BillionGroup Technologies Ltd.
兆豐科技設備有限公司

Green Project Opportunities in Hong Kong and China

Speaker: Prof. Ir Steve S.F. Wong

Managing Director

The Development of BillionGroup with the Vision "To Shape Energy for a better World" since 1991

1991
Building Services Consultant

2000
Energy Consultant

2010
Energy & Environmental Consultant

2015
Energy, Environmental & Waste Consultant

NOW
2020
Energy , Environmental, Waste & Transport Consultant

Portfolio of BillionGroup

BillionGroup Technologies Ltd.
Based in Hong Kong

Energy & Environmental Consultant
(Listed Consultant with EACSB, HKSAR Government and Hengqin Authority, GBA, China)

umwelttechnik & ingenieure GmbH
Based in Germany

Waste Management Consultant

BUI Technologies Ltd.
Based in Hong Kong

Private Equity Fund for Green Projects Development, Operation & Maintenance

BGT Technologies Ltd.
Based in Hong Kong

Design, Build and Operation of Energy, Wastewater, Transport Infrastructures

BillionGroup Technologies Ltd.

Hong Kong Office, BillionGroup

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Prof. K.C. HO, BBS, JP

Director of Environment & Sustainability

Prof. K.L. TSANG, BBS, JP

Director of E&M System

Ir. Anthony W.S. YU

Director of Development

Ir. Y.B. WAI

Director of Infrastructure

Ir K.P. YIM, JP

Director of Building Services

Ir. Dicky K.F. LAI

Director of Logistics & Supply Chain

Prof. Ken CHUNG

Director of Air and Noise Control

Dr Ir. Peter Y.H. YAU

Director of Carbon and Environmental Management

Dr Ir. Shelley W.W. ZHOU

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Mr. Billy T. L. WONG, MSc (Energy & Environment), BEng (Hons)

Wastewater System Manager

Dr. Benjamin CHOW

Project Officer

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Ms. Mariana P.C. LAW, MSc (Social Science), B.S.W. (Hons)

Energy & Environmental Officer

Ms. Fanny T. T. LEE, BSc (Hons)

Germany Office, u&i

Chief Executive Officers and Representatives

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Dipl.-Ing. Nils Oldhafer

Power Engineering / Plant Construction

Dipl.-Ing. Bernd Dibke

(Operations and Supply Engineering)

Head of the Commercial Department Business Management

Cornelia Schücke

(Business Management)

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CLIENT REFERENCE

機電工程署 EMSD

渠務署 Drainage Services Department

路政署 HIGHWAYS DEPARTMENT

HONG KONG FERRY (HOLDINGS) COMPANY LIMITED
香港小輪（集團）有限公司

LEONARDO

華營建築有限公司
CR CONSTRUCTION COMPANY LIMITED
浙建集團

北京控股有限公司
BEIJING ENTERPRISES HOLDINGS LIMITED

中国港湾 CHINA HARBOUR

HKQAA
HONG KONG QUALITY ASSURANCE AGENCY
香港品質保證局

CLP 中電

Lloyd's Register

A-FONTANE

大昌行物流
DCH LOGISTICS

Wong's International Holdings Limited
王氏國際集團有限公司

CLIENT REFERENCE

AECOM

Environmental Protection Department
The Government of the Hong Kong
Special Administrative Region

ALBA

oetinger
aluminium

BSR

BIOTHAN®
Das GWV Bio-Erdgas

AVISTA OIL AG

MARS
petcare

STADTREINIGUNG HAMBURG

eew

CONTINENTAL

Koehler
PAPER GROUP

Käserei Champignon

RETIM
Ecologic Service S.A.

VW Kraftwerk GmbH
KP/LM

MVV Energie

MAP OF BUSINESS CONTACTS

BillionGroup Technologies Ltd.
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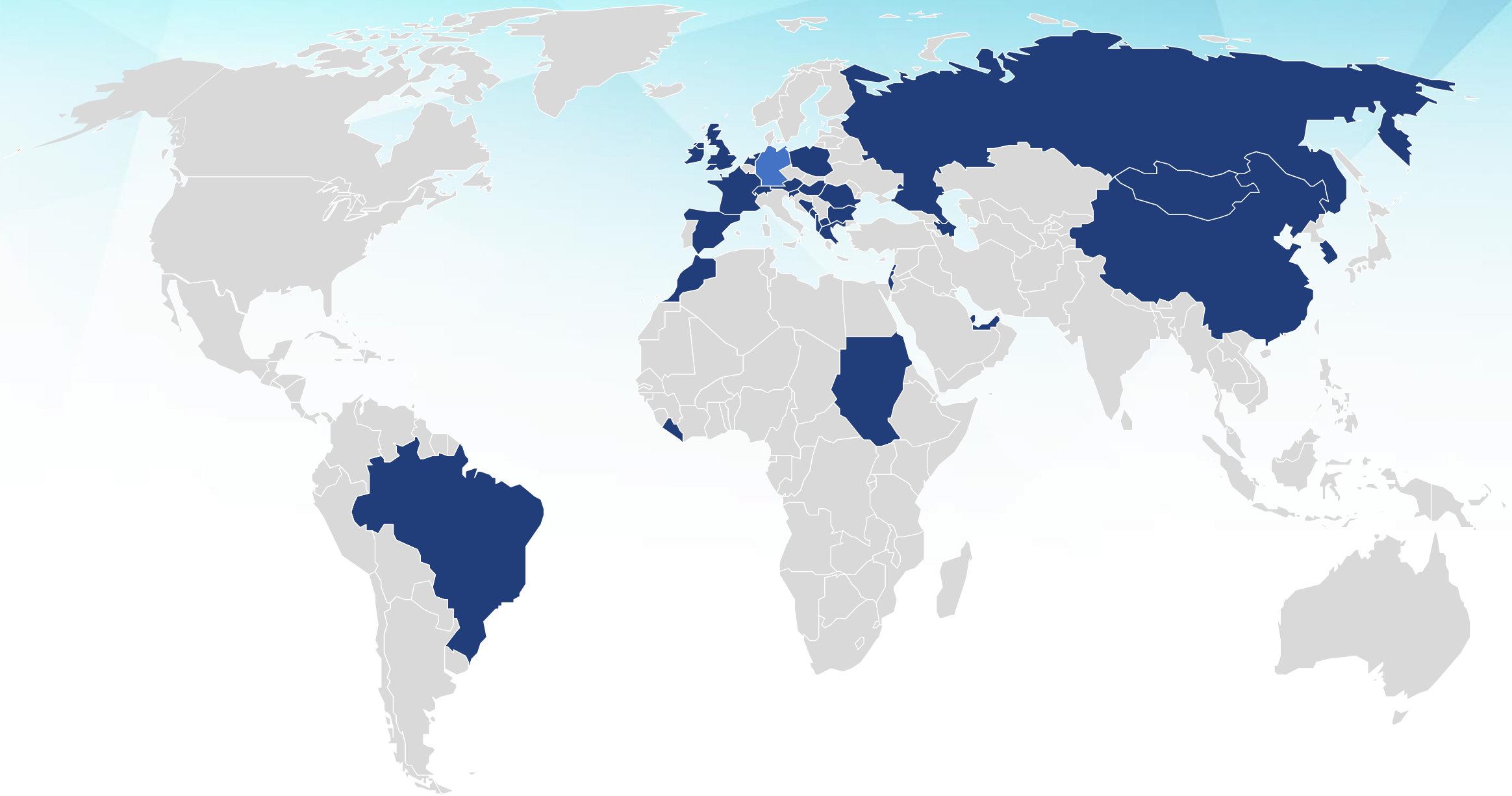

Why are there increasing Green Project Opportunities in Hong Kong and China?

The Fundamental Citizen's Rights according to China's Constitution

The National Constitution was updated in March 2018 to include environmental rights.

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Why are there increasing Green Project Opportunities in Hong Kong and China?

