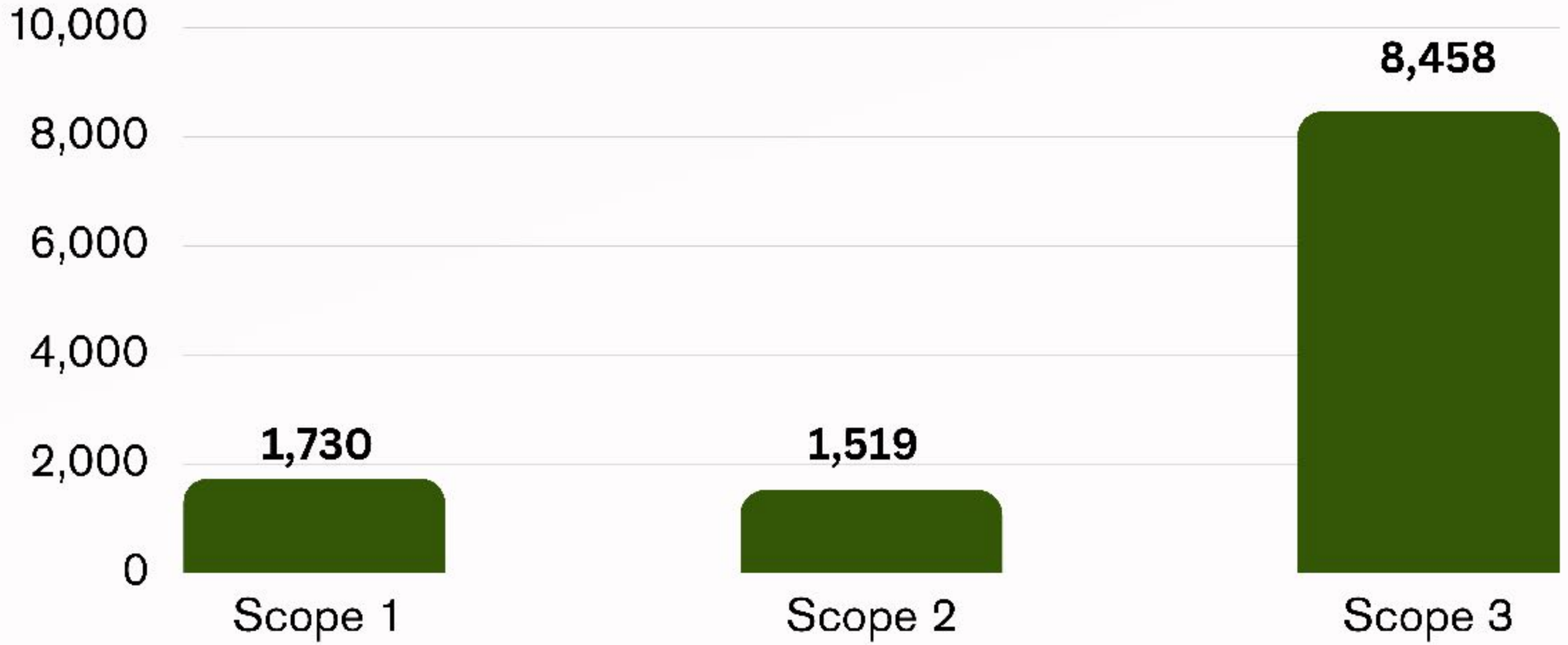
4	5
GHG reduction plan cover 50% of GHG Scope 1+2 and 3 that is significant	GHG reduction plan cover 95% of GHG Scope 1+2 and 3 that is significant and submit Net Zero commitment letter to TGO

