Appendix1　MRV

JCM proposed methodology

Spread Sheet

Joint Crediting Mechanism Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Vietnam
Name of the methodology proponents submitting this form	Oriental Consultants Co., Ltd
Sectoral scope(s) to which the Proposed Methodology applies	Waste energy recovery
Title of the proposed methodology, and version number	Title: Waste Heat Recovery and Utilization in Textile and Garment Factory Version number: 01.0
List of documents to be attached to this form (please check):	☐ The attached draft JCM-PDD: ☐ Additional information
Date of completion	14 February 2018

History of the proposed methodology

Version	Date	Contents revised
01.0	14 February 2018	

A. Title of the methodology

Waste Heat Recovery and Utilization in Textile and Garment Factory

B. Terms and definitions

Terms	Definitions
Textile dyeing and finishing	The procedures from fabric pre-treatment to finishing in textile and garment dyeing houses. Including main procedures of fabric pre-treatment, dyeing and finishing (washing, drying) that is the chemical and physical treatments consuming heat and steam.

Waste heat	Heat energy of boiler exhaust gas and/or waste water from dyeing machines

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	Recovered waste heats are used for preheating feed-water to boilers and dyeing machines so that reduce fuel consumption of boilers that provide steam for dyeing and finishing process.
Calculation of reference emissions	Reference emission is calculated based on the amount of waste energy/heat utilized, boiler efficiency and CO2 emission factor of the fossil fuel that is used for providing energy to the dyeing process. Conservative values of the parameters are used to ensure the reference emission is lower than BaU emission.
Calculation of project emissions	The project emission is calculated based on the electricity consumption of waste heat recovery system and CO2 emission factor of electricity.
Monitoring parameters	The following parameters need to be monitored. The temperature and amount of feed-water through heat exchanger system to boiler and/or dyeing machines in the project. The temperature of feed-water at the inlet of heat exchanger system in project. The amount of electricity consumed by the waste heat recovery (heat exchanger) system.

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	Waste heat (heat from dyeing waste water) recovery from dyeing and finishing process in the existing or new textile and garment factories.
Criterion 2	Spiral heat exchanger is applied for heat recovery.
Criterion 3	Targeting factories with dyeing capacity more than 10 ton/day

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Fossil fuel consumption for getting the same amount of energy (steam and heat) from waste heat recovery and utilized	CO_2
Project emissions	
Emission sources	GHG types
Electricity consumption by the waste heat recovery system	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

The reference emission is the emission from consumption of fossil fuel to gain the same amount of energy utilized from waste heat recovery system.

F.2. Calculation of reference emissions

$$RE_{\mathrm{p}} = (T_P - T_{Re}) \times \mathrm{W}_{th} \times \mathrm{F_w} \times \frac{1}{\mathrm{Ef}} \times \mathrm{EF_{CO2,fuel}} \times 10^{-6}$$

$\mathrm{RE_p}$: Reference emission [tCO_2/p]

$\mathrm{T_P}$: Temperature of feed-water to machines through heat exchanger in the project [℃]

$\mathrm{T_{Re}}$: Temperature of feed-water at the inlet of the heat exchange system in the project [℃]

$\mathrm{W_{th}}$: The specific heat of water [kJ/kg.℃]

$\mathrm{F_w}$: The amount of the feed-water to machines through heat exchanger in the project [t/p]

Ef: Boiler efficiency [ratio]

$\mathrm{EF_{CO2,fuel}}$: CO_2 emission factor the fossil fuel that is used to provide energy for dyeing and finishing process [tCO_2/TJ]

G. Calculation of project emissions

Project emission is calculated based on the amount of electricity consumed by the waste heat recovery system and electricity CO_2 emission factor.

$$PE_p = EC_{PJ,p} \times EF_{elec}$$

PE_p : Project emissions [t CO_2/y]

$EC_{PJ,p}$: Electricity consumption by the waste heat recovery system [MWh/p]

EF_{elec} : CO_2 emission factor of electricity [t CO_2/MWh]

H. Calculation of emissions reductions

$$ER_p = RE_p - PE_p$$

RE_p: Reference emissions [t CO_2/p]

PE_p: Project emissions [t CO_2/p]

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameter	Description of data	Source
Ef	Boiler efficiency	Textile factories (100% is used for conservativeness)
$EF_{CO2,fuel}$	CO_2 emission factor of the fuel used for steam generation Coal: 87.3 tCO_2/TJ (lower case of default value)	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Table 1.4, Chapter 1, Volume 2.
EF_{elec}	CO_2 emission factor of electricity In the case of grid: 0.508 tCO_2/MWh In the case of captive power plant (diesel): 0.8 tCO_2/MWh	In the case of grid (Official data from Vietnam Government). ((IGES's List of Grid Emission Factors updated in Agust 2017)).

		In the case of diesel captive power plant (Table I.F.1, Small Scale CDM Methodology: AMS I.F. ver.2).

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (input sheet) [Attachment to Proposed Methodology Form]

Table 1: Parameters to be monitored *ex post*

(a) Monitoring point No.	(b) Parameters	(c) Description of data	(d) Estimated Values	(e) Units	(f) Monitoring option	(g) Source of data	(h) Measurement methods and procedures	(i) Monitoring frequency	(j) Other comments
(1)	$T_{af,ta}$	Temperature of feed-water at the outlet of waste heat recovery system in the project	63	℃	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	
(2)	$T_{be,ta}$	Temperature of feed-water at the inlet of waste heat recovery system in the project	30	℃	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	
(3)	$F_{w,ta}$	The amount of the feed-water to machines through the waste heat recovery system in the project	93,600	t/p	Option C	Monitored data	Collecting the data with validated/calibrated monitoring devices and inputting to a spreadsheet manually or electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	
(4)	$EC_{PJ,y}$	Electricity consumption by the waste heat recovery system	124	MWh/y	Option C	Monitored data	Collecting electricty consumption data with validated/calibrated monitoring devices and inputting to a spreadsheet electrically . Verified monitoring devices are installed and they are calibrated once a year . Verification and calibration shall meet international standard on corresponding monitoring devices.	continuous	

Table 2: Project-specific parameters to be fixed *ex ante*

(a) Parameters	(b) Description of data	(c) Estimated Values	(d) Units	(e) Source of data	(f) Other comments
Ef	Boiler efficiency	1.00	Ratio	0.75 from the manufacture specification (however, 1 is taken for ensure conservativeness)	
EF_{elec}	CO_2 emission factor of electricity	0.8154	t CO_2/MWh	Grid emission factor of Vietnam	

Table3: *Ex-ante* estimation of CO_2 emission reductions

CO_2 emission reductions	Units
1,110	tCO_2/p

[Monitoring option]

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (Calculation Process Sheet)

[Attachment to Proposed Methodology Form]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period of p		1110	tCO_2/p	ERp
2. Selected default values, etc.				
The specific heat of water	Water	4.18	kJ/kg.℃	W_{th}
CO_2 emission factor the fossil fuel that is used to provide energy for dyeing and finis	coal	87.3	$t\ CO_2/TJ$	$EF_{CO2,fuel}$
3. Calculations for reference emissions				
Reference emissions during the period of p		1128	tCO_2/p	REp
Temperature of feed-water in the project		63	℃	$T_{af,ta}$
Temperature of feed-water in the case of without the project		30	℃	$T_{be,ta}$
Boiler efficiency		1.00	ratio	Ef
The amount of the feed-water in the project		93,600	t/p	$F_{w,ta}$
4. Calculations of the project emissions				
Project emissions during the period of p		18	tCO_2/p	PEp
Emission from electricty consumption by the waste heat recovery system				
Electricity consumption by the waste heat recovery system		22	MWh/p	$EC_{PJ,p}$
CO_2 emission factor of electricity		0.82	$t\ CO_2/MWh$	EF_{elec}

[List of Default Values]

Specific heat	W_{th}	
Water	4.184	kJ/kg. ℃
CO_2 emission factor of the fossil fuel that is used to provide energy for dyeing and finishing process	$EF_{CO2,fuel}$	
Coal	87.3	$t\ CO_2/TJ$

Appendix 2　PDD

Draft　PDD

JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Waste Heat Recovery from the Dyeing and Finishing Process of Textile Factory in Ho Chi Minh

A.2. General description of project and applied technologies and/or measures

The project introduces a waste heat recovery system to dyeing and finishing section of a textile factory in Ho Chi Minh, Vietnam. As a waste heat recovery system, a spiral type heat exchanger from a Japanese company is applied to [redacted], one of the biggest textile factories in Ho Chi Minh. In textile factories, dyeing and finishing processes consume a huge amount of steam and water. Steam is used for drying and increasing the temperature of water in dyeing machines; after the dyeing contaminated water with high temperature, in most cases, is drained to waste water treatment facility directly. In this project, the waste heat recovery system (a spiral heat exchanger and pumps) installed will recover the heat of waste water from the dyeing machines and use the recovered energy is used to increase the temperature of feed water (fresh water) so that decrease the amount of steam used for increasing the temperature of the feed water. The steam reduction will result in decrease in the fuel consumption of boiler in the factory.

Figure 1 [redacted] Factory

In total, 2 waste heat recovery systems to be installed in the factory. One is for dyeing section to recover heat from waste water in dyeing process and another is for boiler section to recover heat from scrubber water from boiler boilers in the factory.

The estimated CO_2 emission reduction from the project is 893 ton/year.

A.3. Location of project, including coordinates

Country	Vietnam
Region/State/Province etc.:	Ho Chi Minh
City/Town/Community etc:	Ho Chi Minh
Latitude, longitude	[redacted]

A.4. Name of project participants

The Socialist Republic of Viet Nam	[redacted]

Japan	TBD

A.5. Duration

Starting date of project operation	TBD
Expected operational lifetime of project	15 years

A.6. Contribution from Japan

The proposed project will receive financial support from the government of Japan. The project is to apply for JCM model projects by the Ministry of the Environment, Japan (MOE). As a result of the financial support provided by MOE program, the initial investment cost of the proposed project has been partially financed by Japanese government (up to 50% of the initial investment cost). Further, the proposed project promotes diffusion of low carbon technologies within Viet Nam. Through the MOE program, spiral type heat exchangers can be applied in textile and other food processing factories.

B. Application of an approved methodology(ies)

B.1. Selection of methodology (ies)

Selected approved methodology No.	A new methodology has developed for the project which needs to be approved by Joint Committee
Version number	

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	Waste heat (heat from dyeing waste water) recovery from dyeing and finishing process in the existing or new textile and garment factories.	The project recoveries waste heat from dyeing and finishing processes of an existing textile factory
Criterion 2	Spiral heat exchanger is applied for heat recovery.	The project applies spiral type heat exchangers provided by [redacted].
Criterion 3	Targeting factories with dyeing capacity more than 10 ton/day	The production capacity of the target factory is around 15~20 ton/day

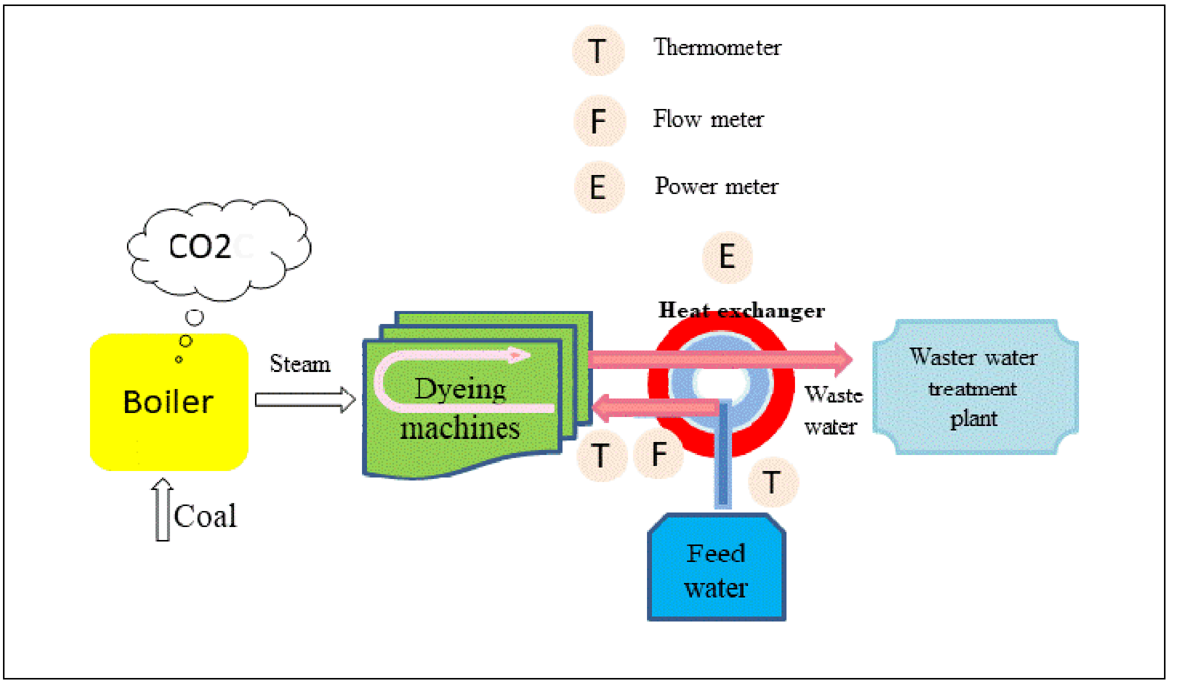
C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions

Emission sources	GHG type
Combustion of coal used for providing steam for dyeing and finishing processes	CO_2
Project emissions	
Emission sources	GHG type
Electricity consumption of waste heat recovery system	CO_2

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2019	923	30	893
2020	923	30	893
2021	923	30	893
2022	923	30	893
2023	923	30	893
2024	923	30	893
2025	923	30	893
2026	923	30	893
2027	923	30	893
2028	923	30	893

Total (tCO_{2e})	9,230	300	8,930

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	No

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Stakeholder meetings regarding the project will be organized in due course.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received

F. References

Reference lists to support descriptions in the PDD, if any.

Annex

Revision history of PDD		
Version	Date	Contents revised
01.0	14 February 2018	First edition

Appendix 3　Workshop Presentation

Giới thiệu Dự án thúc đẩy hợp tác phát triển Cacbon thấp
Trong khuôn khổ hợp tác giữa TP.HCM và TP.Osaka

Workshop on the Promotion of Low Carbon Development
under Ho Chi Minh City - Osaka City Cooperation Project
for Developing Low Carbon City

25 tháng 09 năm 2017
Sở Tài nguyên và Môi trường thành phố Hồ Chí Minh

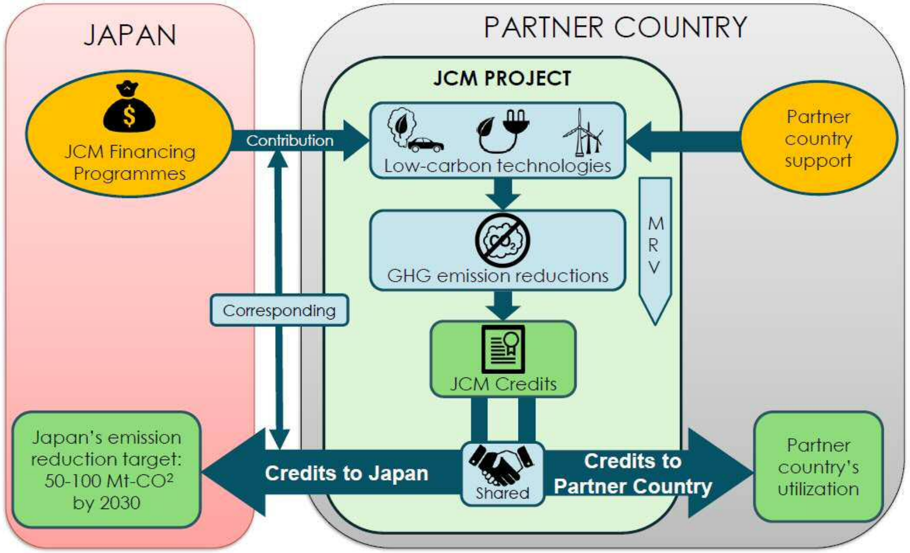
September 25th , 2017
HCMC Department of Natural Resources and Environment

Outline of the JCM Feasibility Study under Cooperation between Ho Chi Minh and Osaka

Osaka City
Oriental Consultants Co., Ltd
Japan Textile Consultants Center
Kurose Chemical Equipment Co., Ltd
Nippon Thermoener Co., Ltd
Yuko-Keiso Co., Ltd
Resona Bank Ltd

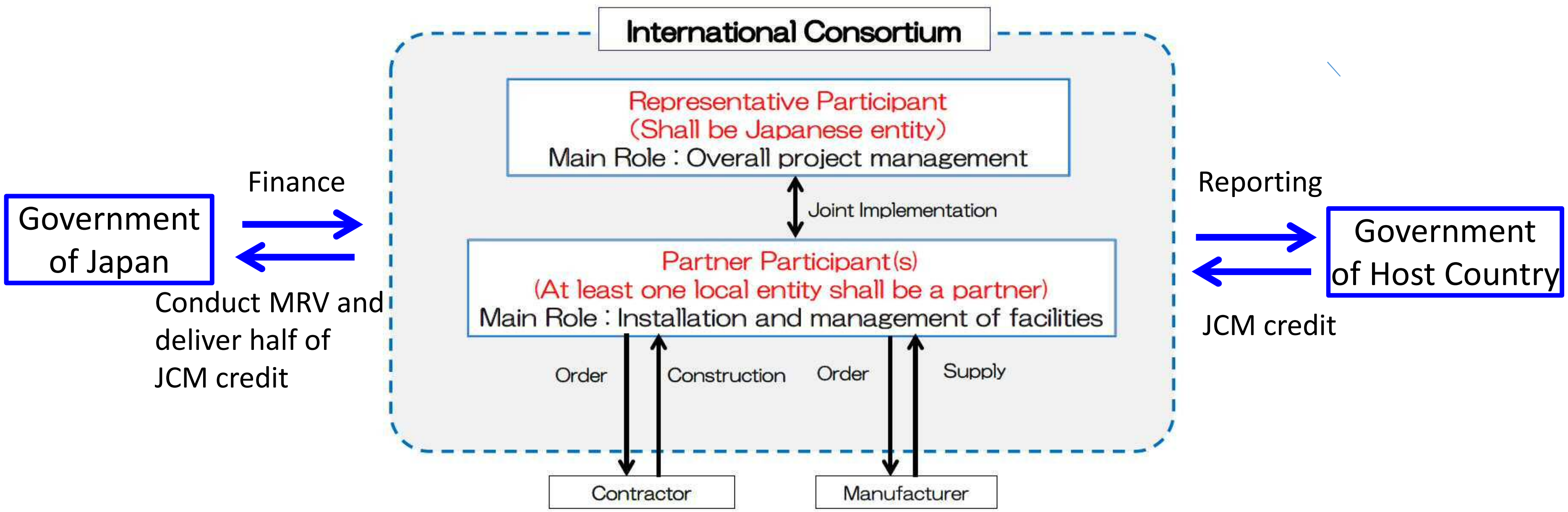
Joint Crediting Mechanism

- July 2013, Vietnam and Japan signed MOU on the application of Joint Crediting Mechanism (JCM)
- September 2013, the first JCM Joint Committee Meeting in Hanoi approved " Guidance for implementation of JCM and rules of procedure for JCM



Benefits of the JCM Scheme

- There are JCM feasibility projects and JCM model projects.
- JCM model projects can be benefited from the financial support up to 50% of investment cost including facilities, equipment and vehicles, which contribute to reduction of CO2 emission as well as cost for installing these facilities.