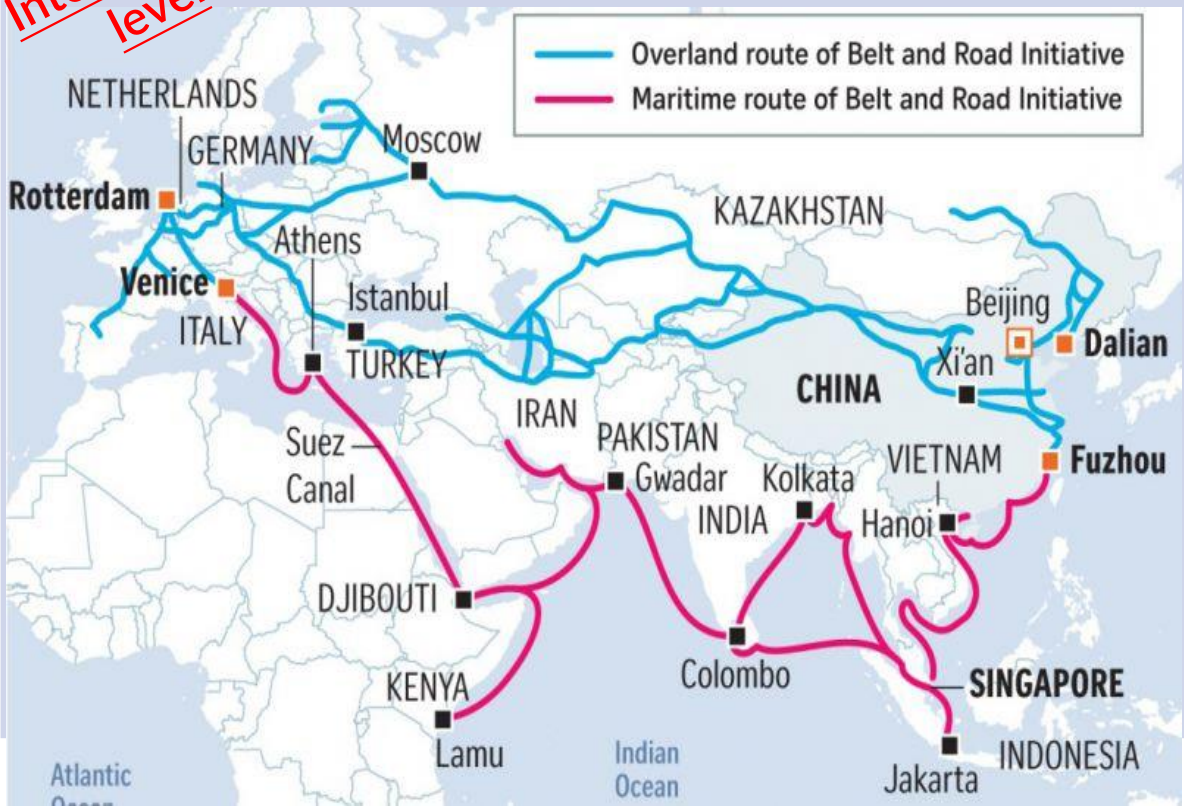
The Key Strategic Planning in China's development blueprint

Guangdong-Hong Kong-Macao Greater Bay Area

2 Regional level

Belt & Road Initiative

1 International level



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Why are there increasing Green Project Opportunities in Hong Kong and China?

National

China's Five-Year Plans
13th: 2016-2020
14th: 2021-2025

Regional

Greater Bay Area
Development Plan

Hong Kong

GREEN FINANCE
HKQAA

HKSAR Government
Green Finance

China's 13th Five-Year Plan (2016-2020)

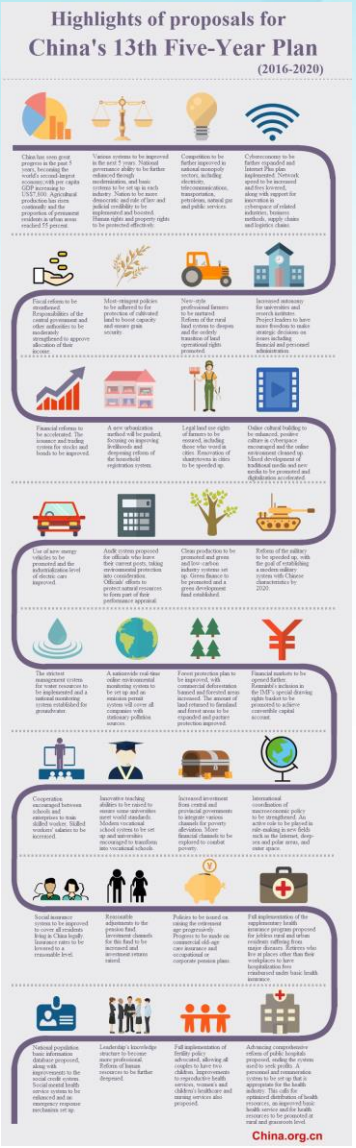
Major Objectives:

- Maintain a medium-high rate of growth
- Achieve significant results in innovation-driven development
- Further coordinate development
- Improve standards of living and quality of life
- Improve the overall caliber of the population and the level of civility in society
- **Achieve an overall improvement in the quality of the environment and ecosystems**
- Ensure all institutions become more mature and better established

China's 13th Five-Year Plan (2016-2020)

Part X – Ecosystems and the Environment includes…

- Promote Economical and Intensive Resource Use
  - Encourage the use of recycled water and advanced wastewater treatment and recycling
  - Arrange for the construction of resource recycling demonstration centers
  - Encourage the circular use of resources between production and society, and accelerate efforts to recycle resources from refuse
- Step Up Comprehensive Environmental Governance
  - Accelerate the development of urban refuse treatment facilities, improve refuse collection and transportation systems, increase the waste incineration rate, and ensure proper treatment of landfill leachate
- Develop Green and Environmentally Friendly Industries
  - Support the development of green services providers, expand the use of energy efficient and environmentally friendly products
  - Establish a green finance system, develop green credit and bonds, and launch green development funds



China's 14th Five-Year Plan (2021-2025)

Following the success of the 13th FYP, ideas proposed for the 14th FYP include…

- More state investments into green and sustainable production
- Slowdown in the country's energy consumption
  - Reduce coal's proportion of the primary energy mix
- Further decrease in carbon intensity
  - Carbon emissions cap
- Steady increase in the use of renewable energy resources
  - Wind and solar expansion

Numerous Green Project Opportunities in upcoming 14th Five-Year Plan!

Greater Bay Area (GBA)

- GBA comprises of the two Special Administrative Regions of Hong Kong and Macao, and the nine Pearl River Delta municipalities
- Objectives:
  - Further deepen cooperation amongst Guangdong, Hong Kong and Macao
  - Fully leverage the composite advantages of the three places
  - Facilitate in-depth integration within the region
  - Promote coordinated regional economic development
  - Develop an international first-class bay area ideal for living, working and travelling
- GBA is the **testbed** for China's Belt & Road Initiative (BRI)
  - 138 countries are part of the BRI
  - We can expect more projects in GBA with a focus on ecological civilization

Greater Bay Area Development Plan

Six Basic Principles:

- To be driven by innovation and led by reform
- To coordinate development and plan holistically
- **To pursue green development and ecological conservation**
- To open up and cooperate and achieve a win-win outcome
- To share the benefits of development and improve people's livelihood
- To adhere to "One Country, Two Systems" and at in accordance with the law

Greater Bay Area Development Plan

Chapter Seven – Taking Forward Ecological Conservation includes…

- To take forward cooperation in the management of water resources, water environment and water-related projects
- Strengthen the management of projects concerning land-based pollution discharge, water-related projects as well as the environment of coastlines and beaches
- To further promote clean production technologies
- To encourage conservation across the board and promote recycling
- Establish circular linkages between the use of resources and materials in industrial production and in everyday life
- Promote low-carbon travelling

Green Finance in Hong Kong

- Green Finance is the financing of investments that provide environmental benefits in the broader context of environmentally sustainable development
- With the growing awareness that **climate change** is a shared responsibility every person must pull their weight on, there is now a rising trend of investors favoring **environmentally ethical** projects over unethical ones
- As one of the world's leading international financial hubs, as well as the most open and international city in the GBA, Hong Kong plays an important role in supporting the economic development of the region
- Amid the tremendous funding needs for green infrastructural development on the Mainland and the opportunities arising from the Belt and Road Initiative, Hong Kong has the potential to grow the green finance market by offering a broader range of green investment products and acting as a hub for raising green capital to meet the needs of both green enterprises and investors

Green Finance in Hong Kong

- **The Hong Kong Government** is actively promoting the development of green finance. Under the **Government Green Bond Program**, the inaugural Green Bond with an issuance size of **US$1 billion** and a **tenor of 5 years** was successfully offered in **May 2019**.
- To make better use of Hong Kong's competitive capital markets and its sophisticated financial and professional services, the Government launched the **Green Bond Grant Scheme** in **June 2018** to **subsidize eligible green bond issuers** in obtaining certification under the Green Finance Certification Scheme established by the **Hong Kong Quality Assurance Agency**.
- The **Green Finance Certification Scheme – Green Fund** was launched in **September 2019** to **provide third-party conformity assessments** and **enhance transparency of investment process**.