GHG emission from 2017 to 2023

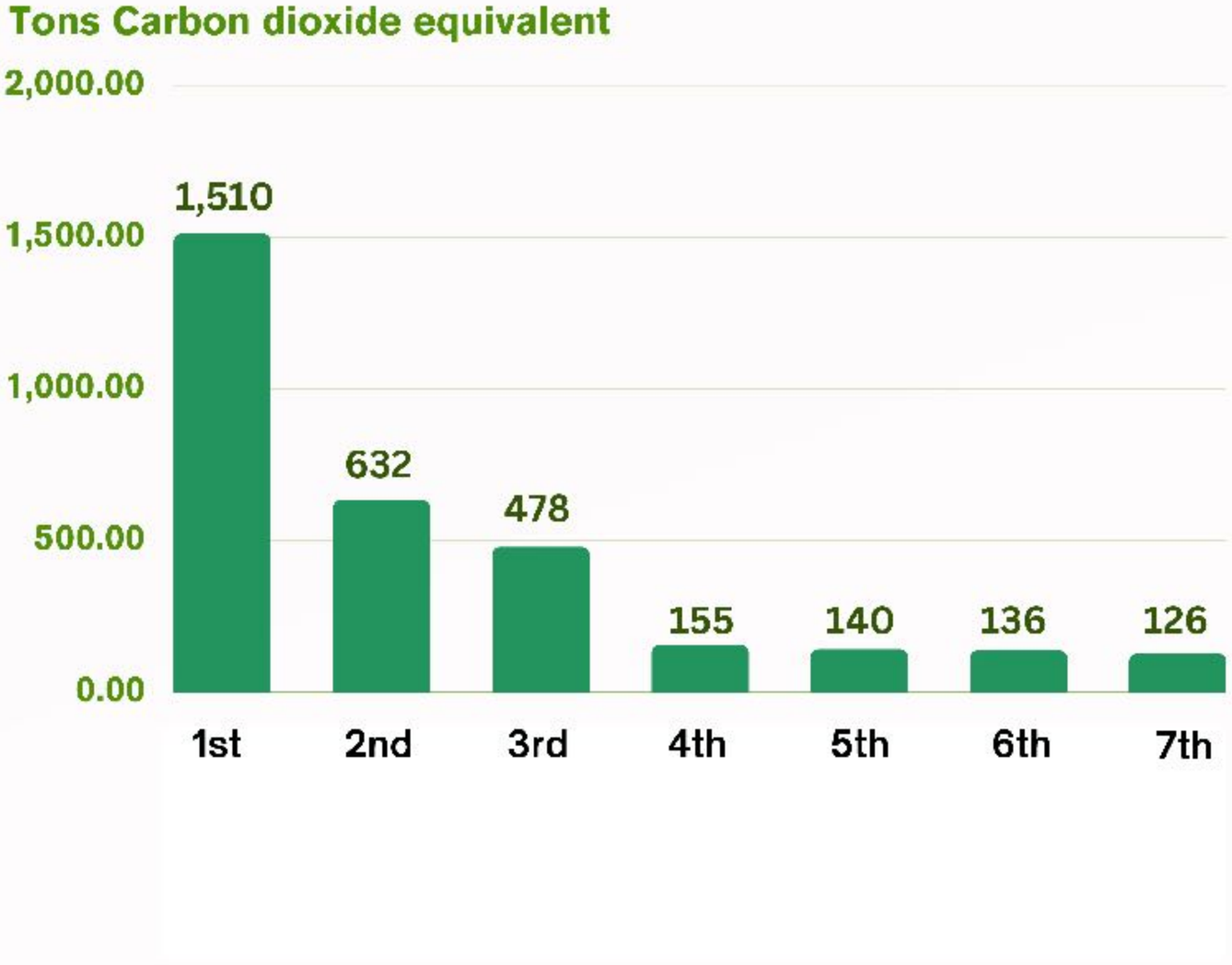


GHG emission from 2023

Tons Carbon dioxide equivalent



7 Top emitters



1st: Electricity

2nd: Burning of diesel

3rd: Burning of LPG

4th: CH4 emission from septic tanks

5th: Burning of petrol

6th: Fertilizer use

7th: CH4 emission from wastewater treatment

Total top 7 added up equal to

98% of GHG Scope 1+2

44% GHG Scope 1+2+3

GHG emision Scope 3

Category	ปริมาณ GHG	Category	ปริมาณ GHG
Purchased goods and services	9,180.81	Downstream transportation and distribution	541.74
Capital goods	12.35	Processing of sold products	1,037.61
Fuel- and energy related activities	521.04	Use of sold products	4,131.71
Upstream transportation and distribution	3.53	End-of-life treatment of sold products	35.41
Waste generated in operations	1.60	Downstream leased assets	x
Business travel	150.46	Franchises	x
Employee commuting	1.48	Investments	x
Upstream leased assets	x	Total	15,617.72