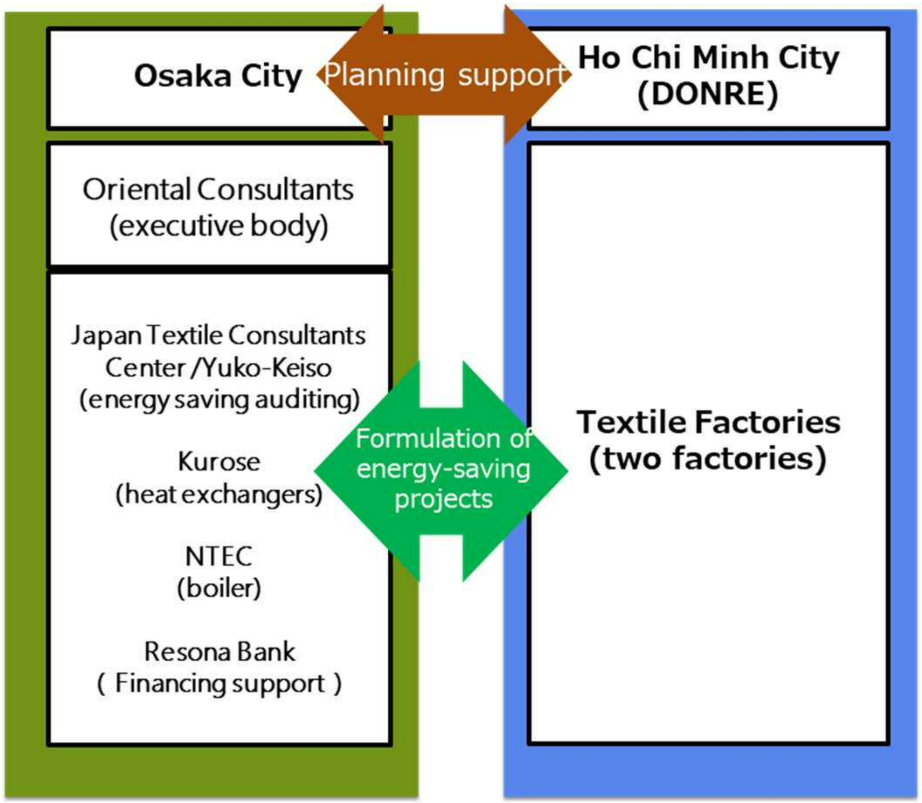
JCM Funded Projects in Vietnam

- Since 2013, there have been 66 JCM projects in Vietnam, among them there are 15 JCM model projects.
- As of September 2017, the model projects are:

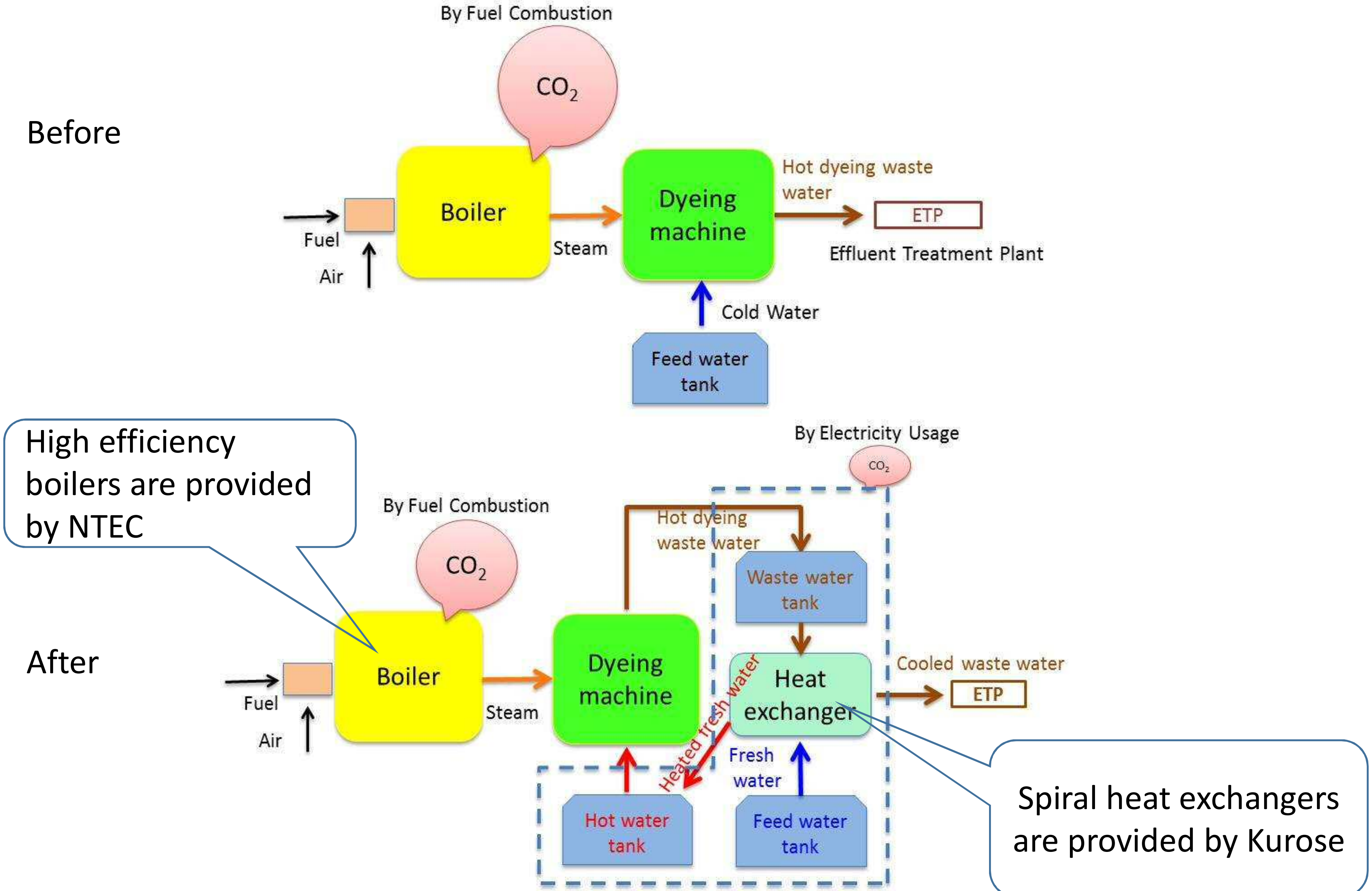
Energy Efficiency Improvement	Beer factory energy efficiency improvement	1
	Rubber factory energy efficiency improvement	1
	Electric wire factory energy efficiency improvement	1
	Lens factory energy efficiency improvement	2
	Energy efficient air conditioner systems to factories	1
	Energy efficient air conditioner system to hotels	1
	Battery factory energy efficiency improvement	1
	Energy efficient transformers	3
	Energy efficient pumps	1
	Energy efficient furnace (ceramic factory)	1
Renewable Energy Promotion	Rooftop solar power generation (shopping mall)	1
Total		14

Study Outline

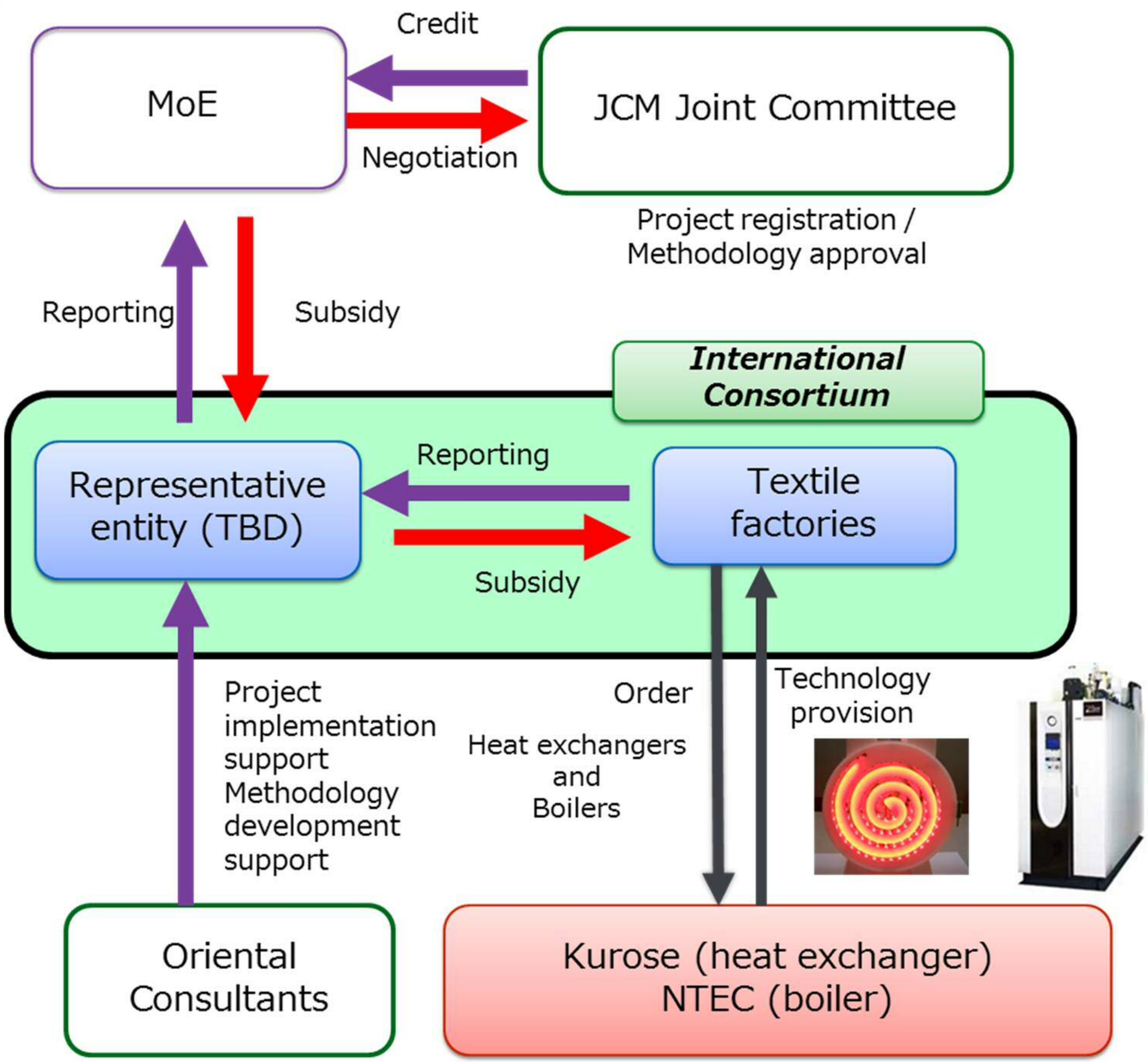
- Energy saving projects for textile factories in Ho Chi Min City
  - Introduction of high efficiency boilers
  - Heat recovery from the waste water of dyeing process through application of heat exchangers.
- Organize workshops on the promotion of JCM projects in Ho Chi Minh.



Project Image



JCM Project Implementation Scheme



Energy Consumption in Textile Factories

- In textile factories, electric energy is the main energy used for processes except for dyeing process

	Spinning	Knitting	Dyeing	Sewing
Electric energy	◎	◎	○	○
Heat energy	×	×	◎	×

- Electric energy is mostly consumed by motors and by air compressors partly
- Dyeing process consumes a large amount of heat energy, which provided by boilers (steam and heat boilers).
- Dyeing process also generates a huge amount of heated wastewater
- Energy saving potentiality in textile factories
  - ✓ Steps of the production processes in order of greatest to least energy consumption

    1) dyeing process 2) spinning 3) knitting 4) sewing

Energy Saving Practices in Textile Factories

- Metering (water, steam, electricity) and understanding the potentiality of energy saving in a factory is very important.
- Fuel related energy saving practices are as follows.

Practice	Range of Typical Fuel Savings (kg coal/ton fabric)	Range of Typical Percentage Savings* (steam)	Largest % Savings Seen at Any Mill
Recover heat from hot water	78–249	6.6–10.4%	29.7%
Improve boiler efficiency	39–89	2.6–4.31%	19.7%
Maintain steam traps and system	12–54	1–4.3%	10.3%
Recover heat from hot air	11–39	0.7–2.8%	5.7%
Insulate equipment and tanks	21–56	1.4–3.2%	19.2%
Fuel savings from reuse of condensate	6–40	0.6–3.1%	7%
Fuel savings from leak detection, preventive maintenance, improved cleaning	N/A–9	N/A–1%	2.2%
Fuel savings from reuse of process water	N/A–10	N/A–0.9%	2.9%
Fuel savings from reuse of cooling water	N/A–5	N/A–0.3%	0.5%
Total	169–550	12.9–30.4%	

*Ranges given as 1 quartile around the median to show typical savings; 25% of factories experienced higher and 25% experienced lower savings.

** Note that while the fuel saving best practices were calculated on the basis of the use of coal as a fuel, these measures would also save energy at mills using natural gas, wood, or other fuels to generate steam.[14]

Source: Natural Resources Defense Council Best Practices for Textile Mills to Save Money and Reduce Pollution

Energy Saving Practices in Textile Factories

- Water related energy saving practices are as follows.
- Water saving itself can save money and also save energy used for preparing the water.

Practice	Range of Typical Water Savings* (ton/ton fabric)	Range of Typical Percentage Savings*	Largest % Savings Seen at Any Mill
Water leak detection, preventive maintenance, improved cleaning	0.6–3.1	1.1–5%	6.1%
Reuse cooling water	0.7–3.9	2–8.9%	18.6%
Reuse condensate	0.2–3.9	0.2–5.4%	20.3%
Reuse process water	0.9–4.4	1.1–6%	21.1%
Water savings from maintaining steam traps and system	N/A–0.1	N/A–0.1%	0.8%
Total	2.4–15.4	4.3–25.4%	

*Ranges given as 1 quartile around the median to show typical savings; 25% of factories experienced higher and 25% experienced lower savings.

Source: Natural Resources Defense Council Best Practices for Textile Mills to Save Money and Reduce Pollution

Energy Saving Practices in Textile Factories

- Process management and operation related energy saving practices are as follows.

Automation	Automation to monitor and control dyeing and printing processes
Recipe upgrades	Enzymes to pretreat and finish cotton fabric
	Increased reliance on higher-quality dyes and chemicals, high fixation, and environmentally friendly dyes
Equipment upgrades	Cold pad batch processing
	Low-liquor-ratio dyeing machines
	Digital printing machines
	Continuous wash (open width) for knit fabrics
	Foam finishing
Improved process management	Benchmark energy and water use and set concrete reduction targets
	Monitor continuously to ensure implementation of improvements
	Undertake failure analysis when things go wrong
	Standardize optimal methods and recipes
	Improve machine utilization, particularly for the most energy-intensive machines
	Schedule colors more carefully to minimize the need for extensive cleaning between batches
	Work with dye/chemical suppliers to optimize process and completely exhaust dyes and finishes
	Sequence dye baths to stagger machine times and cut down maximum mill steam loading needs

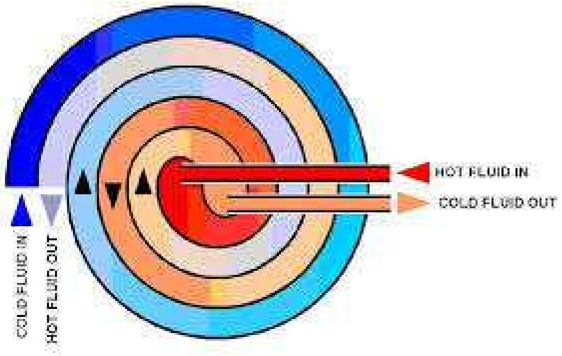
Source: Natural Resources Defense Council Best Practices for Textile Mills to Save Money and Reduce Pollution

2. Spiral Heat Exchanger

1) Low maintenance cost due to easy access. Removable covers provide easy access to interior heat transfer surfaces for field inspections, routine maintenance, or manual cleaning if required.
2) The spiral heat exchanger is compact and requires minimal space for installation and servicing.
3) High thermal efficiency. High heat transfer coefficients are 50-100% greater than shell & tubes
4) Self-cleaning effect reduces fouling and makes spiral heat exchangers ideal for handling tough fluids such as process slurries, sludge, and media with suspended solids or fibers

Plate heat exchanger

Spiral heat exchanger



Spiral heat exchanger

40℃ → 36.6℃

34.8℃ ← 28℃

Waste Heat Recovery (Case Study)

Production capacity	Amount of waste water	Average temperature of waste water	Boiler (efficiency)
14 ton/day	353 ton/day	66 ℃	Gas boiler (CNG) (87%)

Waste water temperature (℃)	Waste water flow rate (t/day)
40～59℃	141
50～79℃	141
>80℃	71
Total	353

Waste water inlet temperature (℃)	61
Supply water flow rate (t/hr)	14.7
Supply water inlet temperature (℃)	26
Surface area of heat exchanger (m^2)	32
Waste water outlet temperature (℃)	37
Supply water outlet temperature (℃)	50

300 days/year

Recovered energy 10,637,867 MJ/year → Saved natural gas 335,728 m3/year → CO2 reduction 585 t/year

	Heat exchanger	Wiring work piping work	Underwater pump	Ancillary equipment	Control board	Auto valve	Flow meter (with transmitter)	Export packing freight	Others	Total
JPY	[redacted]									
US$										

With 50% subsidy => IRR= [redacted]

In the case of coal (in Vietnam)

Boiler efficiency	80%
Net caloric value of coal (TJ/Gg)	31
Coal CO_2 emission factor (t/TJ)	87.3
Coal saved (t/year)	429
CO_2 reduction (t/year)	1156

Vietnam Textile & Apparel Association (VITAS)

The situation and prospect of the Textile industry in Vietnam

NGUYEN THI TUYET MAI – Vice General Secretary

Ho Chi Minh City, 25th Sept. 2017

CONTENT

1. Situation & Prospect of Textile Industry in Vietnam
2. Energy Consumption in Textile Industry

I. Situation & Prospect of Textile Industry in Vietnam

6,000 Enterprises
2,8 mill. labors

- **2011-2015: Average growth 17%/year**
- ***2016: export $US 28,5 bill. (growth by 4%/2015)***