GREEN FINANCE
HKQAA

Main Areas for Green Projects Opportunities

1.1 Types of Renewable Energy

Solar Power

Wind Power

Hydropower

1.2 Renewable Energy – Solar Photovoltaic System

Characteristics:

- New system, comprehensive utilization of solar energy resource with broad development prospects
- Small scale, significant power generation efficiency and internal rate of return (IRR)
- The power generation process is environmentally friendly, non-polluting & no noise
- Helps alleviate the problem of power shortage

1.2 Renewable Energy – Solar Photovoltaic System

Advantages:

- ✓ Help to conserve our environment
- ✓ Earn income via the Feed-in Tariff (FiT) Scheme
- ✓ Lower top floor temperature
- ✓ Drop on air conditioner (A/C) system running cost for over 60%

1.2 Renewable Energy – Solar Photovoltaic System

Two solar photovoltaic systems

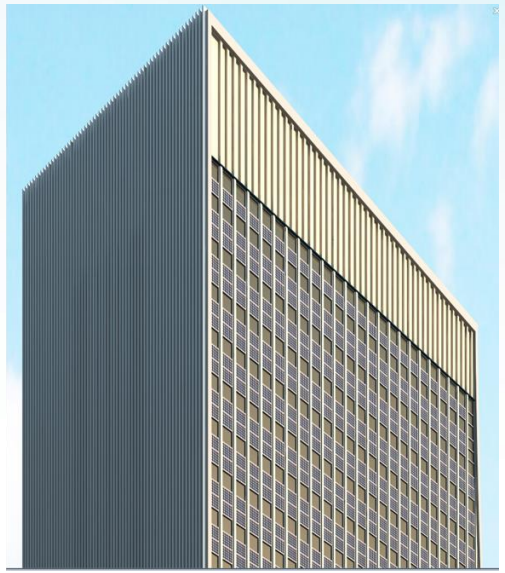
- Building Attached Photovoltaic (BAPV)
- Building Integrated Photovoltaic (BIPV)

	BAPV	BIPV
Types of Building	For Existing Buildings	For New Design Buildings
Application forms	Regular Solar systems that are generally installed on top of the building	Solar Cells integrated into the building envelop elements
Application	On top of the building, e.g., rooftop, curtain walls and ceilings, etc.	Integrate into the building envelop elements, e.g., construction materials as roof tiles and ceramic or glass facades
Extra space for installation	Required	Not required
Advantages	• Simple Installation and Maintenance	• Saves building material and construction cost • Aesthetic and functional • Larger available area for installation (e.g. building facades rather than just rooftops)

1.2 Renewable Energy – Solar Photovoltaic System

Examples:

BAPV



(photo of partial enlargement)

Xi’an Conservatory of Music

BIPV

Rooftop Application

Glass Curtain Application

Parking Shed Application

2.1 Wastewater Treatment – Circular Economy

Wastewater

Industrial Factories

Water Treatment Facility

Clean Water

Coal for incineration

Dry Sludge Coal

Dewatered Sewage Sludge

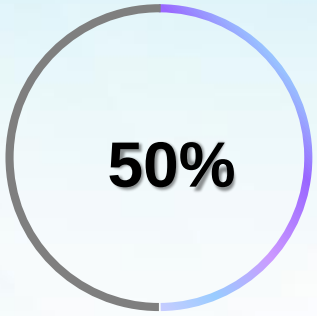
Phosphorous recovery

Fertilizer

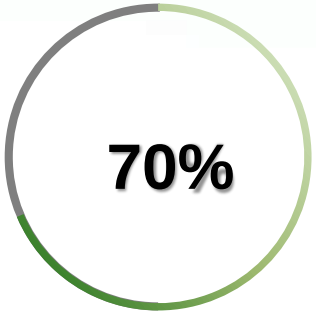
2.2 Wastewater Treatment – Innovative Technologies

Significant Savings

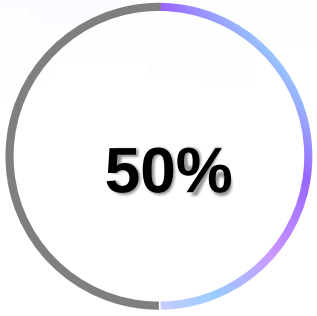
Less Land-use Footprint



Less Waste Sludge Discharge



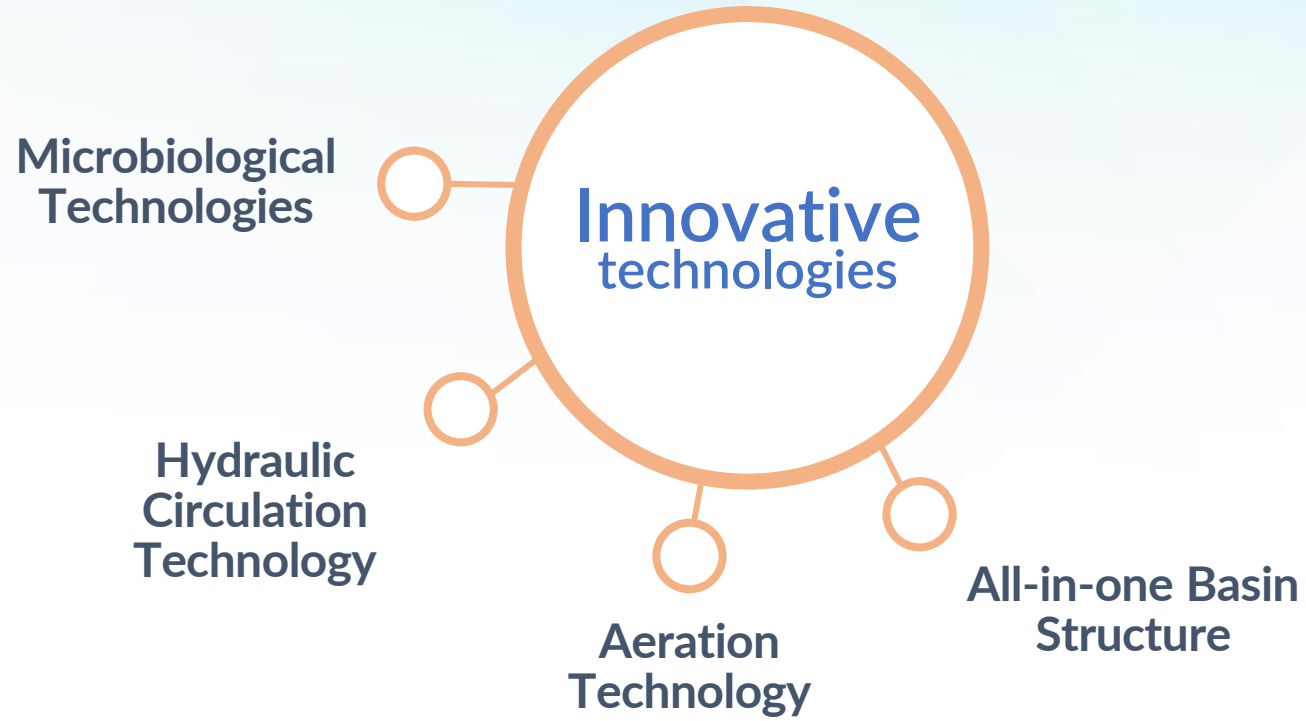
Less Operation & Maintenance Cost



Less Power Consumption
(and CO_2 emission)