GHG Scope 3 that is significant by MFLF criteria



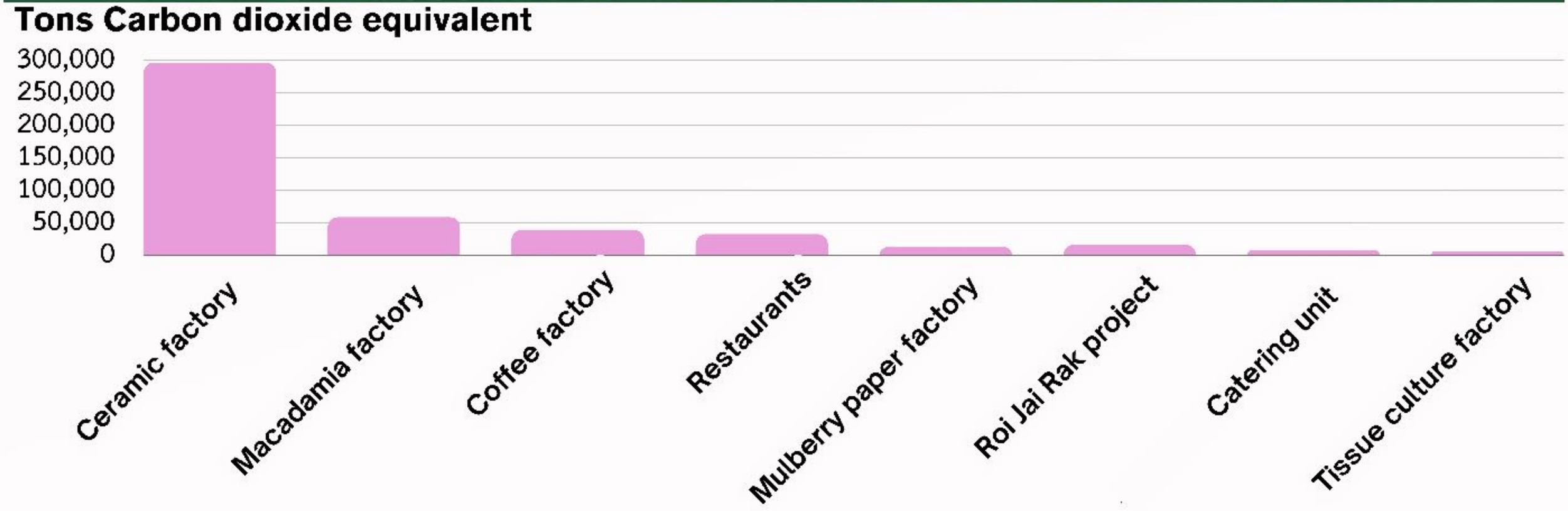

Category 1: GHG emission of raw material

- Coffee cherry
- Macadamia Nut In Husk
- Coffee green bean

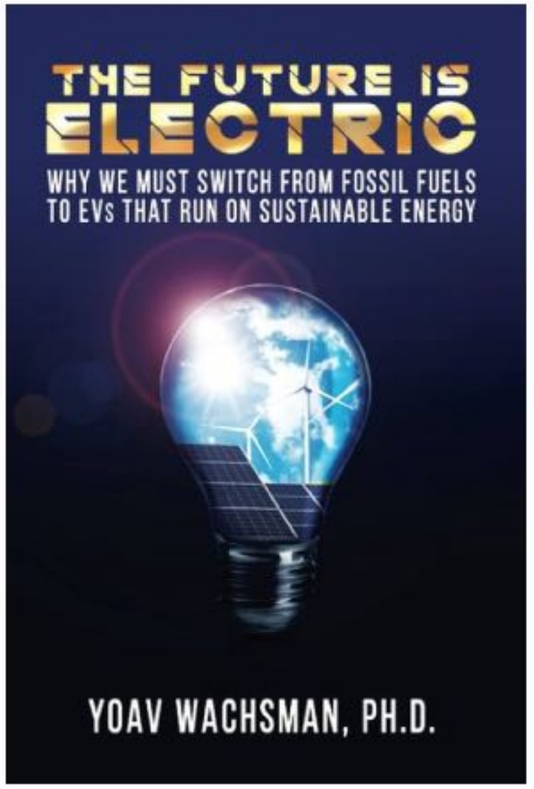
Long-term Low GHG Emission Plan

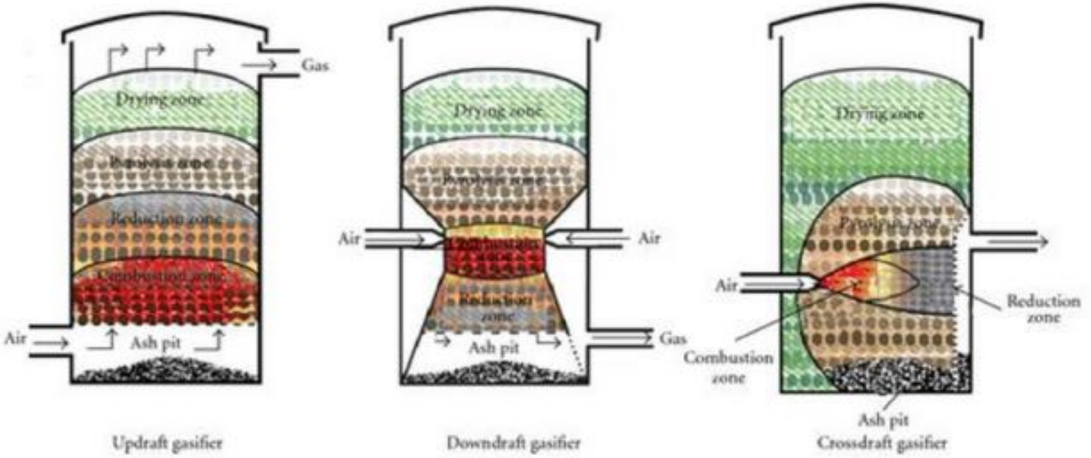
Electricity	LPG	Diesel/Petrol	Fertilizer
• Behavior change • Reduce production loss • Switch to more energy efficient equipment • Use more renewable energy in operation • Buy RECs	• Use Gastification from bamboo charcoal • Use Biogas from coffee processing wastewater • Switch to electric eqipment	• Drive slower • Make driving direction plan • Use appropriate load to a truck • Switch to EV H2 LPG NG	• Customize fertilizer for each plant • Choose the right amount, time, and place to apply • Try controlled or slow released fertilizer • Plant N2 fixer • Switch to organic

Example: Which dept. use the most LPG?



8 dept. are accounted for 98% of GHG emission from LPG





Dongyi 10kg 12 kg กาแฟ Roaster Giesen Electric Coffee อบ 15 กก เครื่องชงกาแฟชนิดคั่วกาแฟอุตสาหกร...

เข้าชม >

Innovation to reduce LPG use

Ceramic factory

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG*
1.	4 m3 kiln	33,120	103,116	100%	Electric kiln/ gasifier	90%
2.	10 m3 kiln	23,520	73,227		Electric kiln/ gasifier	90%
3.	1.5 m3 kiln	19,440	60,525		Electric kiln/ gasifier	90%
4.	Mole driers	19,200	59,777		Use Hot air biomass system more	70%