6 first month/2017: Export $US 14 Bill. ***(growth > 9%)***

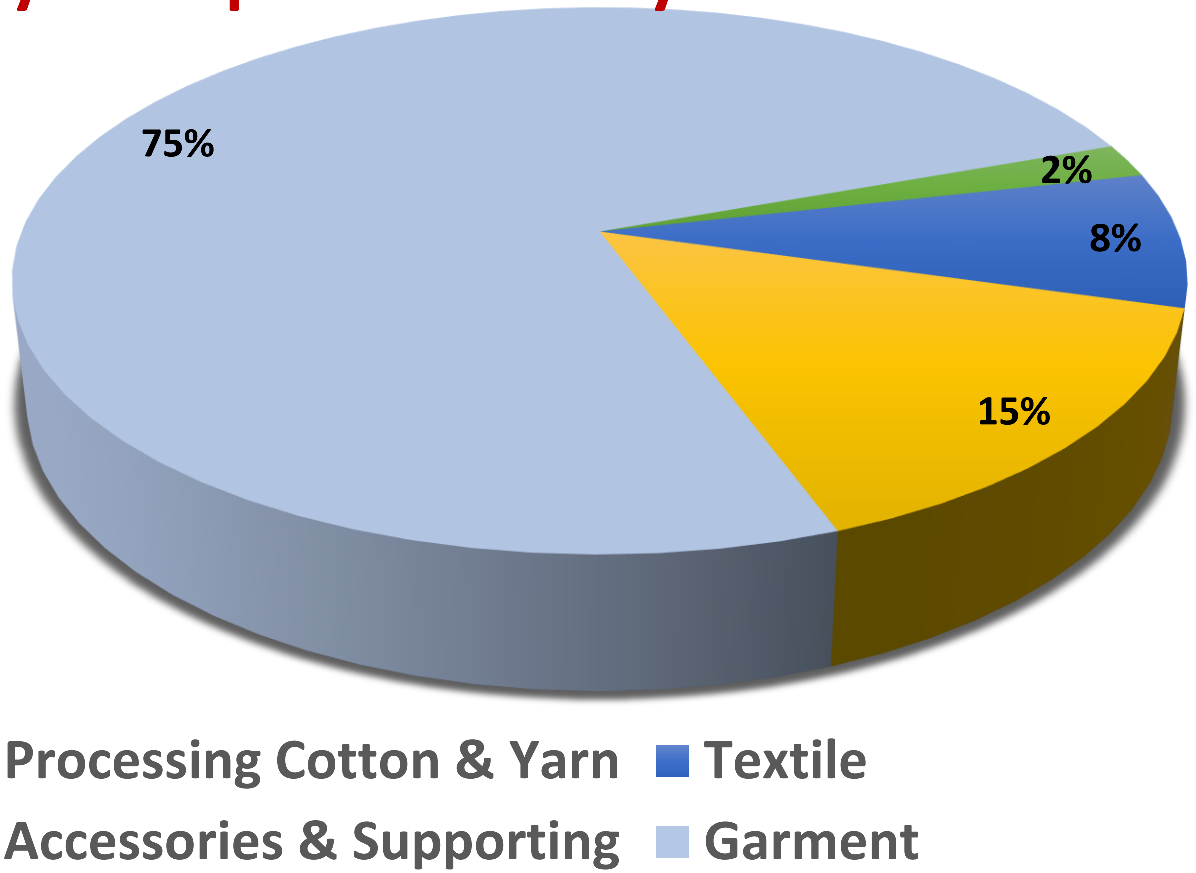
Big Export Value
Top 2 within National

5% total value of national prouduction

Top 5 export country for garment all over the world

I. Situation & Prospect of Textile Industry in Vietnam

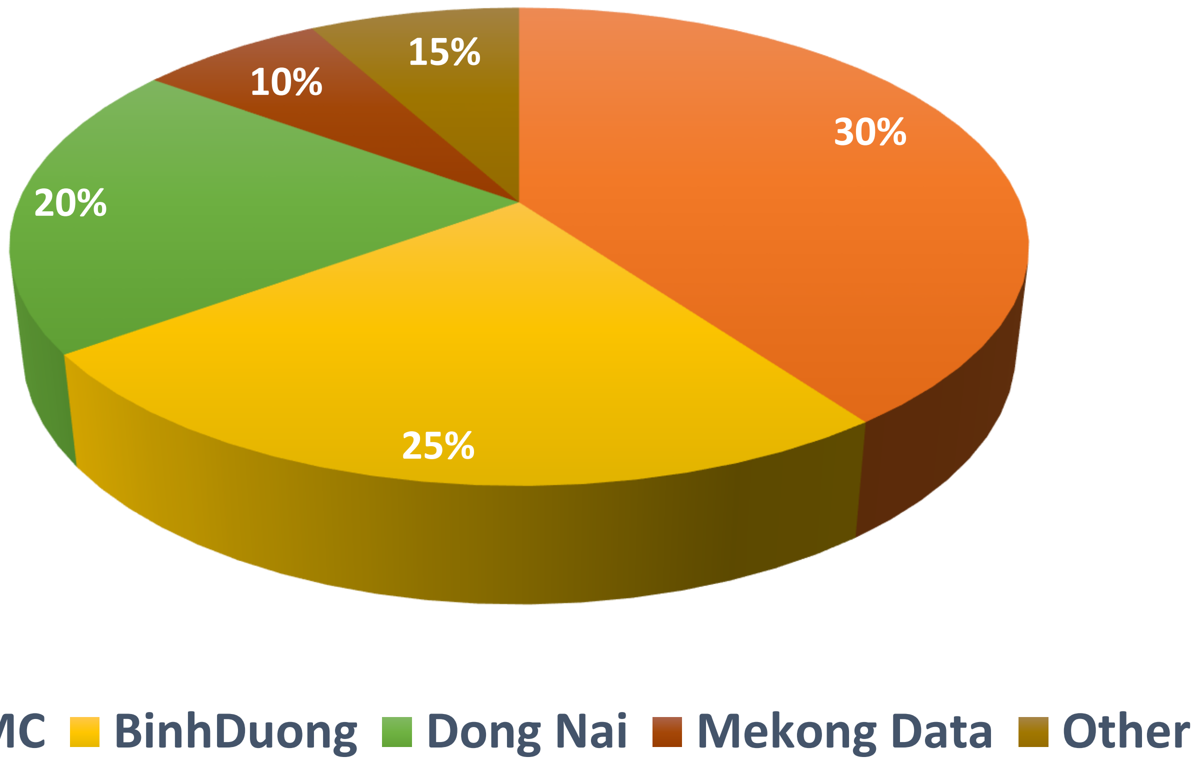
Classify Enterprises Industry



- 15% FDI
- SMEs: 80%

Classified Enterprises by location

(in the South)



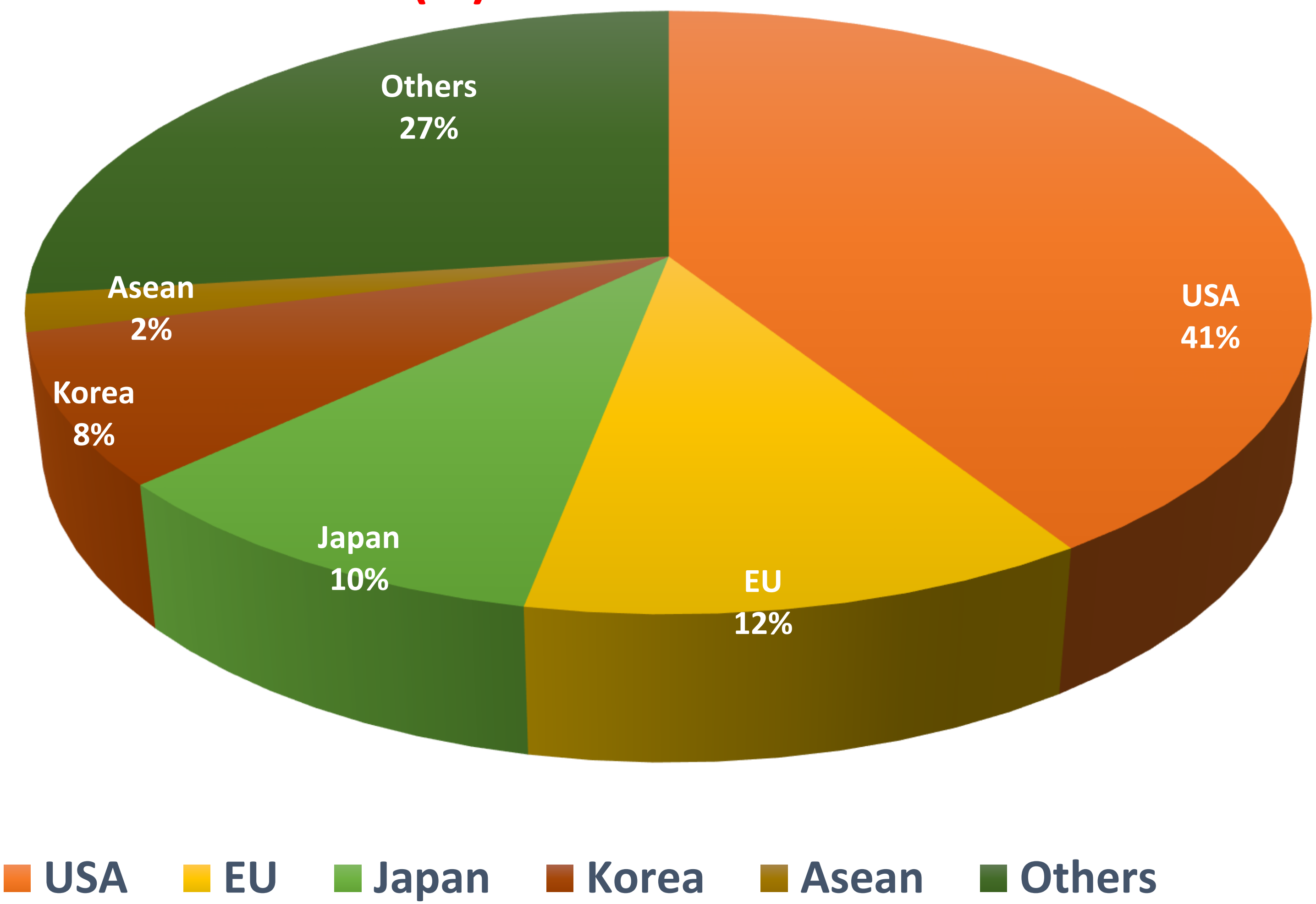
I. Situation & Prospect of Textile Industry in Vietnam

HOCHIMINH CITY

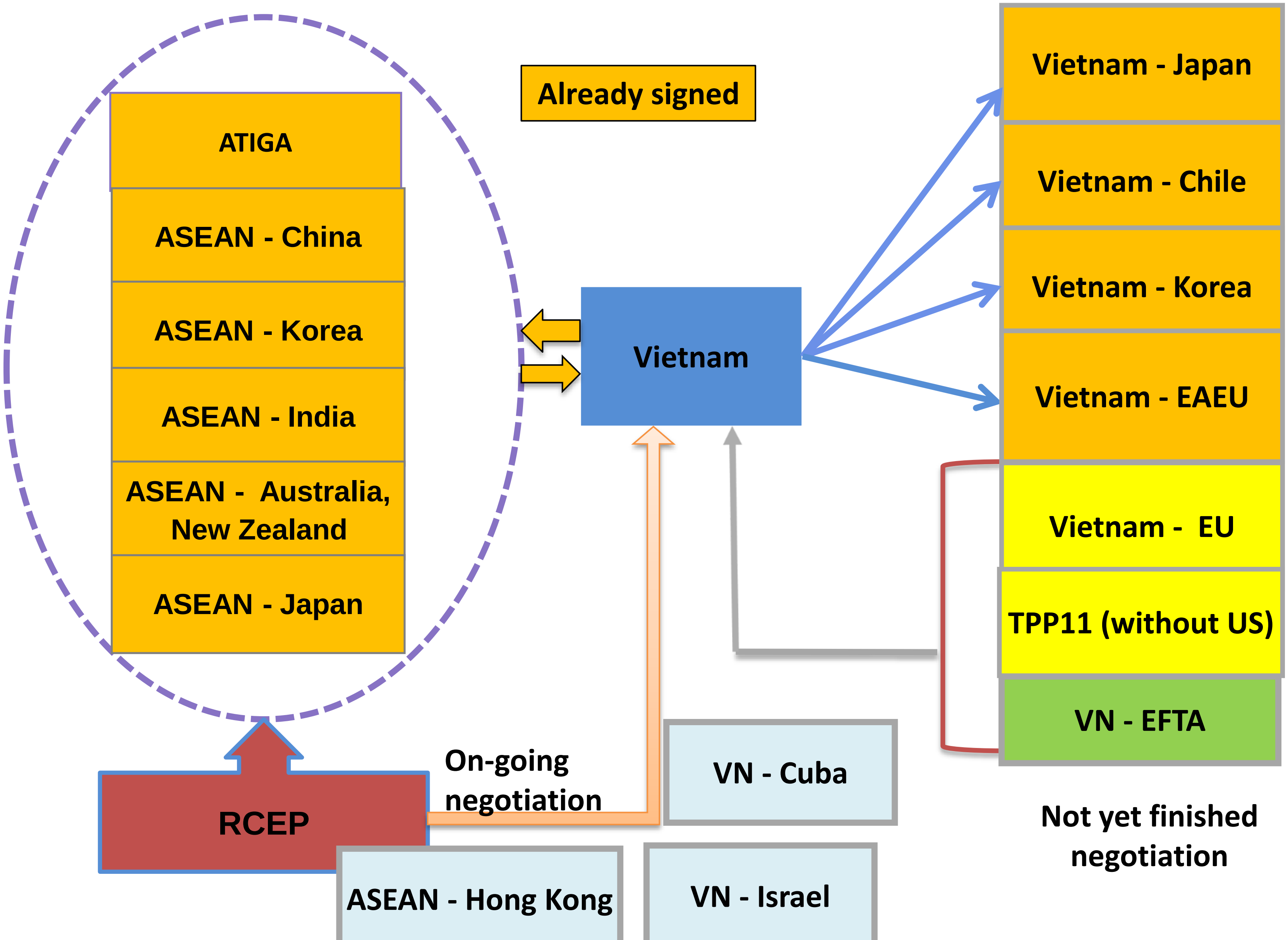
- Fashion Center
- Textile Material Trading Center
- Development of Supporting Industry
- Eliminate polluted factories
- Supply chain from yarn to weaving, knitting and dyeing in industrial zones with complete waste-water treatment system

I. Situation & Prospect of Textile Industry in Vietnam

Export Market 2016 (%)



I. Situation & Prospect of Textile Industry in Vietnam



II. Energy Consumption in Textile Industry in Vietnam

Energy Consumption in Textile Factories

	Spinning	Knitting	Dyeing	Sewing
Electric energy	★	★	★	★
Heat energy	X	X	★	X

1. **Electric energy**: Main energy used for processes *(motors, air compressors)* except for Dyeing process
2. **Dyeing process:** consumes a large of **heat energy**, which provided by **boilers** and generates a huge amount of **heated waste-water**
3. **Energy saving potentiality:** in order of greatest to least energy consumption
   Dyeing/Spinning/Knitting(Weaving)/Sewing

II. Energy Consumption in Textile Industry in Vietnam

Statistication of energy consumption in sub-sectors

Phân ngành		Unit	Energy consumption rate		
			Maximum	Average	Minimum
Fiber sector		kWh/kg	3,780	3,034	2,206
Textile sector					
1	Denim, Wool	MJ/1000m	14.005	11.758	10.080
2	Cotton fabric, PE	MJ/1000m	4.869	3.843	3.092
Dyeing sector		MJ/1000m	26.356	17.553	10.834

Source: ET (2015)

III. Energy consumption in textile industry in Vietnam

V I T A S

Energy saving in sub-sectors

	Energy saving potentiality
Fiber sector	12,2%
Knitting/Weaving sector	4,3%
Dyeing sector	6%
Total	**22,5%**

Source: ET (2015)

III. Energy consumption in textile industry in Vietnam

Energy-saving Solutions

1. **High efficiency boiler** and **good steam distribution system**
2. **Heated Waste-water system**
3. Lighting system (LED)
4. Sewing machines and specialized machines (motors)
5. Air compressor system

Energy-saving Solution

Recommendation:

- Existing factory: Energy audit / Energy saving solution consulting
- Set up a new factory: comprehensive consultancy (combine solutions to invest the technological line with energy saving.....)
- There should be an automatic mechanism for collecting energy data and national energy database of industries, including textile.

VIETNAM TEXTILE & APPAREL ASSOCIATION (VITAS)

TRUNG TÂM TIẾT KIỆM NĂNG LƯỢNG TP.HCM
ENERGY CONSERVATION CENTER HCMC

ENERGY SAVING POTENTIAL IN THE INDUSTRIAL SECTOR

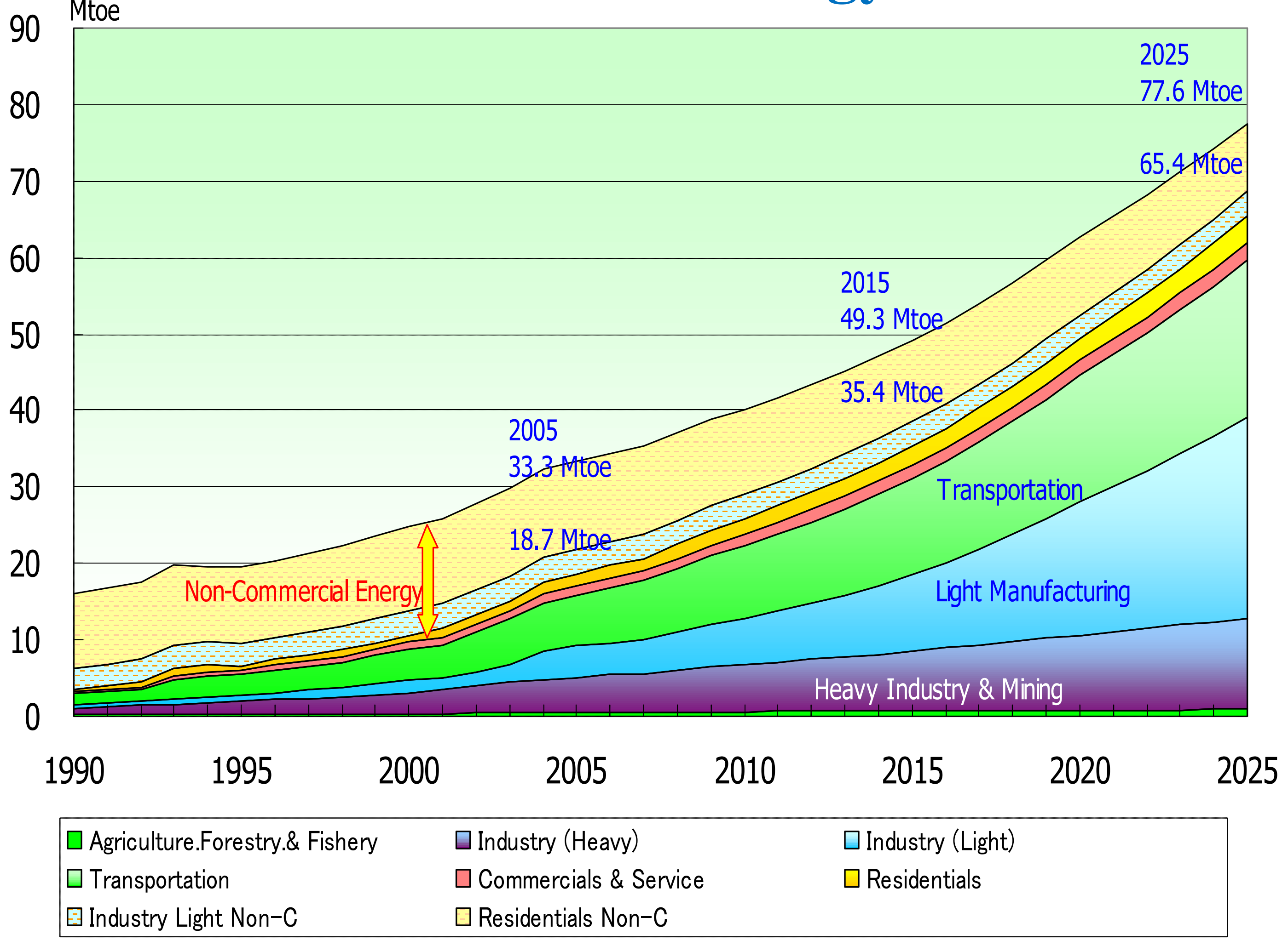




CONTENTS

1. VIETNAM ENERGY OVERVIEW

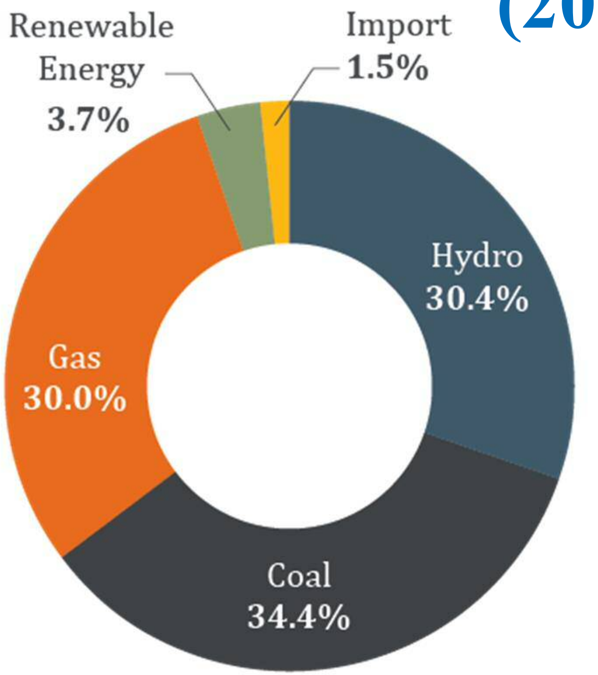
Current situation and forecast of energy demand in Viet Nam