2.2 Wastewater Treatment – Innovative Technologies

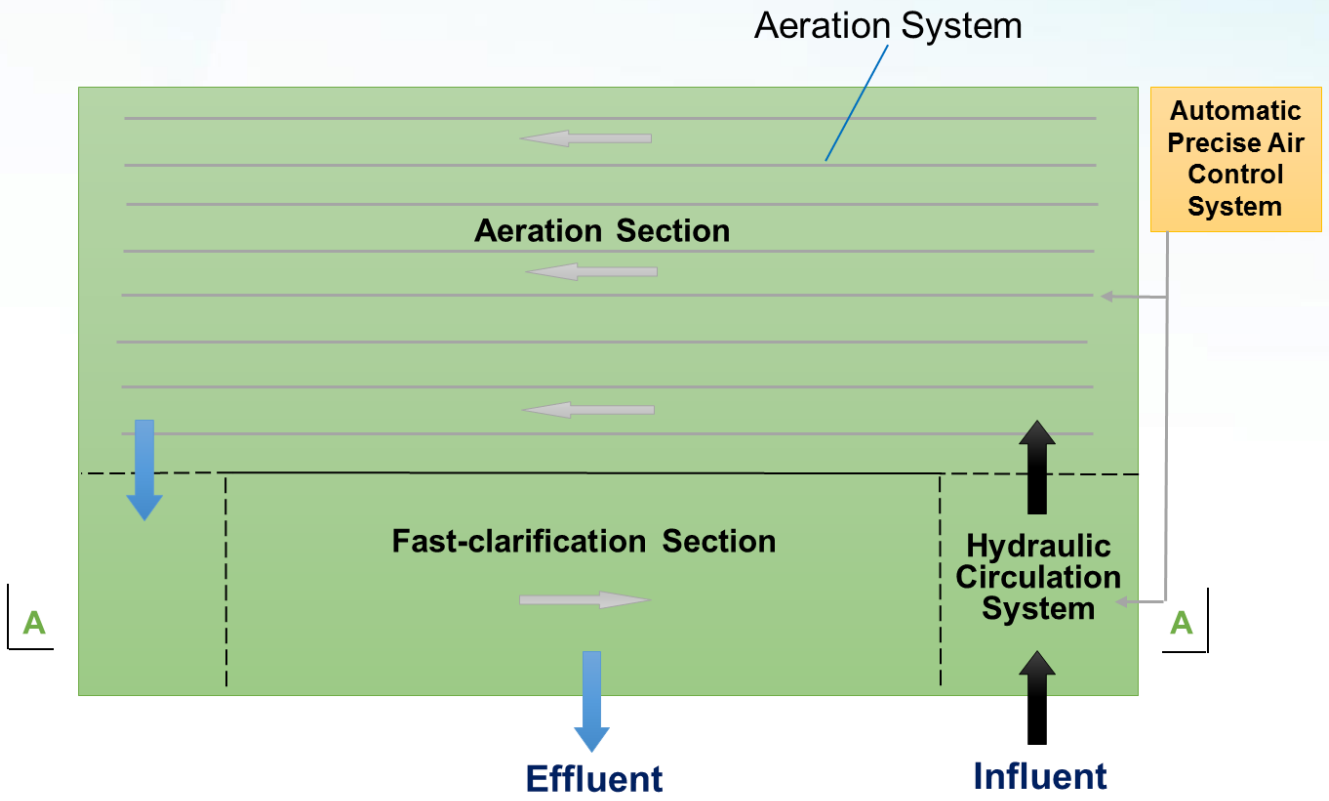
Biological Wastewater Treatment Technology



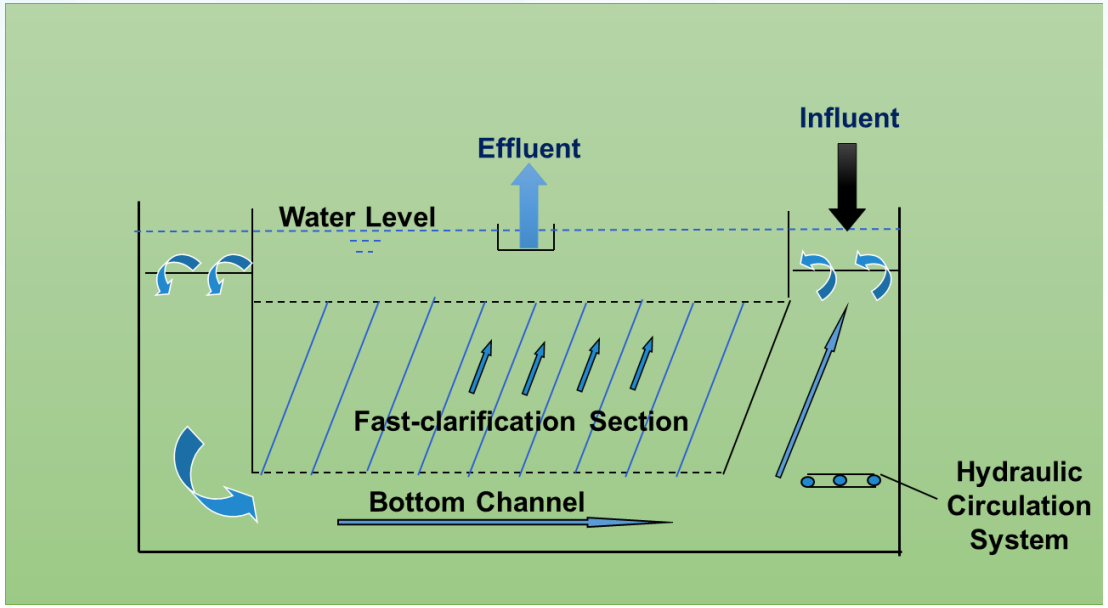
2.2 Wastewater Treatment – Innovative Technologies

Biological Wastewater Treatment Technology

- All-in-One Basin Structure



A Section Profile Chart



2.2 Wastewater Treatment – Innovative Technologies

Biological Wastewater Treatment Technology

Target of Conventional Aeration

Actual Effect of Conventional Aeration

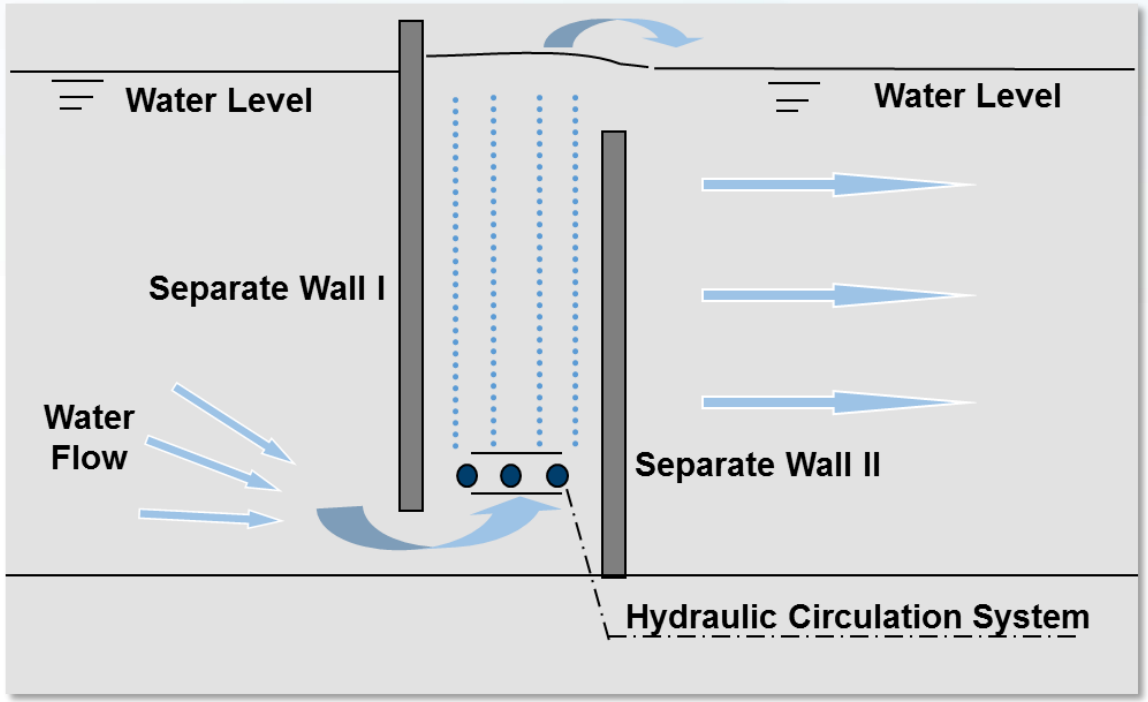
Actual Effect of Our Aeration

	A/O, SBR, OD Process	**Our Process**
Up-flow velocity	1.0 m/s	**0.4 m/s**
Aerated amount	3.5-5.0 $m^3/m \cdot h$	**0.5-0.7 $m^3/m \cdot h$**
SOTE	20%	**48%**
Fine Bubble Micro-mixing with Bacteria		

2.2 Wastewater Treatment – Innovative Technologies

Biological Wastewater Treatment Technology

- Hydraulic Circulation Technology: Airlift Circulation System
  - ✓ High influent diluting ratio
  - ✓ Increase impact resistance
  - ✓ Fine living environment for bacteria
  - ✓ Low air volume needed, 5% blower capacity