Macadamia factory

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG*
1.	10 m3 Drying silos	13,137	40,903	100%	Use Hot air biomass system more	70%
2.	Cookie ovens	5,630	17,530		Electtric oven	50%

*accounted for GHG emission of electricity

Innovation to reduce LPG use

Coffee factory

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG
1.	Coffee roasters	6,255	19,473	100%	Electric roasters	50%
2.	Afterburner	6,255	19,473		Electrostatic precep.	50%

Restaurant 1

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG
1.	Stovetops	5,518	17,179	100%	Induction oven	50%
2.	Egg flying stovetops	Inc.	Inc.			

Restaurant 2

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG
1.	Stovetops	4,846	15,087	100%	Induction oven	50%
2.	Gas ovens	Inc.	Inc.		Electric oven	50%

*accounted for GHG emission of electricity

Innovation to reduce LPG use

Mulberry paper factory

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG
1.	200-L Boiling tanks	3,840	11,956	100%	Gasifier	80%
2.	Hot plate driers	Inc.	Inc.		Use Hot water biomass system more	90%

Roi Jai Rak project

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG
1.	Stovetops	2,392	7,447	100%	Induction oven	50%
2.	Gas burner	151	471		To be determined	

Catering unit

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG
1.	Stovetops	2,500	7,784	100%	Induction oven	50%
2.	Outdoor stovetops	Inc.	Inc.			
3.	Egg frying Stovetops	Inc.	Inc.			