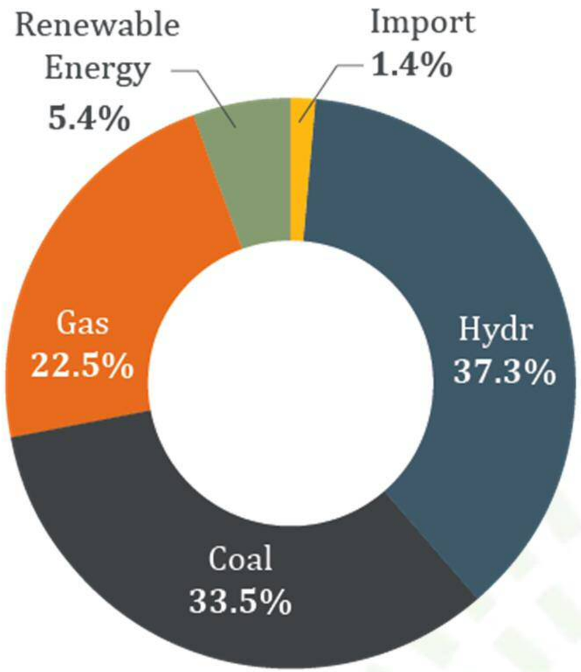


Source: Institute of Energy

1. VIETNAM ENERGY OVERVIEW

Electricity production and installed capacity by sources (2015)





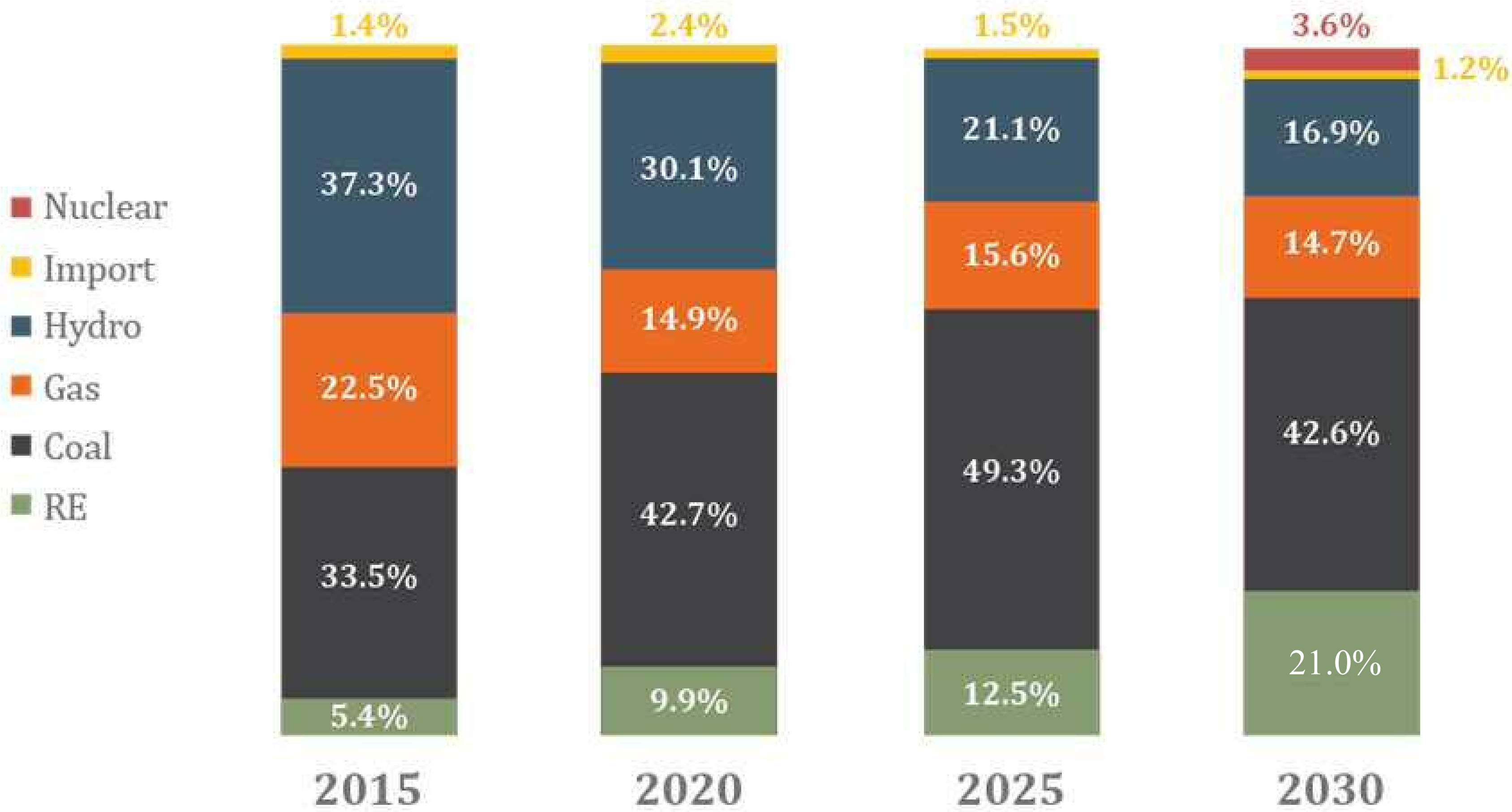
Electricity production: **> 164 TWh** in 2015.

The annual increase: **12% - 15%.**

Hydropower, natural gas and coal are the most important primary energy sources for electricity production.

1. VIETNAM ENERGY OVERVIEW

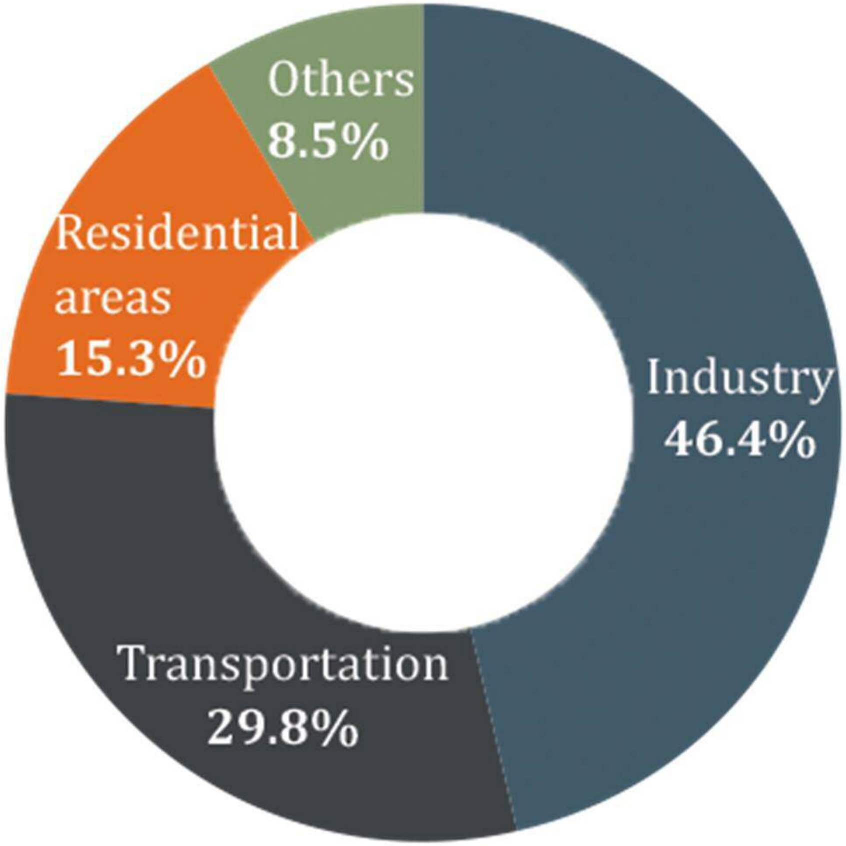
Installed capacity targets - National Development Plan VII



	2015	2020	2025	2030
Installed Capacity	39 GW	60 GW	96 GW	129.5 GW

1. VIETNAM ENERGY OVERVIEW

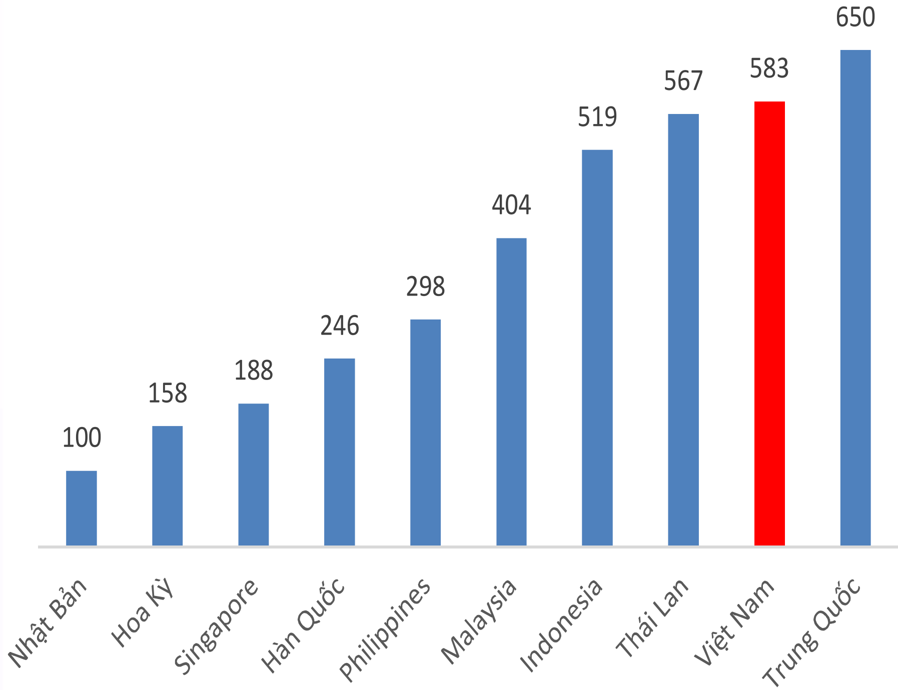
Energy consumption by sector in 2015

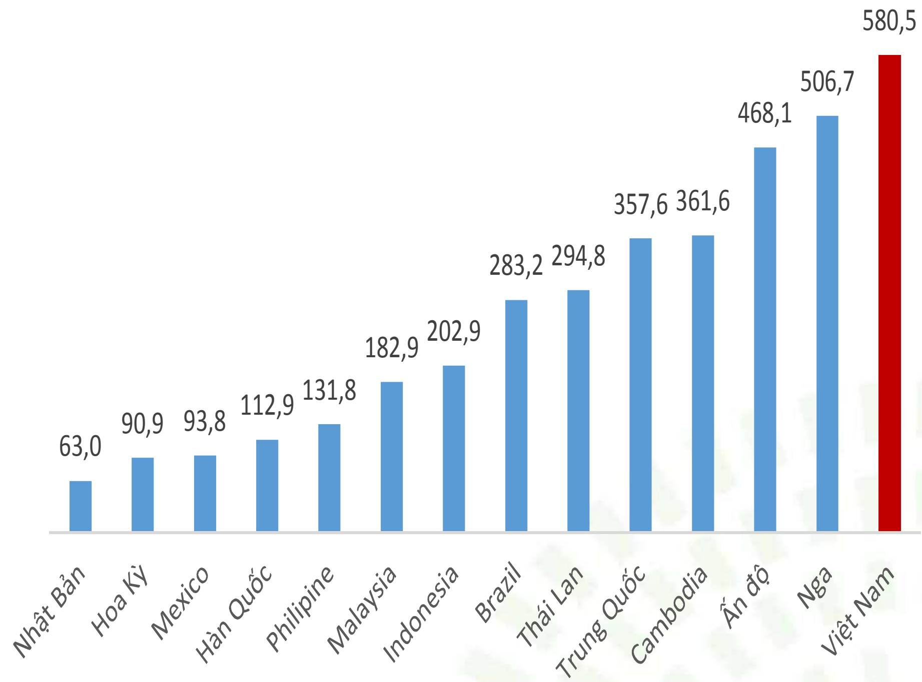


Source: Energy Consumption by Sector, Institute of Energy

1. VIETNAM ENERGY OVERVIEW

Vietnam Energy Intensity in 2011





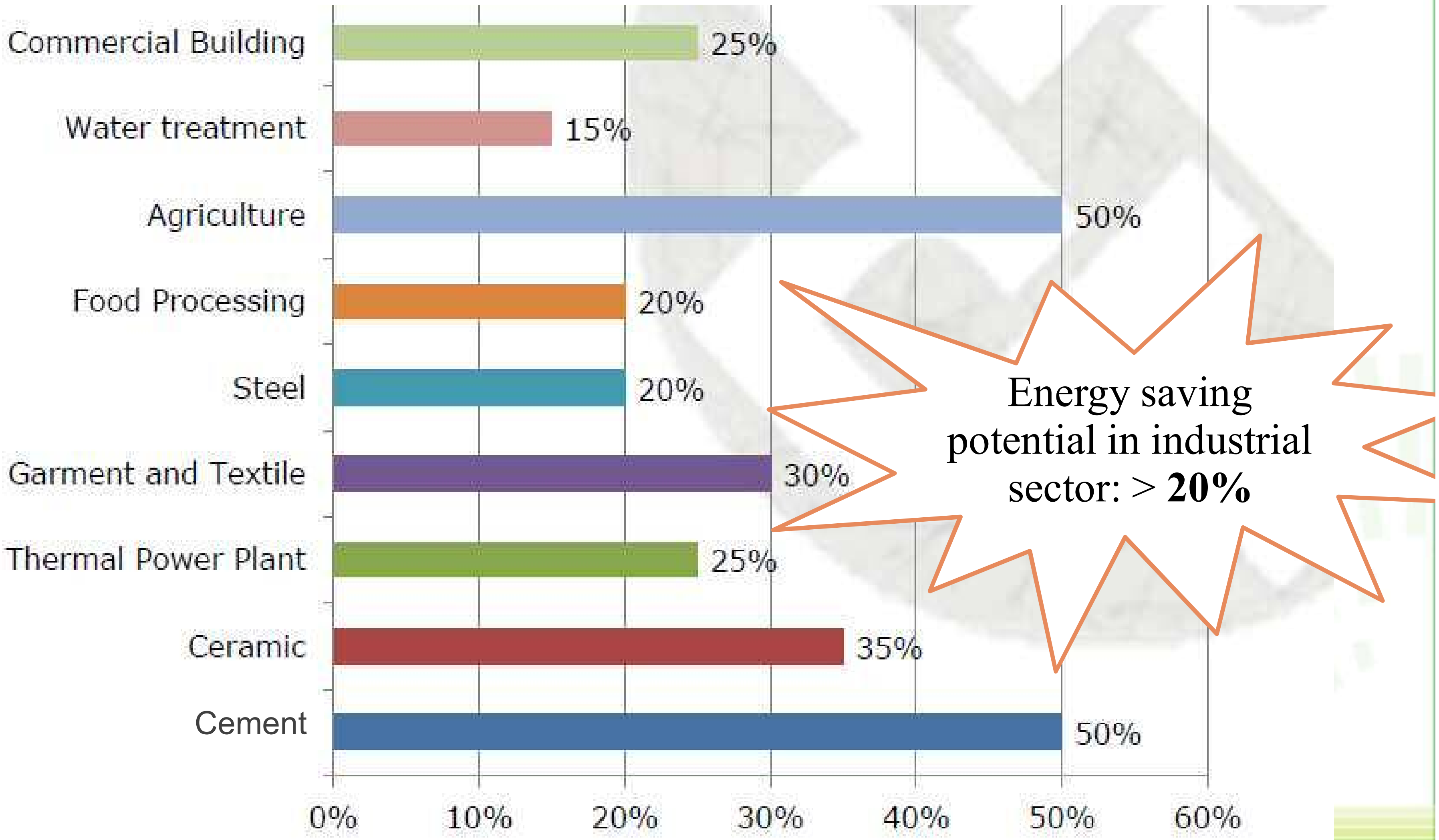
Unit : kgOE /1,000 USD

National energy intensity | **Energy intensity in the industrial sector**

Source: Institute of Energy

1. VIETNAM ENERGY OVERVIEW

Energy saving potential by sectors



Source: Statistics data from Vietnam National Energy Efficiency Program, 2000

2. EXISTING POLICIES ON ENERGY EFFICIENCY

- **Law** on Energy Efficiency and Conservation No. 50/2010/QH12
- Electricity Law 2004 28/2004-QH11
- Decision No.1855/QD-TTg, approving the national energy development strategy of Vietnam to 2020, with the vision to 2050
- Decree No.21/2011/NĐ-CP, detailing the Law on Energy Efficiency and Conservation and measures for its implementation.
- Decision No.1427/QĐ-TTg, approving National target program on energy efficiency and conservation (EC&C) for the period 2012 – 2015.
- Circular No.36/2016 /TT-BCT, on the regulation of labeling **energy label** for energy-using equipment

2. EXISTING POLICIES ON ENERGY EFFICIENCY

Law on Energy Efficiency & Conservation

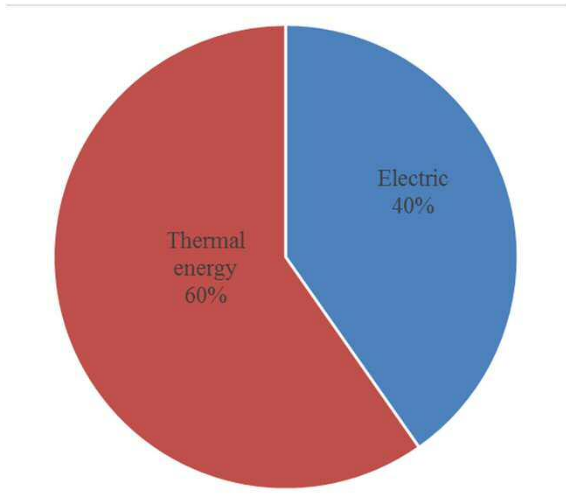
- Industrial facilities
- Transportation sector
- Agriculture sector
- Residential & services
- Construction and Public lighting
- Energy consuming Equipment and Machinery
- Investment projects and agencies, units using State budget

Designated Energy-using Units

ecc HCMC
TRUNG TÂM TIẾT KIỆM NĂNG LƯỢNG TP.HCM - ENERGY CONSERVATION CENTER HCMC
244 Dien Bien Phu Street, Ward 7, District 3, HCMC Tel: (84-8) 39322372 Fax: (84-8) 39322373 www.ecc-hcm.gov.vn

3. CURRENT STATUS OF EE TECHNOLOGIES IN TYPICAL SECTORS

- **Garment and textile Sector**
  - High demand for electricity and thermal energy.
  - Some typical enterprises : Cost of thermal energy is over 50% of energy cost.
  - Energy cost accounts for 10-15% of production cost whereas energy waste is up 20-32% due to old technologies and outdated energy management systems.