2.2 Wastewater Treatment – Innovative Technologies

Biological Wastewater Treatment Technology

Prominent Advantages:

✓ **Low Construction Cost and Less Land Footprint**
- Integrated All-in-One Structure

✓ **Excellent Performance**
- High biomass concentration (8g/L)
- Mainstream SND
- High impact resistance

✓ **Energy Saving**
- Reduced power consumption for aeration and hydraulic circulation

✓ **Low Operation Maintenance Cost**
- Non-stop self-cleaning mechanism
- Low excess sludge

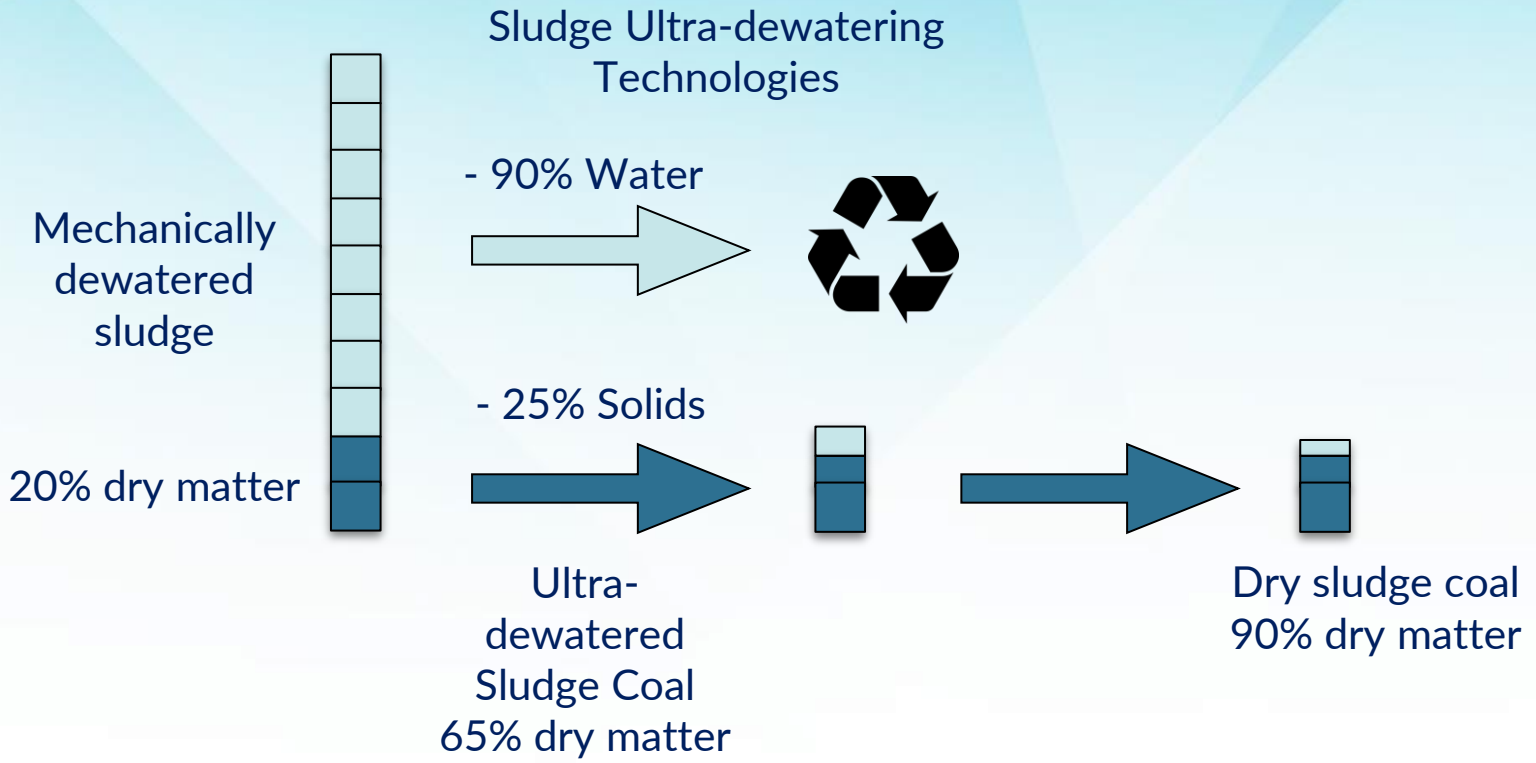
	Conventional Processes (CASS、AAO、OD)	Our Process
Blueprint Area (m^2/m^3)	0.7 ~ 0.9	**0.4 ~ 0.5**
Operating Cost (RMB/m^3)	0.22 ~ 0.25	**0.12 ~ 0.17**
DO (mg/L)	2~4	**0.3**
MLSS (mg/L)	2,000~4,000	**6,000~8,000**
Gas-Water Ratio	6 ~ 8	**3 ~ 4**
Effective Depth of Water (m)	4 ~ 5	**5.5 ~ 6**
Minimum Operating Temperature(℃)	10 ℃	**7 ℃**

2.2 Wastewater Treatment – Innovative Technologies

Sludge Ultra-dewatering Technology

What is Wastewater Treatment Sludge?

- Residue from Wastewater Treatment with (almost) all pollutants
- Consists of feces and bio-sludge from treatment process
- 70-80% water content



Problems if sludge is not treated:
- High disposal cost
- Energy-consuming incineration necessary for safe disposal

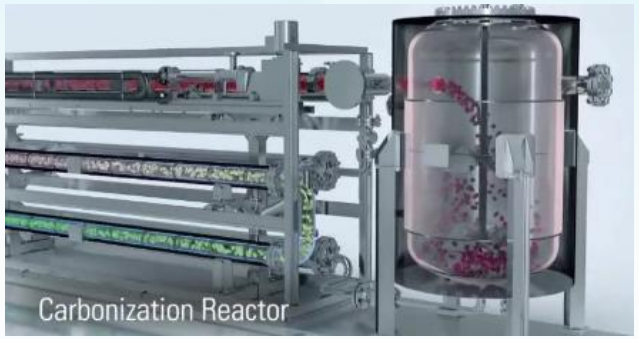
Sludge Ultra-dewatering Technology allows for:
- Less disposal cost
- Energy recovery
- Recovery of Phosphorous

2.2 Wastewater Treatment – Innovative Technologies

Sludge Ultra-dewatering Technology

The Process

1. Dewatered Sewage Sludge



2. Carbonization to Coal Slurry

3. Coal Slurry

4. Ultra Dewatering

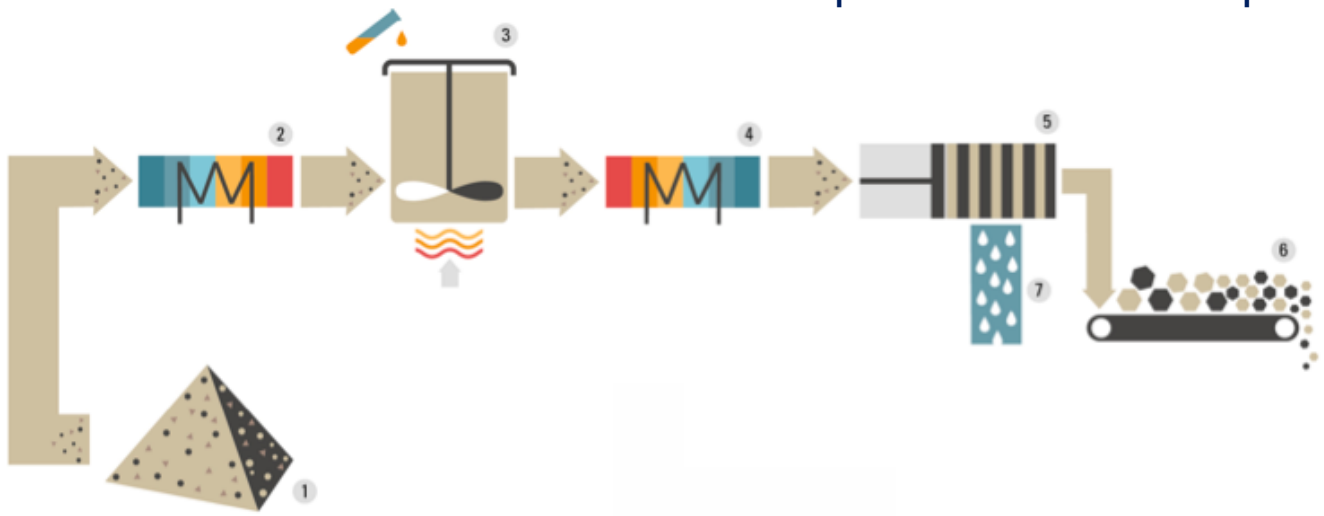
5. Dry Sludge Coal

2.2 Wastewater Treatment – Innovative Technologies

Sludge Ultra-dewatering Technology

Advantages:

- ✓ **Completely continuous process**
- ✓ Minimal number of valves and pumps
- ✓ Stable pressure and temperature levels
- ✓ No lag time through batch process
- ✓ No loss of condensate like steam injection
- ✓ Ultra-dewatering in automated filter press with optional vacuum evaporation



2.2 Wastewater Treatment – Innovative Technologies

- Reference: Shaoxing Dyestuff Industrial Park

- Reference: CNPC Group Acrylonitrile Plant WWTP

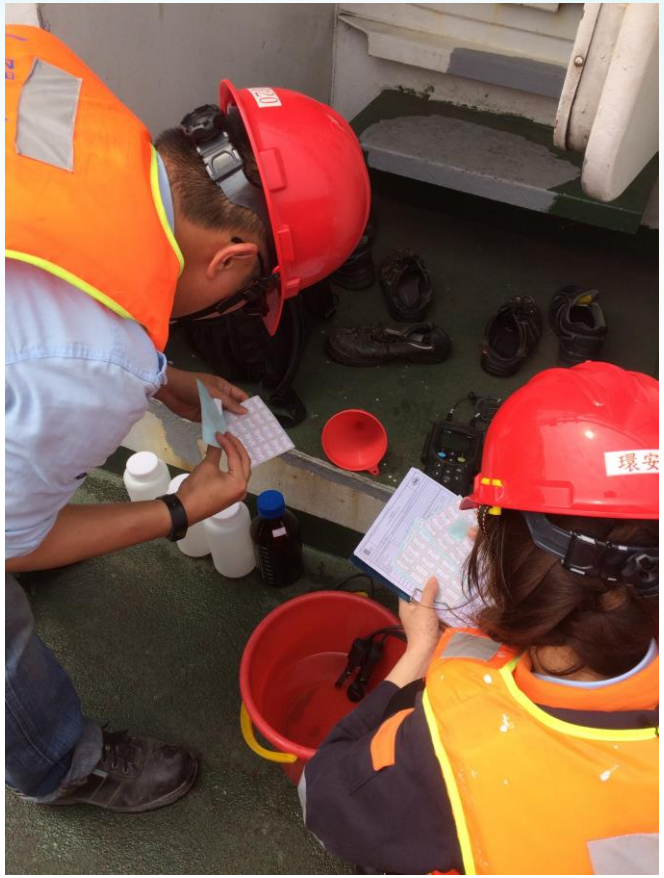
2.3 Wastewater Treatment – Water Management

Assist a steel factory in Vietnam to

1. Investigate the cause of water pollution
2. Carry out the water quality monitoring plan
3. Set up the mitigation measure