*accounted for GHG emission of electricity

Innovation to reduce LPG use

Roy Jai Rak project (Mushroom)

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG
1.	Mushroom steamer	2,297	7,152	100%	Biomass steamer	100%
2.	Autoclave	192	580		Cylindrical biomass burner	100%

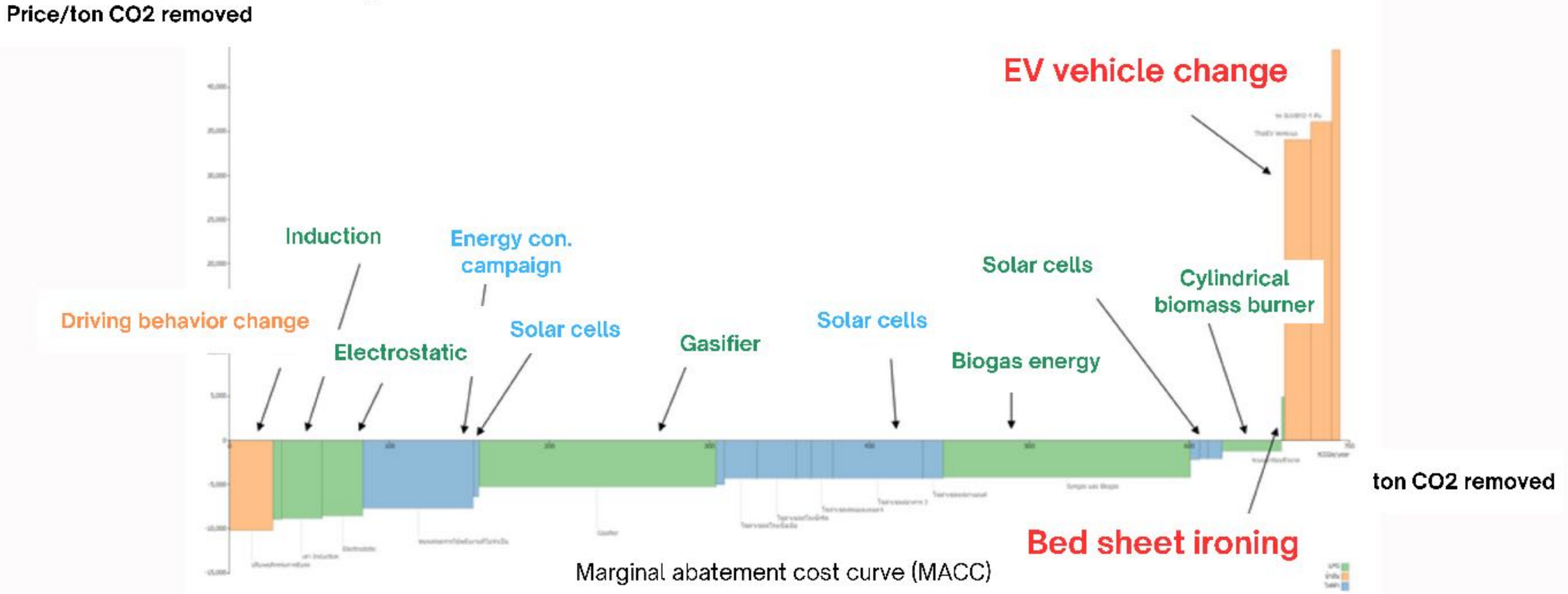
Tissue culture factory

No.	Existing Equipment	LPG use per year (kg)	Sum of kgCO2eq	% of all emission	Replacement Technology	Efficiency to reduce GHG
1.	Autoclave	1,963	6,110	100%	Cylindrical biomass burner	100%

*accounted for GHG emission of electricity

What shall we do first?

Things that can reduce the most GHG with minimum investment.



Marginal abatement cost curve (MACC)

Plan for 2025

To do:

- Submit 5-year Net Zero pathway plan by 2026
- Do things that can be done with behavior change, first --> improve awareness
- Management to monitor consistently

Time for actions

1) Do
Already have technology installed

2) Ask
Technology exists, but no money to buy

2) Test
Technology exists, but need to adapt

3) Wait
No technology available in the market

KPI for MFLF 2025

An organization that can maintain the proposed Net Zero Pathway

1

Reduce GHG emission less than 4% from 2023

2

Reduce GHG emission less than 6.6% from 2023

3

Reduce GHG emission more than 6.6% from 2023

4

Reduce GHG emission more than 8% from 2023

5

Reduce GHG emission more than 10% from 2023


Thank You