Energy consumption structure in textile plant

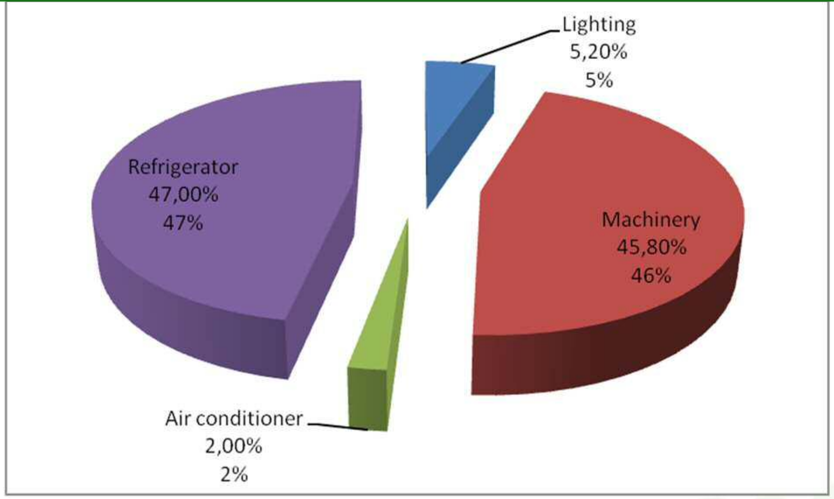
Source: ECC-HCMC

3. CURRENT STATUS OF EE TECHNOLOGIES IN TYPICAL SECTORS

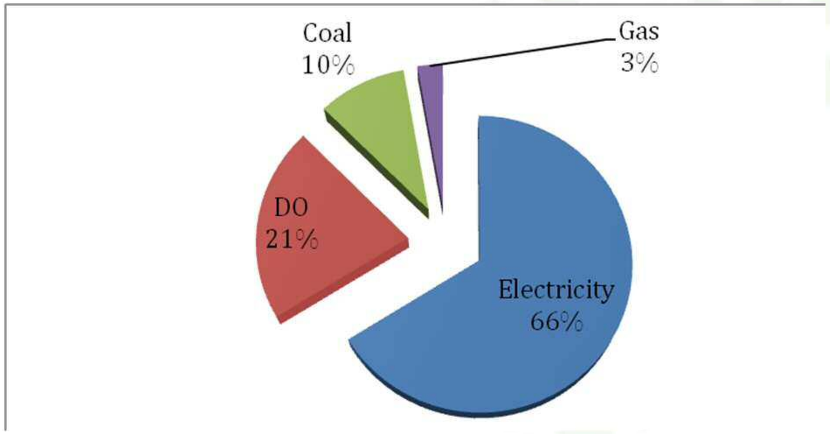
- **Garment and textile Sector (cont.)**
  - Energy saving potential : up to 30%.
  - The EE equipment can be applied :
    - High efficiency boilers
    - Waste heat recovery systems.
    - High efficiency air compressors.
    - EE motors and variable speed drives.
    - Production equipment: EE electric sewing machines, …

3. CURRENT STATUS OF EE TECHNOLOGIES IN TYPICAL SECTORS

- **Food processing sector :**
  - High demand for electricity.
  - Accounts for about 18% of the total electricity demand for the manufacturing industry in HCMC
  - Energy consumption structure as follows:



Energy consumption structure by systems



Source: ECC-HCMC

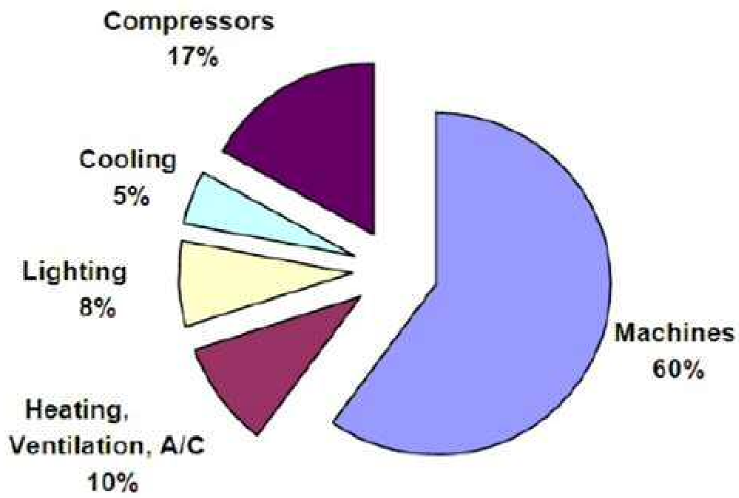
Energy consumption structure by types

3. CURRENT STATUS OF EE TECHNOLOGIES IN TYPICAL SECTORS

- **Food processing sector (cont.)**
  - Major equipment : refrigeration systems.
  - The technological level : old, low energy efficiency.
  - Energy saving potential : up to 20%.
  - The EE equipment can be applied :
    - EE motors and variable speed drive (VSD)
    - LED
    - High efficiency boilers, heat pumps, solar water heaters
    - Insulation materials;
    - Production equipment : EE freezing machines, ice making machines, …

3. CURRENT STATUS OF EE TECHNOLOGIES IN TYPICAL SECTORS

- **Rubber & Plastic sector**
  - High demand for electricity.
  - Accounts for about 28% of the total electricity demand for the manufacturing industry in HCMC.
  - Energy consumption structure as follows:



Energy consumption structure

Source: ECC-HCMC

3. CURRENT STATUS OF EE TECHNOLOGIES IN TYPICAL SECTORS

- **Rubber & Plastic sector (cont.)**
  - Major equipment : injection, extrusion and blowing systems.
  - The technological level : old, inefficient technologies or outdated processes.
  - Energy saving potential : up to 15%.
  - The EE equipment can be applied :
    - LED
    - EE motors, servo motors and variable speed drive (VSD)
    - High efficiency air compressors
    - Production equipment : electric molding machine, electromagnetic heating technology, high-performance automatic bottle blowing machine, robotics…

4. ENERGY EFFICIENCY EQUIPMENT & ITS ENERGY SAVING POTENTIAL

Energy saving up to:

10% -15%

Ventilation Fans

Energy saving up to:

30% - 50%

LED lamps

Energy saving up to:

20 - 30%

Boiler System

Energy saving up to:

10% - 40%

Inverter

4. ENERGY EFFICIENCY EQUIPMENT & ITS ENERGY SAVING POTENTIAL

Energy saving up to:

60% - 90%

Solar Water Heater

Energy saving up to:

35% - 40%

Electronic sewing machine

Fuel saving up to:

15% - 20%

Sew saver

Fuel saving up to:

60%

Heat pump

4. ENERGY EFFICIENCY EQUIPMENT & ITS ENERGY SAVING POTENTIAL

IQF (*individually quick frozen*)

Energy saving up to:

5 – 10%

Refrigerator with screw compressor

Energy saving up to:

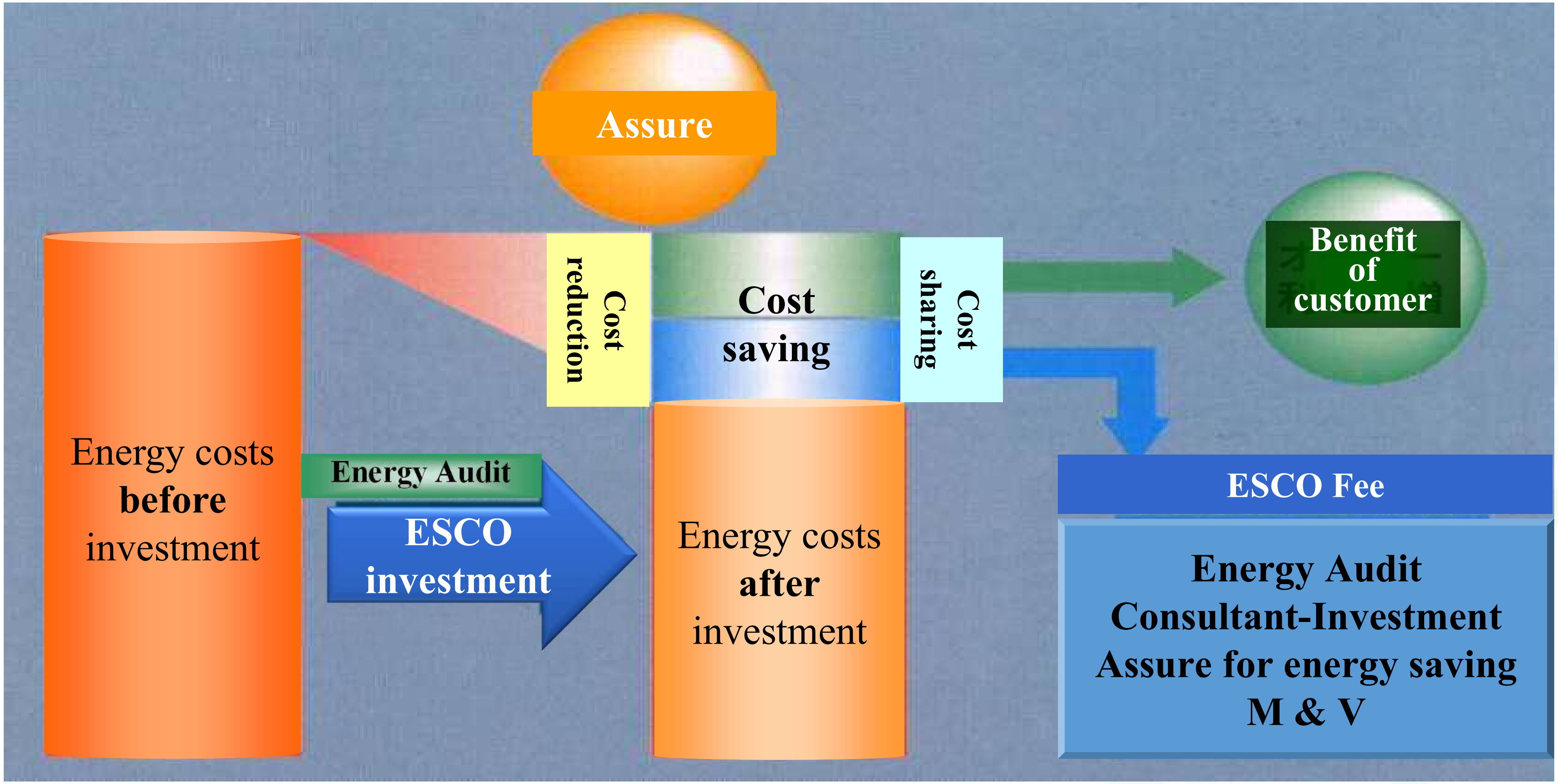
10 – 15%

5. RECOMMENDATIONS FOR PROMOTING ENERGY EFFICIENCY IN VIETNAM

- Implement pilot projects
- Build a financial mechanism for investing new technology: ESCO, leasing financial, ….
- Cooperate with a Vietnam's agency for implementing the technology transfer to reduce the investment cost.

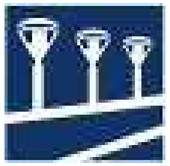
6. ESCO MODEL

What is ESCO model?



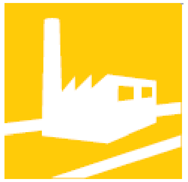
6. ESCO MODEL

What are potential areas for ESCO investment?



Public lighting

Commercial buildings



Industrial plants/ factories

Electricity distribution system

Renewable energy

6. ESCO MODEL

Typical ESCO projects

LEGEND HOTEL

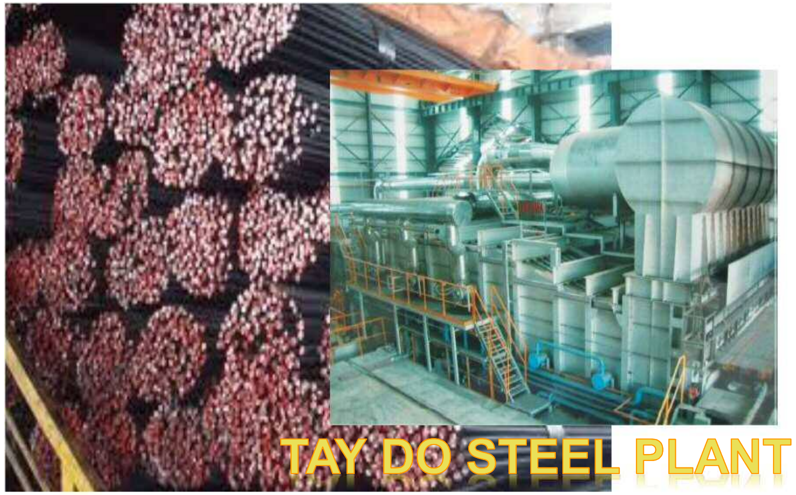
RIVERSIDE HOTEL

115 HOSPITAL

NIKKO HOTEL HANOI

6. ESCO MODEL

Typical ESCO projects



TAY DO STEEL PLANT

GREEN BEE PACKAGING COMPANY

PUBLIC LIGHTING IN BEN TRE


Thank you

Osaka City

CCAP Capacity Building

Osaka City Government

Osaka City

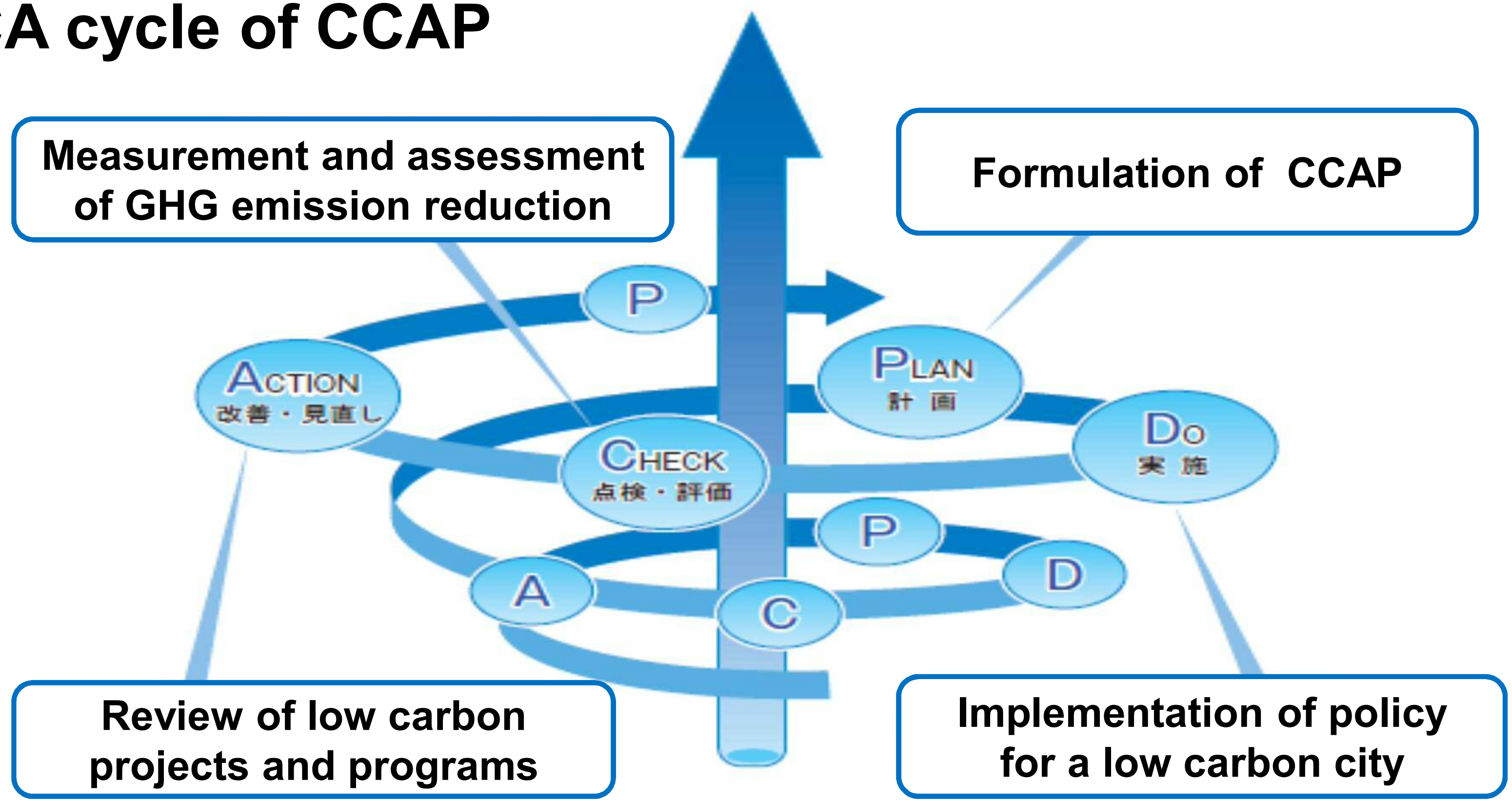
Development of a Low Carbon City MOU Signing between Ho Chi Minh City and Osaka City

6 September 2016
Ho Chi Min City

1. Development of human resources
2. Sharing professional skills and knowledge on low-carbon and Environmental conservation measures
3. Creating new projects toward the realization of a low-carbon city
4. Promoting public awareness and dissemination of information on the prevention of global warming.