2.3 Wastewater Treatment – Water Management

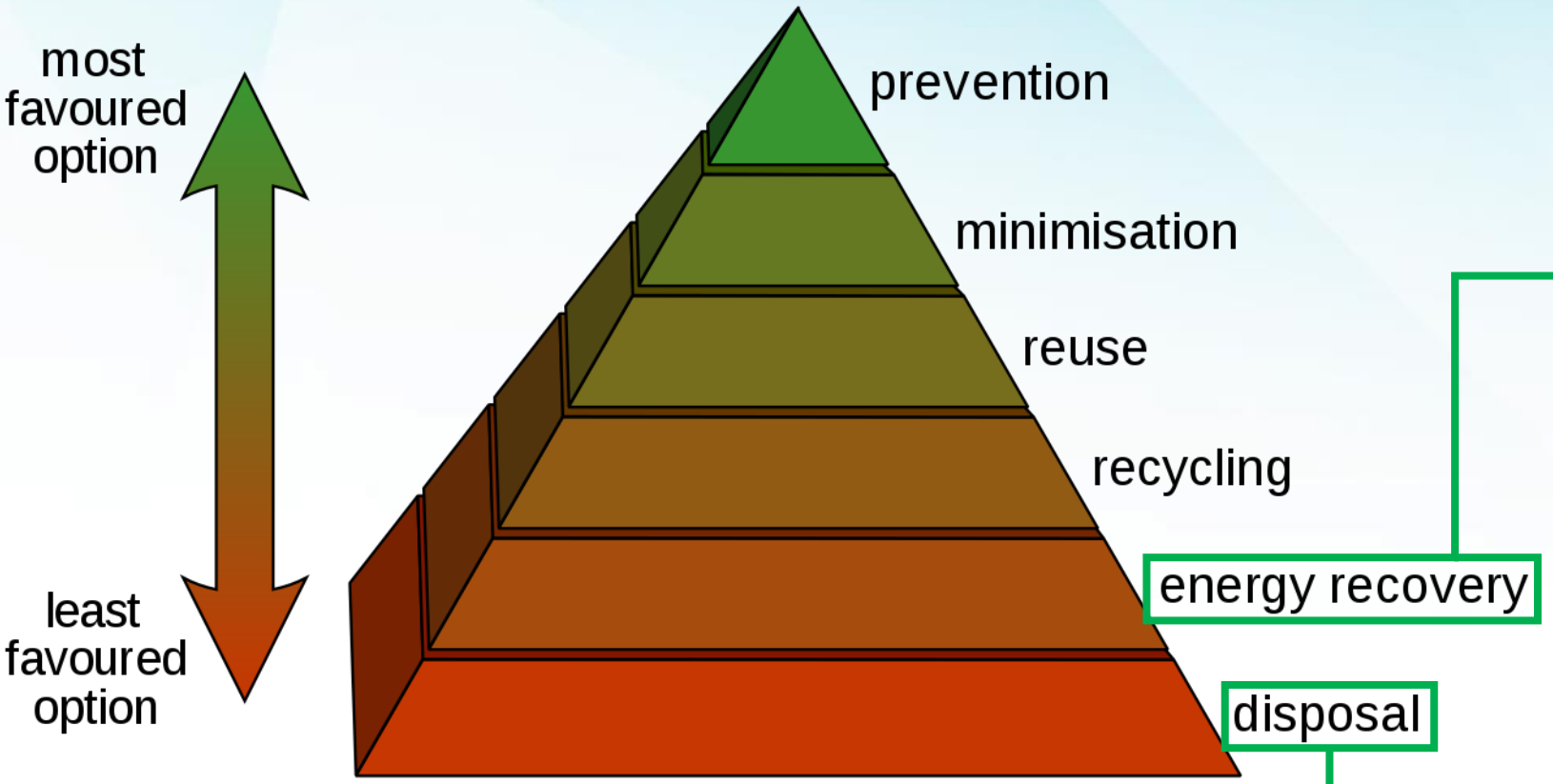
Photos of Site Inspection in Vietnam



2.3 Wastewater Treatment – Water Management

Findings During the Investigation

3.1 Waste Hierarchy in Smart Cities



Waste to Energy

Smart Waste Management System

3.2 Waste Management – Waste Treatment Facilities

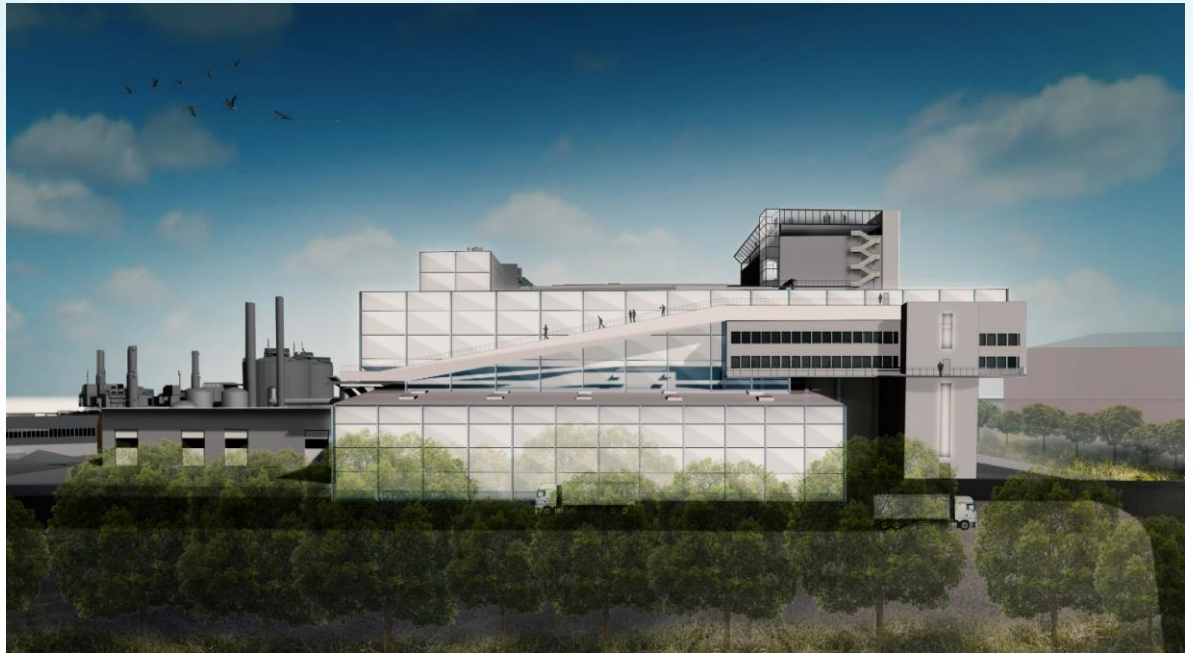
Reference: Integrated Waste Management Facilities in Hong Kong

EPD, 2018

EPD, 2018

3.2 Waste Management – Waste Treatment Facilities

Reference: Hamburg's Centre for Resources and Energy in Germany



3.2 Waste Management – Waste Treatment Facilities

Reference: Hamburg's Centre for Resources and Energy in Germany

Background:

- Design and Build of **Hamburg's Centre for Resources and Energy** in Germany
- Current Status: The completion of all plant sections will be in 2023

Client: Stadtreinigung Hamburg (SRH)

Time Period: Since February 2017

Investment: 280 Mio €

STADTREINIGUNG HAMBURG

3.2 Waste Management – Waste Treatment Facilities

Reference: Hamburg's Centre for Resources and Energy in Germany

Technical Data/Plant Sections:

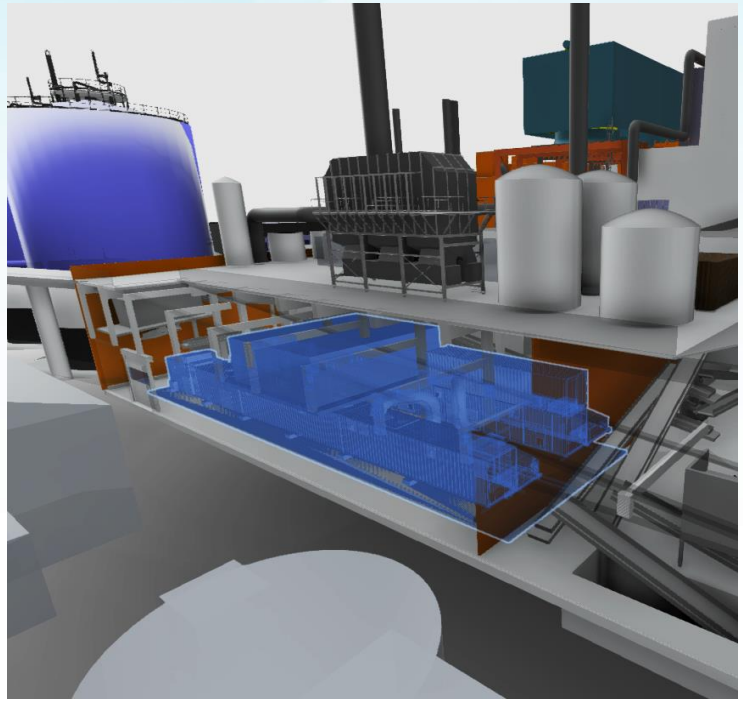
Plant section 1: Sorting of up to 140,000 Mg waste from household and public litter bins for production of recovered substitute fuels (RDF), fermentation of fine fraction and production of a bio-fuel and other biomasses

Plant section 2: Fermentation and composting of 22,000 Mg/a bio- and green waste

Plant section 3: Treatment of 8.5 mio m^3/a biogas from plant sections 1 and 2 as well as optional further 4 mio m^3/a from an existing fermentation plant (Biowerk)

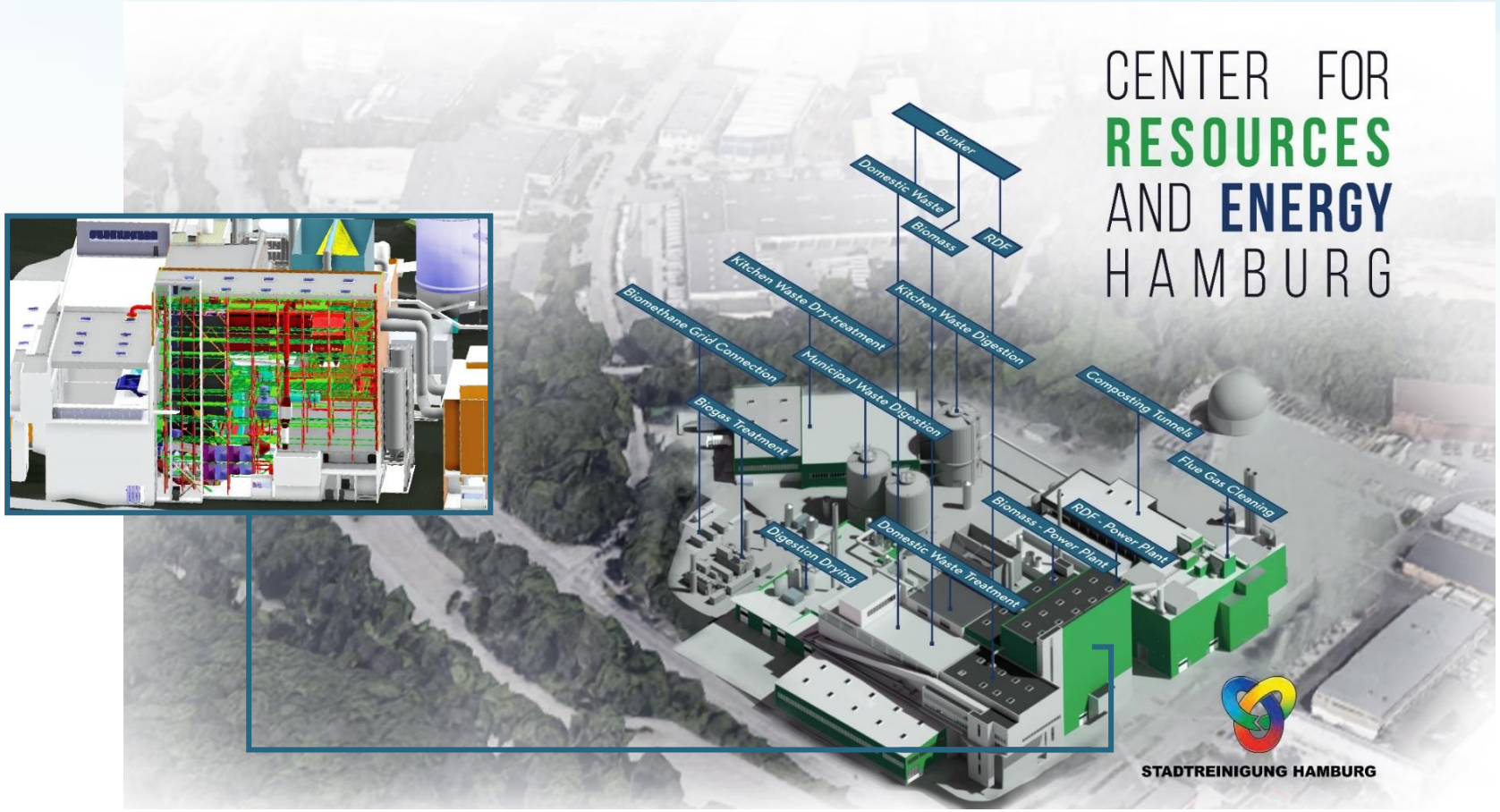
Plant section 4: Biomass-heated power plant with a thermal capacity of 2 x 20 MW