Low Carbon Project in Ho Chi Minh

PDCA cycle of CCAP



Strengthening human resource development for proper PDCA

Administrative staff undertakes professional training on prevention of global warming.

e.g. Choice of low carbon technologies and projects
GHG inventory in 10 fields

Osaka City

Installation of Low Carbon Technology

Initiatives in the field of energy is effective regarding GHG emission reduction

LED lighting

Station

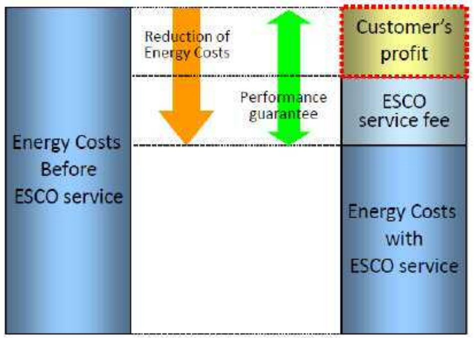
Park

Solar panels

School

Water purification plant

Hydroelectric power facility

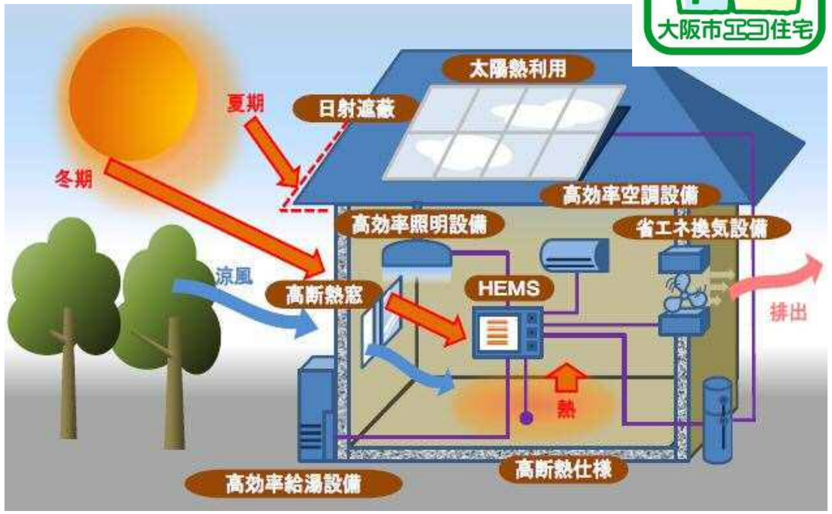


Promotion of ESCO projects

Installation of low carbon technologies at public facilities

Promotion of GHG Emissions Reduction for Citizens and Businesses

Osaka City Eco Housing Promotion Project



Zero energy house

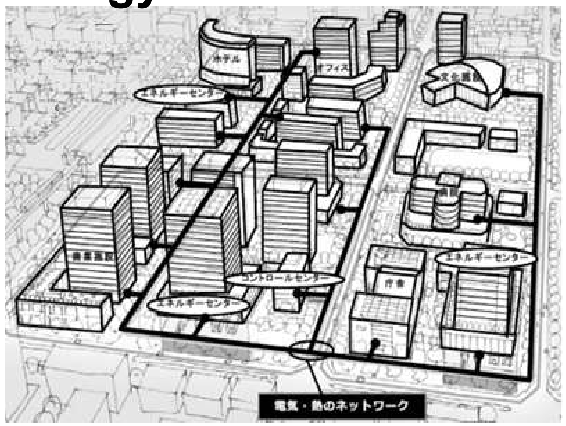
Comprehensive Assessment System for Building Environmental Efficiency

Excellent building

Support projects for energy saving

- Improvement of operations
- Installation of energy saving equipment
- Case example on energy saving

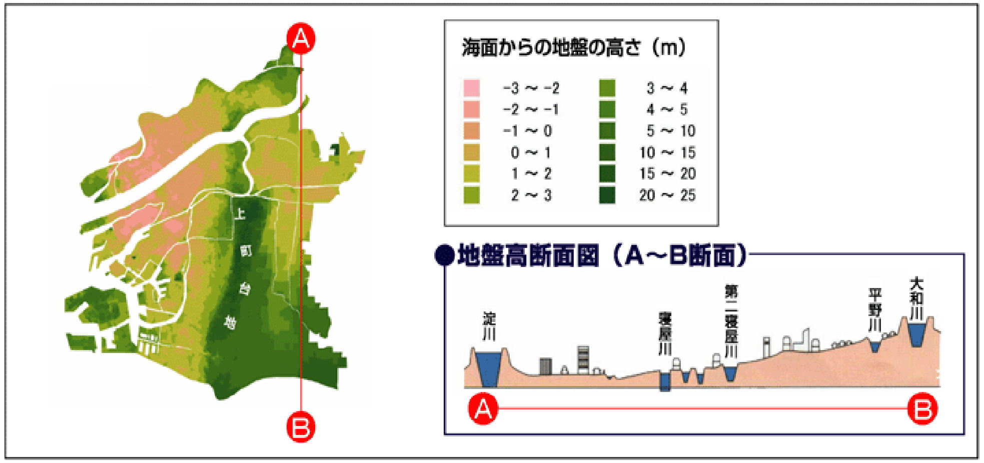
Promotion of the use of area energy networks



Ensuring the supply of energy for business continuation in times of disaster

Promotion of energy efficiency and CO_2 reduction

Adaptation Measures for Climate Change



Flood hazard map

Flood stop doors

Green space at Buildings

Promotion of Public Awareness on Global Warming

Seminars

Environmental awareness and education

Transfer of Osaka City’s experience and expertise

Osaka City

GHG Inventory

GHG emission =
∑ (Activity date × Emission factors × Global warming potential(GWP))

Statistical data | Research data | Report of IPCC

Field	Statistical data(e.g.)
Energy	Fossil fuel consumption
Industry	Shipment amount of products
Waste management	Amount of landfill waste
Transportation	Automobile mileage
Agriculture	Number of cows

Type of greenhouse gas	Business Activities for which the Emission Calculation is Required
○Energy-derived carbon dioxide (CO_2) (Carbon dioxide emitted in connection with fuel combustion or the use of electricity or heat supplied by another party.)	Use of fuels Use of electricity supplied from another party Use of heat supplied from another party
Greenhouse gases other than the above ○Non-energy derived CO_2 ○Methane (CH_4) ○Nitrous oxide (N_2O) ○Hydrofluorocarbons (HFC) ○Perfluorocarbons (PFC) ○Sulfur hexafluoride (SF_6) ○Nitrogen trifluoride(NF_3)	**Non-energy derived CO_2** Production of cement, Production of ethylene, etc. **CH_4** Mining of coal, Waste disposal by landfill, Treatment of sewage, night soil, etc. **N_2O** Use of fertilizer on cultivated land, Management of livestock excrement, etc. **HFC** Use of sprayers, etc. **PFC** Production of aluminum , etc. **SF_6** Production of SF6,etc **NF_3** Production of NF_3, etc.

GHG	GWP
CO_2	1
CH_4	25
N_2O	298
HFC	1,430,etc
PFC	7,390,etc
SF_6	22,800
NF_3	17,200

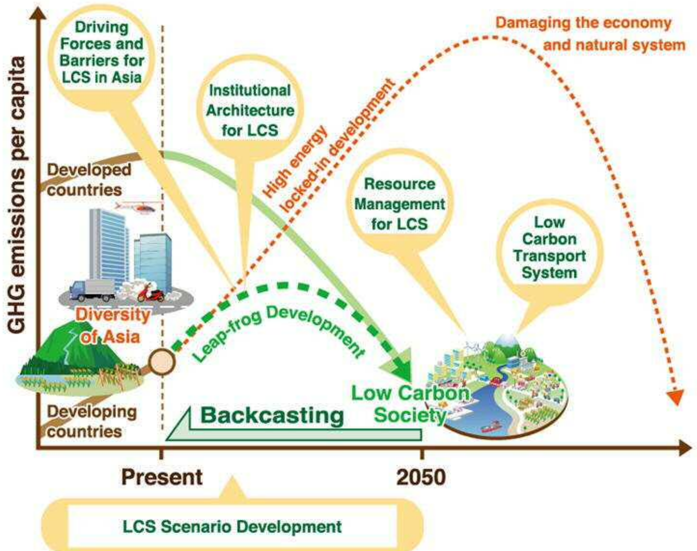
Link to SPI-NAMA project

Future Training

◆ October 2017; Osaka City
"Global Dialogue on Technology for Resilient Cities"

◆ December 2017; Osaka City and Kansai area
"Training for formulation of low carbon city plan"

◆ January 2018; Ho Chi Minh City
" Training for low carbon projects and GHG inventory"



Thank you very much!

ỦY BAN NHÂN DÂN THÀNH PHỐ HỒ CHÍ MINH

BAN CHỈ ĐẠO THỰC HIỆN KẾ HOẠCH HÀNH ĐỘNG ỨNG PHÓ VỚI BIẾN ĐỔI KHÍ HẬU

Kế hoạch hành động ứng phó với biến đổi khí hậu trên địa bàn TP.HCM giai đoạn 2017-2020, tầm nhìn đến năm 2030

Osaka, tháng 10/2017

Mục lục

1. Nguyên tắc xây dựng

KHHĐ ứng phó BĐKH dựa trên 4 nguyên tắc chính:

- *Các giải pháp thích nghi* phải dựa trên nỗ lực tổng hợp của nhiều bên liên quan dưới sự chỉ đạo xuyên suốt của lãnh đạo Thành phố.
- Triển khai được các *dự án giảm thiểu BĐKH* cụ thể.
- Các bên tham gia đều có lợi.
- Phát triển thể chế về BĐKH.

1. Nguyên tắc xây dựng

10 lĩnh vực trong KHHĐ ứng phó với BĐKH:

① Quy hoạch đô thị

② Năng lượng

③ Giao thông

④ Công nghiệp

⑤ Quản lý nước

⑥ Quản lý chất thải

⑦ Xây dựng

⑧ Y tế

⑨ Nông nghiệp và an ninh lương thực

⑩ Du lịch, văn hóa và nâng cao nhận thức cộng đồng

2. Mục tiêu của KHHĐ

- Lồng ghép các yếu tố BĐKH vào các Chiến lược, Chương trình, Quy hoạch và Kế hoạch phát triển kinh tế- xã hội của TP. HCM với điều kiện cụ thể và phù hợp với giai đoạn 2016-2020.
- Xây dựng và triển khai chương trình, dự án ưu tiên nhằm thích ứng BĐKH, giảm lượng khí nhà kính phát thải trong 10 lĩnh vực phát triển KTXH.
- Nâng cao năng lực hợp tác quốc tế và khả năng thu hút đầu tư trong công tác ứng phó với BĐKH.
- Tăng cường công tác quản lý và nỗ lực triển khai hoạt động giảm phát thải khí nhà kính.

3. Các nhóm giải pháp ứng phó BĐKH

① **Nhóm các giải pháp trong khuôn khổ KHHĐ**

Gồm những nhiệm vụ khả thi triển khai trong giai đoạn 2017-2020, phù hợp với điều kiện tài chính và các nguồn lực khác của TP.HCM.

② **Nhóm các giải pháp phát triển kinh tế- xã hội cần thiết cho công tác ứng phó BĐKH**

Gồm những nhiệm vụ phát triển cơ sở hạ tầng vĩ mô; những nhiệm vu khó triển khai bằng ngân sách TP nhưng rất cần thiết cho nhu cầu ứng phó BĐKH.

→ BCĐBĐKH sẽ phối hợp kêu gọi đầu tư và triển khai thực hiện.

QUY HOẠCH ĐÔ THỊ

ĐỊNH HƯỚNG

- Lồng ghép BĐKH vào quy hoạch đô thị
- Phát triển hệ thống văn bản pháp lý
- Phòng chống và giảm thiệt hại của ngập lụt
- Nâng cao chất lượng sống trong điều kiện BĐKH

HÀNH ĐỘNG ỨNG PHÓ

- Lồng ghép BĐKH trong điều chỉnh và cập nhật quy hoạch đô thị
- Xây dựng và hoàn thiện các quy định và hoạt động quy hoạch đô thị
- Kết hợp các công trình nhằm tăng diện tích mặt nước và mảng xanh

NĂNG LƯỢNG

ĐỊNH HƯỚNG

HÀNH ĐỘNG ỨNG PHÓ

Nâng cao hiệu quả sử dụng năng lượng

Đến 2020, 10% DN tiêu thụ NL trọng điểm áp dụng ISO 50001.

Thúc đẩy năng lượng tái tạo. Năm 2020: tỉ lệ năng lượng tái tạo >1,74% so với tổng NL tiêu thụ của TP.

Tỉ lệ tổn thất điện năng đến 2020 còn khoảng 5% và đến 2025: 4,8%.

Phát triển năng lượng tái tạo, năng lượng sạch

Cải thiện hệ thống chiếu sáng công cộng bằng các loại đèn có hiệu quả tiêu thụ điện năng cao hơn.

Đẩy mạnh tuyên truyền, nâng cao nhận thức cộng đồng về sử dụng năng lượng có hiệu quả trong đời sống và sản xuất.

GIAO THÔNG VẬN TẢI

ĐỊNH HƯỚNG

Lồng ghép BĐKH vào quản lý giao thông, xây dựng chính sách và nâng cao nhận thức

Nâng cao hiệu quả tiêu thụ năng lượng, sử dụng năng lượng sạch giảm phát thải KNK

Phát triển và định hướng chuyển đổi sang giao thông công cộng phù hợp

HÀNH ĐỘNG ỨNG PHÓ

Nâng cao diện tích và chất lượng đường giao thông, giảm số điểm và thời gian ùn tắc.

Khuyến khích việc sử dụng phương GT thông chạy bằng điện hoặc các loại nhiên liệu sạch.

Nâng cao công tác tuyên truyền, khuyến khích, tạo điều kiện thuận lợi cho việc sử dụng phương tiện giao thông công cộng.

Phát triển giao thông thủy nhằm hỗ trợ giảm áp lực cho hệ thống giao thông đường bộ.

Xây dựng các chính sách khuyến khích đầu tư vào hệ thống giao thông.

CÔNG NGHIỆP

ĐỊNH HƯỚNG

Nâng cao hiệu quả tiêu thụ năng lượng và tài nguyên trong sản xuất công nghiệp

Hướng đến quản lý phát thải khí nhà kính từ các hoạt động sản xuất công nghiệp, nhất là các ngành công nghiệp trọng điểm

HÀNH ĐỘNG ỨNG PHÓ

- Xây dựng quy định về báo cáo phát thải KNK hàng năm đối với nhà máy sx CN trên địa bàn thành phố.
- Khuyến khích và hỗ trợ các doanh nghiệp chuyển đổi sang công nghệ và trang thiết bị hiệu quả năng lượng hơn, tăng cường tái sử dụng, tái chế nguyên vật liệu và chất thải trong hoạt động sản xuất.
- Tăng cường quản lý và kiểm toán năng lượng ở các khu công nghiệp, doanh nghiệp.

QUẢN LÝ NƯỚC

Định hướng: cấp nước	
1	Đảm bảo an ninh nguồn nước cấp.
2	Đa dạng hóa các nguồn dự trữ nước cấp.
3	Hạn chế khai thác tài nguyên nước ngầm.
4	Thúc đẩy các cơ chế quản lý nguồn nước liên vùng.
5	Nâng cao hiệu quả sử dụng năng lượng trong quá trình xử lý và phân phối nước.
6	Tăng cường khả năng chống chịu của mạng lưới cấp nước trước các điều kiện thời tiết khắc nghiệt.
7	Tăng cường sử dụng nước có hiệu quả.

QUẢN LÝ NƯỚC

Định hướng: Thoát nước

1	Quản lý chặt chẽ công tác quy hoạch đô thị, hạn chế việc giảm diện tích mặt nước.
2	Thay đổi quan điểm chống ngập: điều tiết nước và thích nghi tích cực.
3	Nâng cao hiệu quả hệ thống thoát nước và xử lý nước thải.
4	Tăng diện tích trữ nước, giảm dòng chảy đỉnh lũ, giảm thiệt hại do ngập úng.
5	Xây dựng liên hồ điều tiết nước, giảm nguy cơ ngập
6	Khuyến khích công trình có thảm thực vật và hệ thống thu trữ nước mưa.

QUẢN LÝ CHẤT THẢI

ĐỊNH HƯỚNG

Giảm thiểu phát sinh chất thải rắn	Đẩy mạnh tái sử dụng và tái chế chất thải	Ứng dụng công nghệ xử lý chất thải: thu hồi và tái sinh năng lượng	Cải thiện và phát triển hệ thống quản lý chất thải

HÀNH ĐỘNG ỨNG PHÓ

- Giảm thiểu phát sinh chất thải rắn: Tuyên truyền nâng cao nhận thức; tái sử dụng, tái chế các loại chất thải rắn chiếm thành phần lớn.
- Nhân rộng mô hình phân loại chất thải rắn tại nguồn.
- Triển khai các dự án tái chế chất thải; xử lý chất thải tái sinh năng lượng.
- Tăng cường công tác thu gom, tái chế và xử lý bùn thải, các loại chất thải công nghiệp, y tế, nguy hại.
- Tăng cường năng lực quản lý chất thải rắn và nước thải, ứng dụng công nghệ thông tin vào quản lý chất thải.

XÂY DỰNG

ĐỊNH HƯỚNG

Giảm năng lượng chiếu sáng và điều hòa cho các công trình	**Sử dụng vật liệu xây dựng mới, thân thiện với môi trường**	**Thúc đẩy xây dựng công trình xanh**

HÀNH ĐỘNG ỨNG PHÓ

- Nâng cao năng lực quản lý đầu tư xây dựng và quản lý công trình xây dựng thân thiện với môi trường.
- Tái sử dụng và tái chế chất thải xây dựng.
- Tăng cường sử dụng gạch không nung.
- Sử dụng năng lượng hiệu quả trong hoạt động thi công xây dựng
- Xây dựng khung pháp lý tăng hệ số sử dụng đất khi quy hoạch các dự án xây dựng công trình thân thiện với môi trường
- Xây dựng quy định về dán nhãn sinh thái đối với vật liệu xây dựng thân thiện với môi trường và công trình xanh.
- Xây dựng chính sách hỗ trợ, ưu đãi đầu tư nhằm khuyến khích phát triển và tạo điều kiện cho các dự án sản xuất vật liệu xây dựng thân thiện với môi trường, công trình xanh.

Y TẾ

ĐỊNH HƯỚNG

Nâng cao năng lực ứng phó với tác động gián tiếp của BĐKH: dịch bệnh, thiên tai và di dân

Phi tập trung hóa dịch vụ y tế cộng đồng, giảm nhu cầu y tế chuyển tuyến vào nội thành

HÀNH ĐỘNG ỨNG PHÓ

- Đào tạo, tập huấn nâng cao chất lượng đội ngũ y tế địa phương.
- Xây dựng mô hình dự báo tác động của BĐKH đến sức khỏe cộng đồng theo các kịch bản cập nhật.
- Xây dựng hệ thống cảnh báo sớm dịch bệnh truyền nhiễm.
- Xây dựng các kịch bản cấp cứu ứng phó với thảm họa thiên tai và BĐKH.
- Đa dạng hóa nguồn đầu tư, hỗ trợ xây dựng cơ sở vật chất kỹ thuật nhằm tăng cường năng lực mạng lưới trạm y tế.

NÔNG NGHIỆP

ĐỊNH HƯỚNG

Nâng cao năng lực, nhận thức về giảm thiểu và thích ứng

Đánh giá tác động BĐKH các lĩnh vực nông nghiệp

Đào tạo, tập huấn; Tuyên truyền, phổ biến thông tin, kiến thức.

Quản lý diện tích rừng hiện có; phát triển diện tích rừng, cây xanh TP.

Đánh giá tác động BĐKH đến lĩnh vực NN, LN, TS, thủy lợi và phát triển nông thôn.

Triển khai thực hiện dự án ưu tiên.

HÀNH ĐỘNG ỨNG PHÓ

DU LỊCH

ĐỊNH HƯỚNG

Nâng cao ý thức bảo vệ môi trường trong hoạt động du lịch cho du khách.

Đa dạng hóa các hoạt động du lịch, đẩy mạnh hoạt động du lịch sinh thái và du lịch đường thủy.

HÀNH ĐỘNG ỨNG PHÓ

Tuyên truyền khuyến khích hoạt động du lịch gắn với việc bảo vệ và thân thiện với MT.

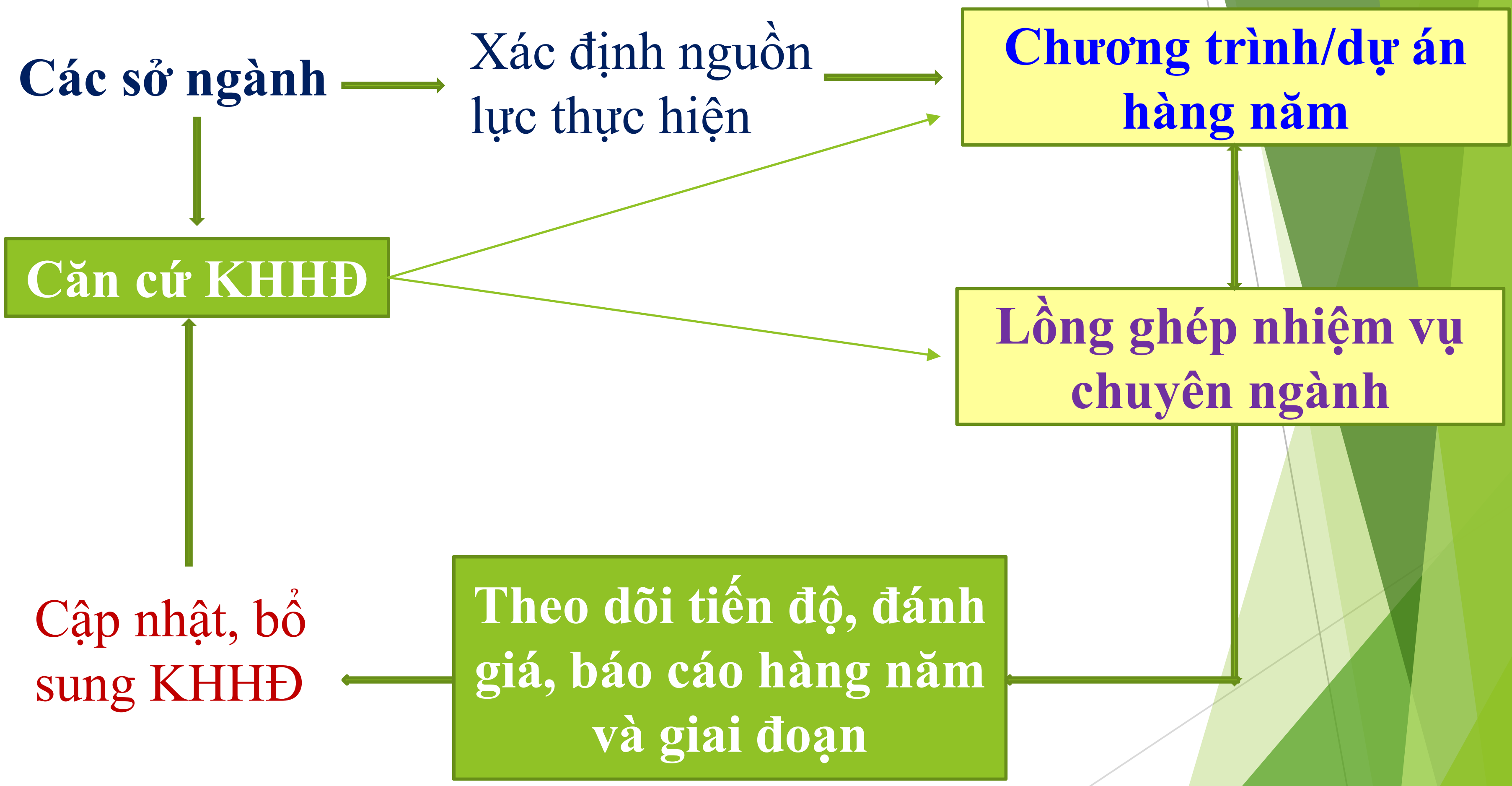
Thay thế, đầu tư các trang thiết bị có hiệu quả sử dụng năng lượng trong hoạt động du lịch.

NHIỆM VỤ KHÁC

Tổng hợp

- Xây dựng hệ thống kiểm kê khí nhà kính, MRV cấp TP.
- Xây dựng, nâng cấp hệ thống giám sát KTTV và BĐKH.
- Nâng cao năng lực quản lý rủi ro, cứu hộ, cứu nạn.
- Xây dựng tài liệu tuyên truyền về BĐKH.
- Tổ chức hội nghị, hội thảo về ứng phó BĐKH.
- Đánh giá tác động BĐKH đến quy hoạch phát triển KT-XH.
- Nâng cao năng lực quản lý nhà nước ứng phó với BĐKH.
- Nghiên cứu mô hình quản lý đô thị trong điều kiện BĐKH
- Nâng cao nhận thức cộng đồng về BĐKH.

4. Cách thức triển khai KHHĐ



5. Khó khăn

- Về mặt chuyên môn: BĐKH là lĩnh vực còn khá mới, phạm vi rộng và đan xem trong nhiều ngành, lĩnh vực.

- Về thông tin, số liệu: Chưa đầy đủ, còn rời rạc, chưa có tập hợp được đầu mối; cơ chế chia sẻ, cập nhật thông tin giữa các ngành còn hạn chế.

- Về kinh phí: Kinh phí đầu tư khá lớn, trong khi TP phải giải quyết cơ sở hạ tầng giao thông, chống ngập, xử lý chất thải… và cá vấn đề xã hội khác.

- Nguồn kinh phí hỗ trợ từ quốc tế cũng có giới hạn.

6. Định hướng chương trình phát thải carbon thấp

1) Tuyên truyền CBCC, cộng đồng, doanh nghiệp về các hoạt động giảm phát thải KNK.

2) Triển khai hoạt động kiểm kê KNK 2 năm/lần vào năm chẵn.

3) Triển khai thí điểm hoạt động giảm phát thải KNK NAMA/MRV. Lồng ghép các hoạt động này trong Kế hoạch thực hiện chiến lược Tăng trưởng xanh.

4) Từng bước xây dựng thể chế, chính sách để tạo hành lang pháp lý và tăng cường sự tham gia của cộng đồng.

5) Xây dựng và triển khai các chương trình, dự án trên cả hai mục tiêu, thích ứng và giảm thiểu BĐKH.

6) Tăng cường hợp tác quốc tế trên lĩnh vực giảm thiểu BĐKH: chuyển giao công nghệ, tái sinh năng lượng, năng lượng tái tạo.

CHÂN THÀNH CẢM ƠN

Giới thiệu Dự án thúc đẩy hợp tác phát triển Cacbon thấp Trong khuôn khổ hợp tác giữa TP.HCM và TP.Osaka

2st Workshop on the Promotion of Low Carbon Development under Ho Chi Minh City - Osaka City Cooperation Project for Developing Low Carbon City

22 tháng 01 năm 2018
Sở Tài nguyên và Môi trường thành phố Hồ Chí Minh

January 22th , 2018
HCMC Department of Natural Resources and Environment

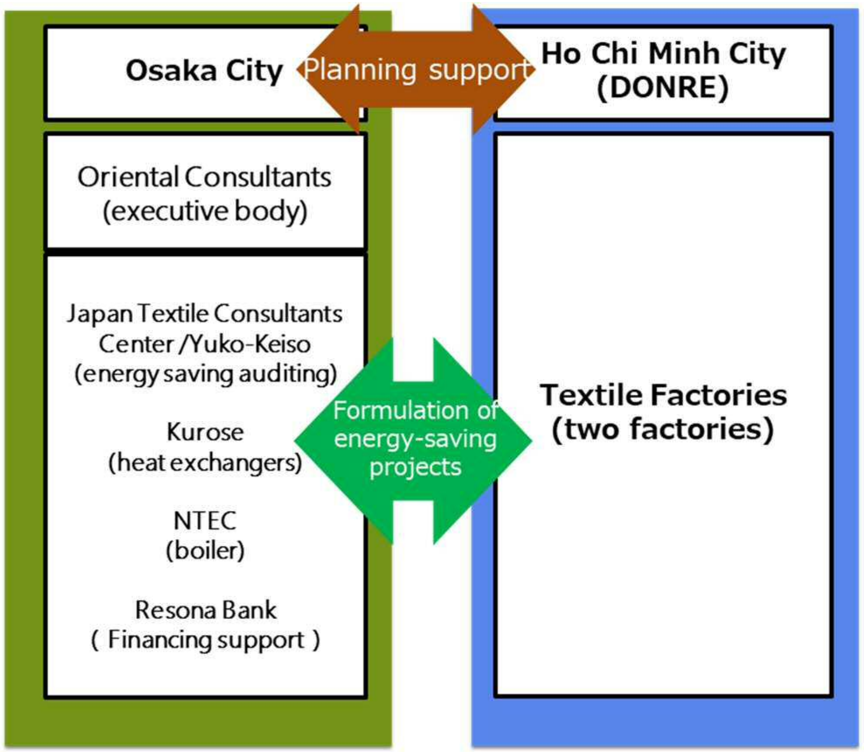
Outcome of the JCM Feasibility Study under Cooperation between Ho Chi Minh and Osaka

Osaka City
Oriental Consultants Co., Ltd
Japan Textile Consultants Center
Kurose Chemical Equipment Co., Ltd
Nippon Thermoener Co., Ltd
Yuko-Keiso Co., Ltd
Resona Bank Ltd

Study Outline

ORICONSUL

- Conduct energy auditing in textile factories in Ho Chi Min City to confirm energy saving potentiality for
  - Introduction of high efficiency boilers
  - Heat recovery from the waste water of dyeing process through application of heat exchangers.
- Organize workshops on the promotion of JCM projects in Ho Chi Minh.



Energy Auditing

- Targets factories:
- Schedule: Sep.25~29, 2017 (two days for each)
- Objectives:
  - ✓ Observe operation condition of boilers
  - ✓ Confirm operation condition of dyeing, washing and other machines
  - ✓ Observe the volume and temperature of waste water and clean supply water

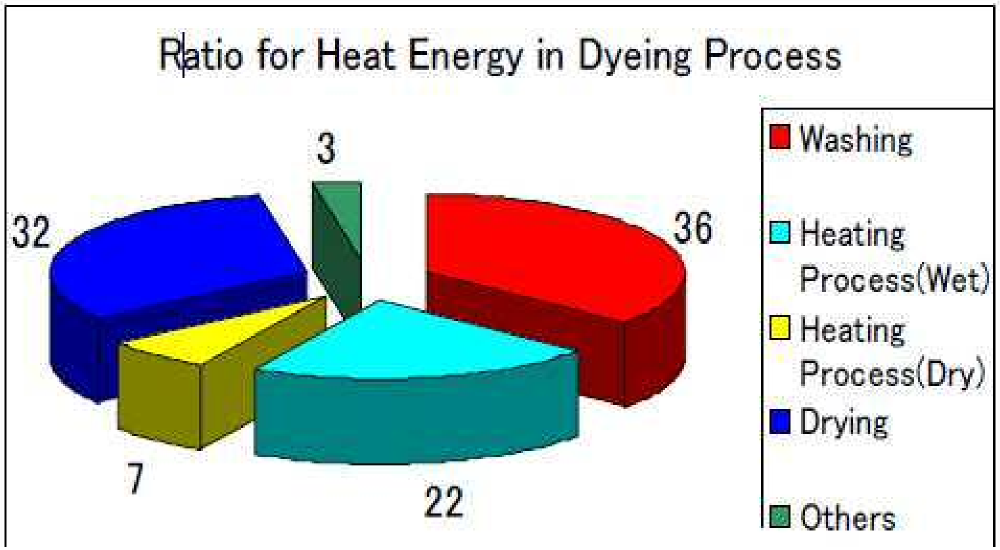
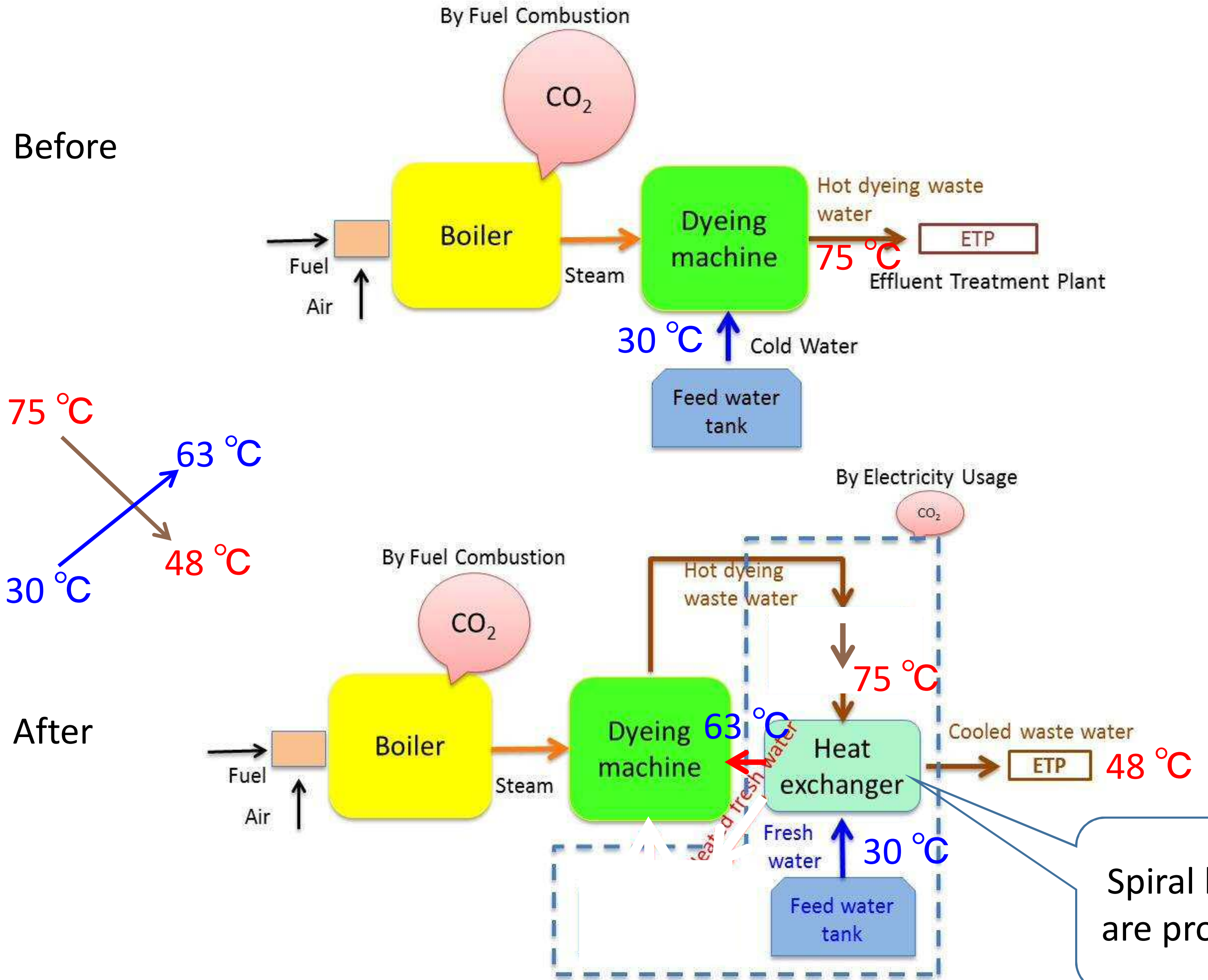


Image of Waste Energy Recovery



Spiral heat exchangers are provided by Kurose

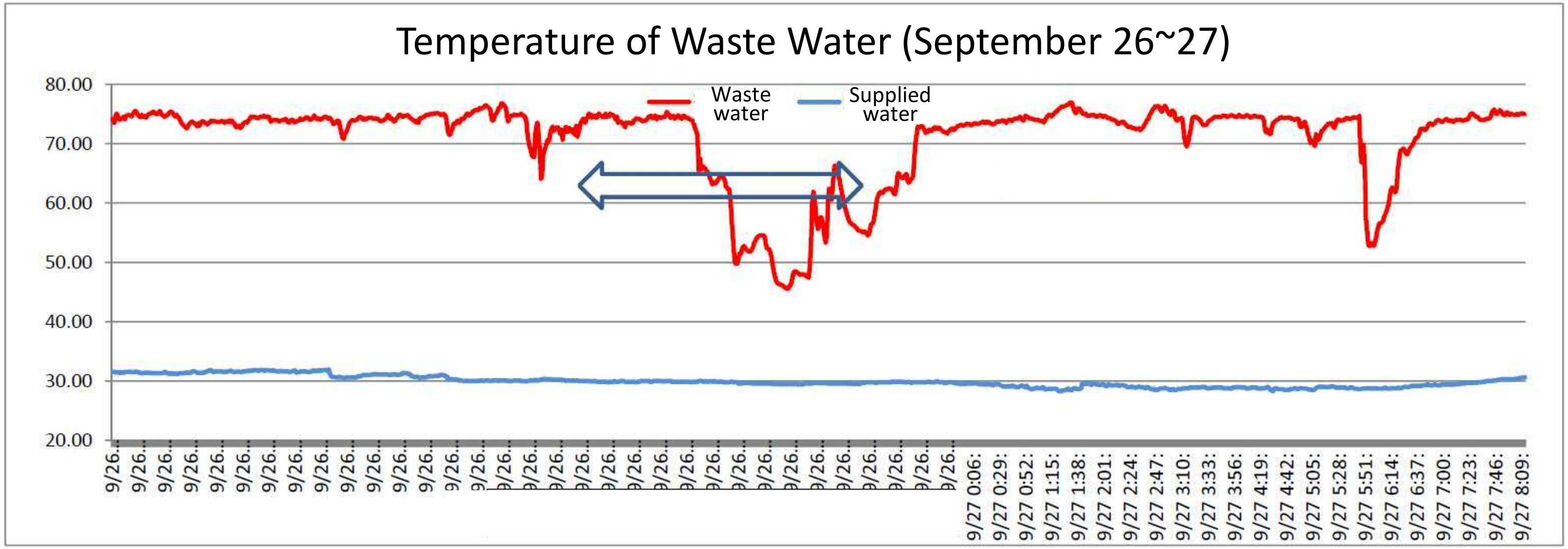
Energy Auditing

☐ Temperature of waste water from scouring and bleaching machines.

Supplied water: 30℃

± 45 ℃

Waste water: 75 ℃ (average)



Energy Auditing

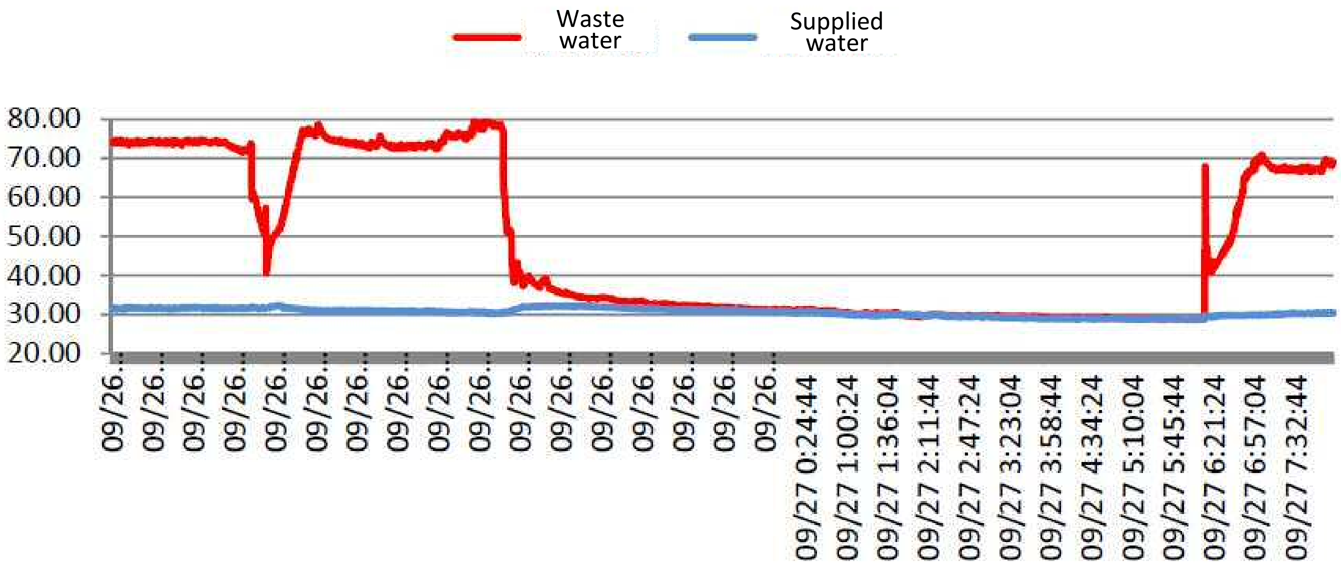
- Temperature of waste water from dyeing machines.

Supplied water: 30℃

± 45 ℃

Waste water: 75 ℃ (average)

Temperature of Waste Water (September 26~27)



Energy Recovery

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Potential Waste Energy (TJ/year)

Waste water flow rate	Amount of waste water	Average temperature of waste water	Temperature of supplied water	Working days and machine operation rate	Potential heat energy
32 ton/h	768 ton/day	75 ℃	30 ℃	300 days/year and 50%	**21 TJ/year**

The specific heat of water:4.184 kJ/kg･℃

Outcome of the hear exchanger

Waste water inlet temperature (℃)	75
Supply water inlet temperature (℃)	30
Surface area of heat exchanger (m^2)	56
Waste water outlet temperature (℃)	48
Supply water outlet temperature (℃)	63
Supply water flow rate (ton/h)	24

13 TJ/year

Energy can be recovered by using a heat exchanger with 60 % efficiency

Boiler efficiency	70%
Net caloric value of coal (Kcal/kg)	5,900
Coal CO_2 emission factor (t C02/TJ)	87.3
Coal saved (t/year)	759
CO_2 reduction (t/year)	1,134

Investment Analysis

Total Cost of Waste Heat Recovery System Introduction

Unit: 10 thousand Japanese yen (¥)

Heat exchanger (one unit)	Pumps, flow and temperature meters , control panel and their installation	Packaging and transportation	Custom and other taxes	Total

(The price of imported coal in Vietnam will be $87 per ton during the period 2016-2020 and $96 per ton in the following five years).Vietnam Investment Review: http://www.vir.com.vn/moit-proposing-to-import-coal.html

With 50% subsidy

No	Items	Total	Construction Period										
			0	1	2	3	4	5	6	7	8	9	10
1	Cash inflow	7,590	0	759	759	759	759	759	759	759	759	759	759
1.1	Saved coal cost	7,590	0	759	759	759	759	759	759	759	759	759	759
2	Cash outflow	1,794	1,294	50	50	50	50	50	50	50	50	50	50
2.1	Initial cost	1,294	1,294	0	0	0	0	0	0	0	0	0	0
2.2	Maintenance	500	0	50	50	50	50	50	50	50	50	50	50
3	Net cash flow	**5,796**	-1,294	709	709	709	709	709	709	709	709	709	709

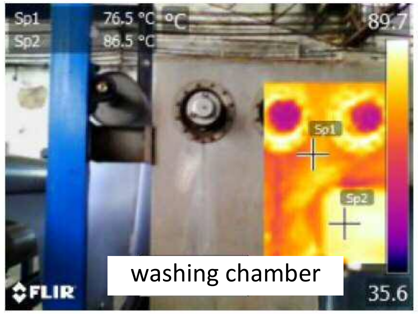
Payback period (year)	1.8
Net benefit	5,796
IRR	54%

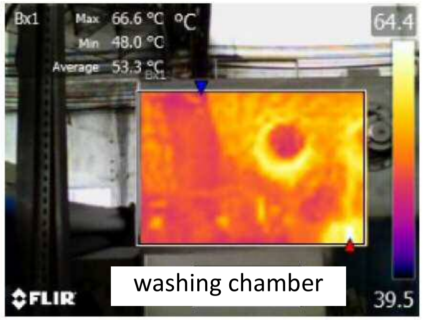
Energy Auditing

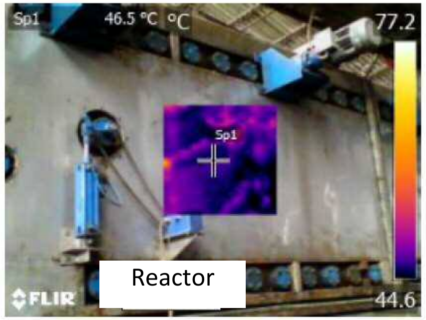
ORICONSUL

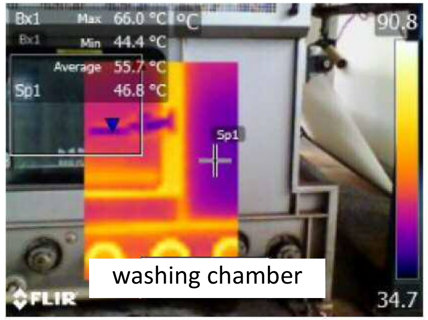
☐ Insulation of scouring and bleaching machines

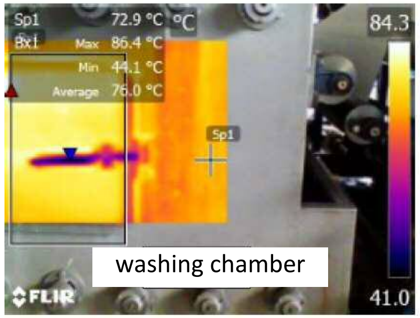
- ✓ Insulation of washing chamber and cylinder also helps saving energy from the process

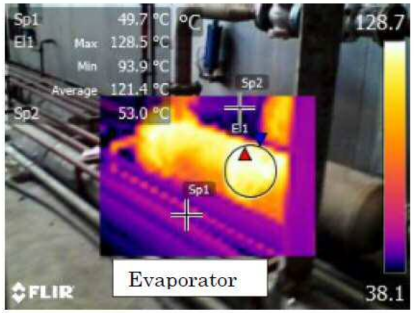


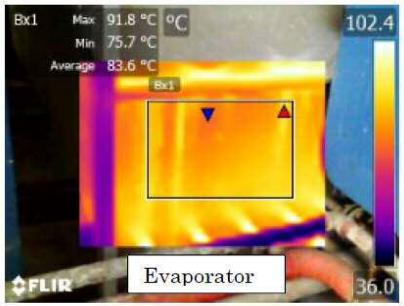












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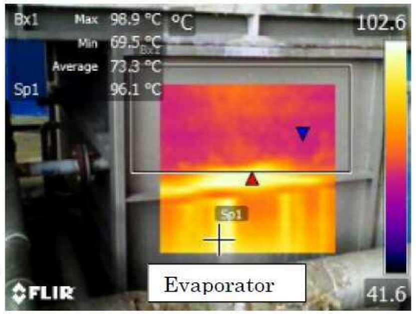
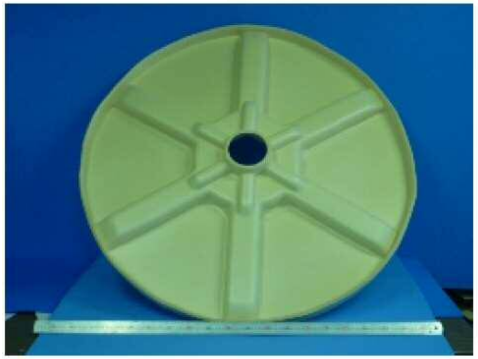


Insulation Materials

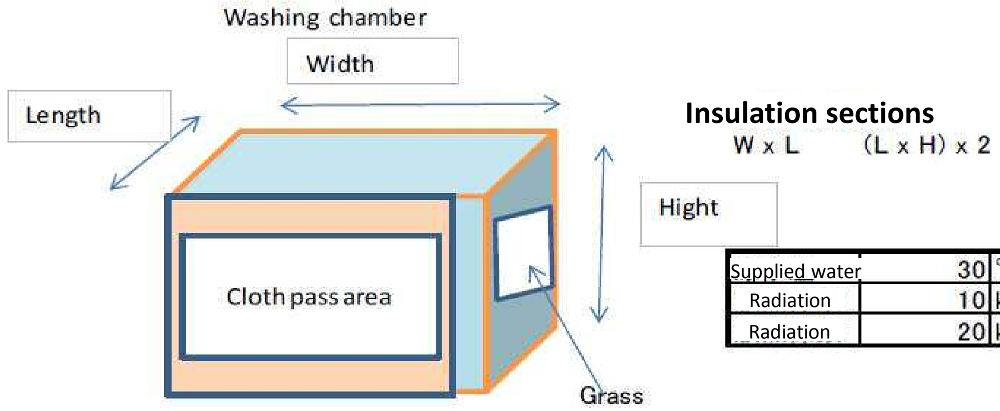
For cylinder



For washing chamber

Energy Auditing

☐ Energy saving and emission reduction



Supplied water	30	℃	
Radiation	10	kcal/m2-h	Chamber
Radiation	20	kcal/m2-h	Cylinder

Total radiation	Insulation efficiency	Working days and machine operation rate	Cal/joule	Potential energy can be saved
138,408 kcal/h	80%	300 days/year and 50%	4.184	**1.6 TJ/year**

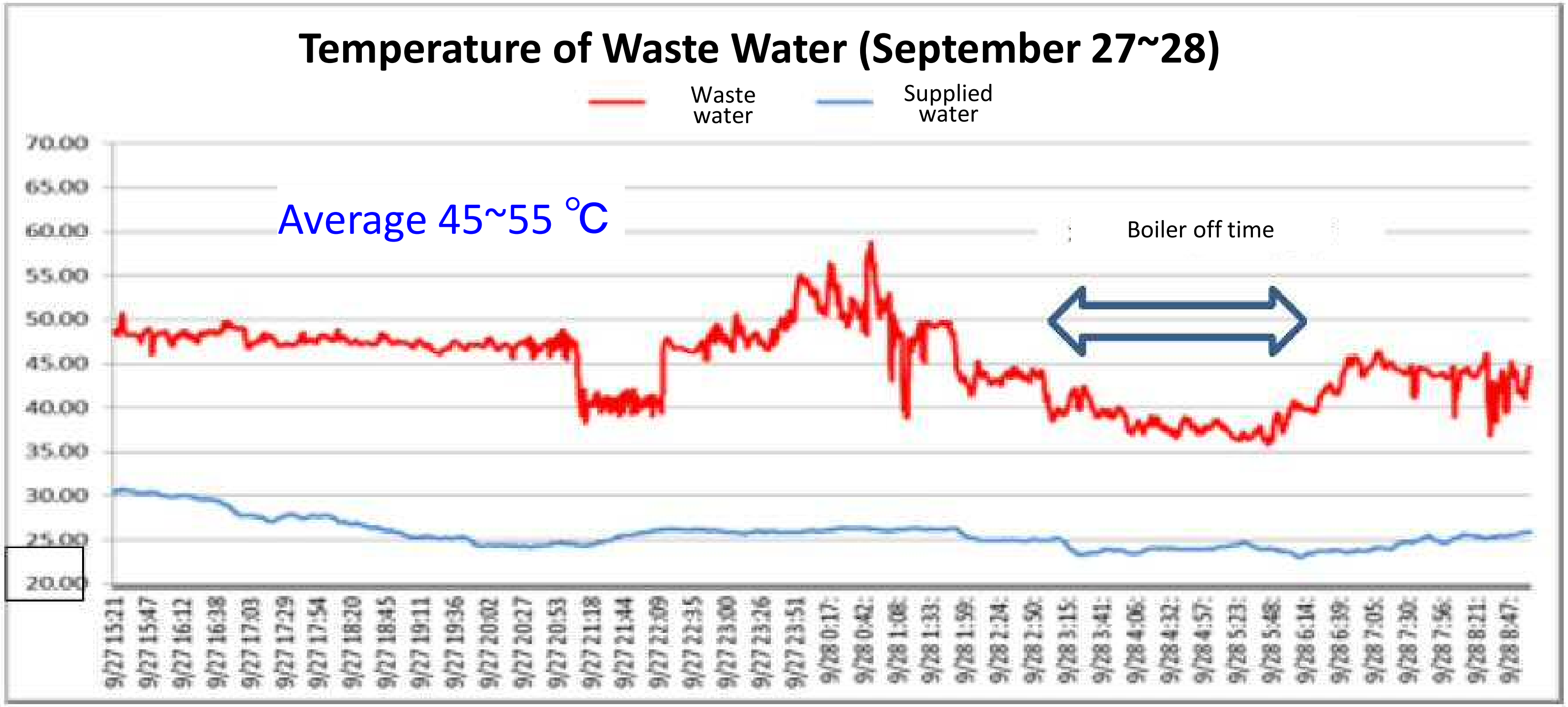
Boiler efficiency	70%	Total cost= ¥3,035 thousand
Net caloric value of coal (Kcal/kg)	5,900	The coals price is ¥10,000 /ton (field survey) =>
Coal CO_2 emission factor (t C02/TJ)	87.3	¥960 thousand /year can be saved.
Coal saved (t/year)	96	The cost can be payback in nearly 3 years.
CO_2 reduction (t/year)	139	

Cylinder Dryer Insulation Cost/piece

Washing trough Insulation cost=

Energy Auditing

- Temperature of all waste water from scouring, bleaching and dyeing machines.



This is the temperature of all waste water from process machines and measured at the point outside of the workshop. The temperature of waste water at the dropping point of machines is far higher than the above temperature.

Energy Recovery

ORICONSUL

Potential Waste Energy (TJ/year)

Machines	Waste water flow rate	Average temperature of waste water	Temperature of supplied water	Working days and machine operation rate	Potential heat energy
Scouring	9 ton/h	89 ℃	30 ℃	300 days/year and 40%	**6 TJ/year**
Mercerize	12ton/h	75 ℃	30 ℃	300 days/year and 25%	**4 TJ/year**
Dyeing	9ton/h	90 ℃	30 ℃	300 days/year and 40%	**6 TJ/year**

The specific heat of water:4.184 kJ/kg･℃

Heat Exchanger Outcome

Waste water inlet temperature (℃)	83.5
Supply water inlet temperature (℃)	30
Surface area of heat exchanger (m^2)	56
Waste water outlet temperature (℃)	51
Supply water outlet temperature (℃)	71
Supply water flow rate (ton/h)	24

10 TJ/year
energy can be recovered by using a heat exchanger with 60 % efficiency

Boiler efficiency	70%
Net caloric value of coal (Kcal/kg)	5,900
Coal CO_2 emission factor (t C02/TJ)	87.3
Coal saved (t/year)	583
CO_2 reduction (t/year)	873

Investment Analysis

Total Cost of Waste Heat Recovery System Introduction

Unit: 10 thousand Japanese yen

Heat exchanger (one unit)	Pumps, flow and temperature meters , control panel and their installation	Packaging and transportation	Custom and other taxes	Total

(The price of imported coal in Vietnam will be $87 per ton during the period 2016-2020 and $96 per ton in the following five years).Vietnam Investment Review: http://www.vir.com.vn/moit-proposing-to-import-coal.html

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No	Items	Total	Construction Period										
			0	1	2	3	4	5	6	7	8	9	10
1	Cash inflow	5,830	0	583	583	583	583	583	583	583	583	583	583
1.1	Saved coal cost	5,830	0	583	583	583	583	583	583	583	583	583	583
2	Cash outflow	1,684	1,184	50	50	50	50	50	50	50	50	50	50
2.1	Initial cost	1,184	1,184	0	0	0	0	0	0	0	0	0	0
2.2	Maintenance	500	0	50	50	50	50	50	50	50	50	50	50
3	Net cash flow	**4,146**	-1,184	533	533	533	533	533	533	533	533	533	533

Payback period (year)	2.2
Net benefit	4,146
IRR	44%

Energy Recovery

Potential Waste Energy (TJ/year)

Machines	Waste water flow rate	Average temperature of waste water	Temperature of supplied water	Working days and machine operation rate	Potential heat energy
Boiler scrubber	10 ton/h	52 ℃	28 ℃	300 days/year and 50%	**3.6 TJ/year**

The specific heat of water:4.184 kJ/kg･℃

Heat Exchanger Outcome

Waste water inlet temperature (℃)	52
Supply water inlet temperature (℃)	28
Surface area of heat exchanger (m^2)	56
Waste water outlet temperature (℃)	40
Supply water outlet temperature (℃)	47
Supply water flow (ton/h)	6

1.8 TJ/year
energy can be recovered by using a heat exchanger with 50 % efficiency

Boiler efficiency	70%
Net caloric value of coal (Kcal/kg)	5,900
Coal CO_2 emission factor (t C02/TJ)	87.3
Coal saved (t/year)	105
CO_2 reduction (t/year)	157

Investment Analysis

Total Cost of Waste Heat Recovery System for Dyeing machines and Boiler Scrubber

Unit: 10 thousand Japanese yen

Heat exchanger (two unit)	Pumps, flow and temperature meters , control panel and their installation	Packaging and transportation	Custom and other taxes	Total

(The price of imported coal in Vietnam will be $87 per ton during the period 2016-2020 and $96 per ton in the following five years).Vietnam Investment Review: http://www.vir.com.vn/moit-proposing-to-import-coal.html

With 50% subsidy

No	Items	Total	Construction Period											
			0	1	2	3	4	5	6	7	8	9	10
1	Cash inflow	7,568	0	688	688	688	688	688	688	688	688	688	688
1.1	Saved coal cost	7,568	688	688	688	688	688	688	688	688	688	688	688
2	Cash outflow	2,589	2,089	50	50	50	50	50	50	50	50	50	50
2.1	Initial cost	2,089	2,089	0	0	0	0	0	0	0	0	0	0
2.2	Maintenance	500	0	50	50	50	50	50	50	50	50	50	50
3	Net cash flow	**4,979**	-2,089	638	638	638	638	638	638	638	638	638	638

Payback period (year)	3.3
Net benefit	4,979
IRR	28%

Energy Auditing

- Energy saving and emission reduction from insulation of scouring, mercerize and dyeing machines.

Total radiation	Insulation efficiency	Working days and machine operation rate	Cal/joule	Potential energy can be saved
153,962 kcal/h	80%	300 days/year and 50%	4.184	**1.8 TJ/year**

Boiler efficiency	70%	Total cost= ¥1660 thousand/year
Net caloric value of coal (Kcal/kg)	5,900	The coals price is ¥10,000/ton (field survey) =>
Coal CO_2 emission factor (t C02/TJ)	87.3	¥1,570 thousand /year can be saved.
Coal saved (t/year)	107	The cost can be payback within 2 years.
CO_2 reduction (t/year)	157	

Cylinder Dryer Insulation Cost/piece=

Washing trough Insulation cost=

Scheme of JCM Model Project

- JCM model projects can be benefited from the financial support up to 50% of investment cost including facilities, equipment and vehicles, which contribute to reduction of CO2 emission as well as cost for installing these facilities.

JCM Project Implementation

- Points to be considered to implement JCM model project
  - ✓ Investment decision of the factories and preparation of the finance
  - ✓ Agreement on the formulation of international consortium between representative participant and the factories.
  - ✓ Agreement on the Allocation of Joint Crediting Mechanism(between the members of the international consortium)
  - ✓ Project implementation plan and schedule
  - ✓ Financing plan
- Next actions
  - ✓ Confirm the schedule of MoE Japan's open recruitment for public JCM model project
  - ✓ Prepare related documents
  - ✓ Other things as necessary

JCM Project Preparation Flow

ORICONSUL

January

- Cost Estimation
- Business Model

February

Decision Making

May

- Formulation of the Consortium
- Preparation for JCM Application

Action Plan Support

- In order to facilitate HCMC CCAP by sharing knowledge and know-how through international cooperation such JCM, a list of outline of projects is developed under the study.

<u>Example of project outline</u>

Energy Efficient Boiler			
Category	Energy saving	Project Type	JCM model project
Name of Project	Introduction to energy efficient boiler in factories		
Project outline	Promote energy saving in factories by introducing energy efficient boilers. Employing a boiler through their rehabilitation or replacement will result in a reduction of fossil fuel consumption and related CO2 emissions.		
Visual Description	 Once-through boiler ■ High Efficiency ■ Low cost for maintenance ■ Compact ■ Monitoring system		
Operation and Features	Nippon Thermoener is a manufacturer of boilers and provides high efficient boilers, such as steam boilers, hot-water heaters, and heat medium boilers, and other energy-saving and environmentally friendly equipment and systems.		
Examples of Implementation	Various factories such as textile, food processing and so on.		

Future City-City Cooperation Projects

Osaka City Government

Development of a Low Carbon City MOU Signing Between Ho Chi Minh City and Osaka City

6 September 2016
Ho Chi Min City

1. **Development of human resources**
2. **Sharing professional skills and knowledge on low-carbon and Environmental conservation measures**
3. **Creating new projects toward the realization of a low-carbon city**
4. **Promoting public awareness and dissemination of information on the prevention of global warming**
5. **Implementation of annual policy dialogues between Mayor offices toward the development of a low-carbon city in Ho Chi Minh**

Dialogue between Mayor Offices

16 October 2017
Osaka City

Future City-City Cooperation Projects

- Project proposals in the field of energy
  ⇒Introduction of solar power generation system and energy saving technology
- Capacity building for administrative staff
- Improvement of public awareness for citizens and businesses

Thank you very much