Plant section 5: RDF-heated power plant with a thermal capacity of 1 x 48 MW



3.2 Waste Management – Waste Treatment Facilities

Reference: Hamburg's Centre for Resources and Energy in Germany



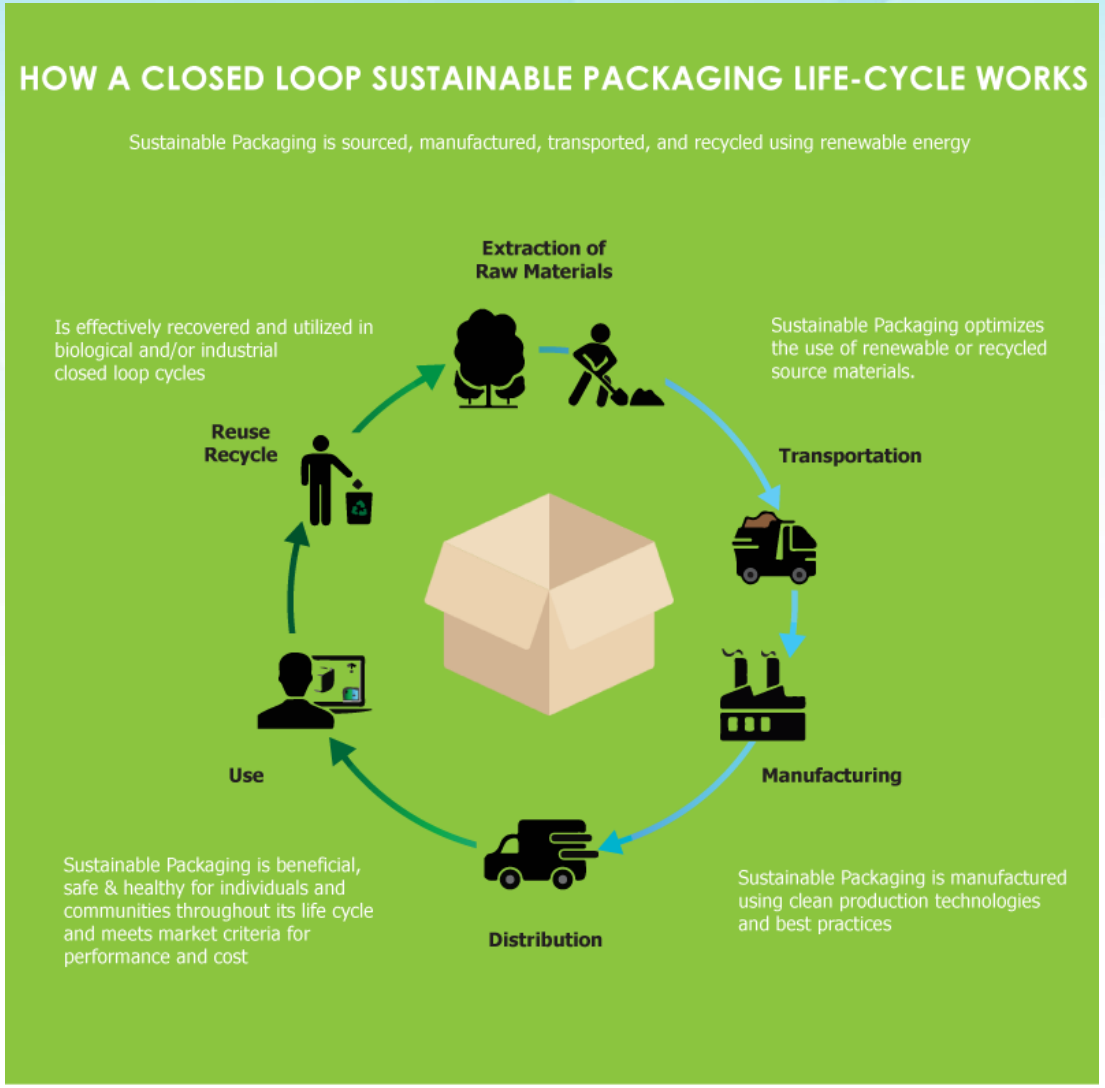
4.1 Green Supply Chain Management

What is a Supply Chain?

- A network consisting of all parties involved (e.g. supplier, manufacturer, distributor, wholesaler, retailer, customer, etc.), directly or indirectly, in producing and delivery products or services to ultimate customers

Why is it important to practice Green Supply Chain Management (GSCM)?

- ✓ Cost savings (conserving materials, reduced energy and water use)
- ✓ Reach optimal levels of sustainability performance
- ✓ Better public image
- ✓ Decreased environmental liability
- ✓ Attract resources from socially concerned investors



4.1 Green Supply Chain Management

How to practice GSCM?

An example of a clothing business:

- Green Procurement
  - Select suppliers that provide green fabrics (e.g. organic cotton, recycled materials)
  - Place purchasing orders through email (paperless)
- Green Manufacturing
  - Increase energy efficiency in lighting and heating within factories → cost savings (reduced energy use)
  - Recycle/reuse extra fabric → minimize waste
  - Practice ecolabelling of products → encourage green consumer behavior

4.1 Green Supply Chain Management

How to practice GSCM?

An example of a clothing business:

- Green Distribution
  - Use “green” packaging materials (e.g. biodegradable plastics, recycled products)
  - Promote recycling and reuse programs (e.g. collecting old clothes from customers for recycling, collecting packaging materials for reuse)
- Green Logistics
  - Use alternative fuel vehicles (e.g. electric trucks)
  - Group orders together rather than in small batches → cost savings (reduced fuel consumption)
- Process Optimization
  - Identify flaws/problems within the supply chain (e.g. oversupply of a certain style that is left unsold) → waste of money, materials, storage space
  - Implement a new process (e.g. use predictive analytics to calculate amount of stock needed for each clothing style) → cost savings

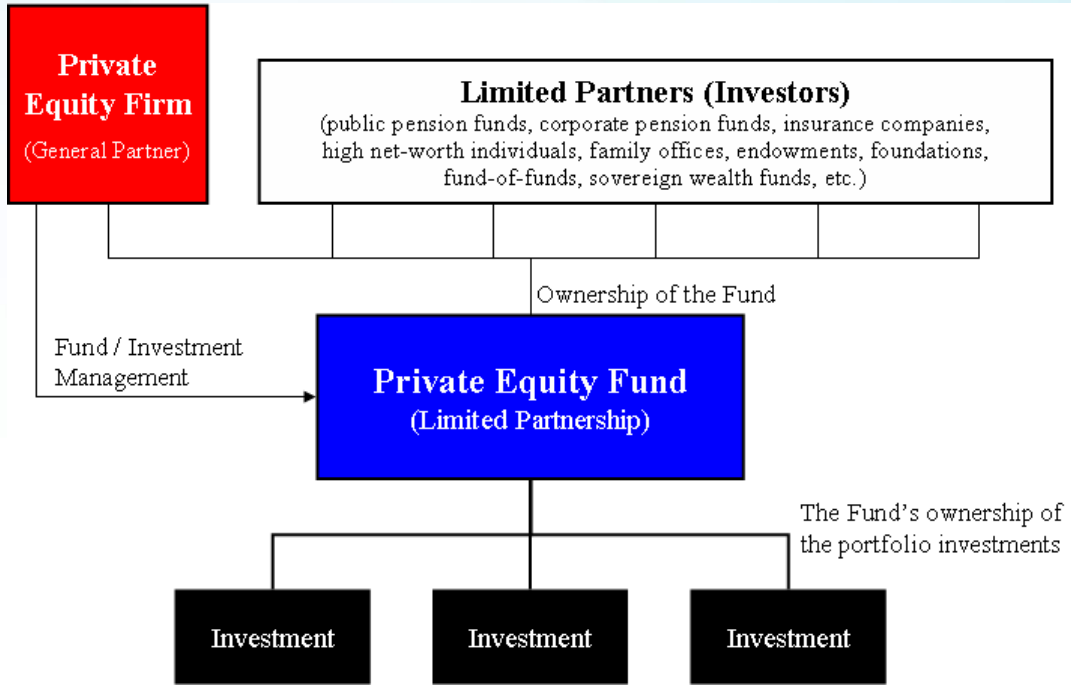
4.1 Green Supply Chain Management

GSCM in Hong Kong

- Hong Kong is known for its trade centers and its status as an international transportation and aviation hub
- The practice of GSCM would save time, cut costs and reduce energy consumption – all of which would benefit all parties involved within the supply chain
- As a testbed, Hong Kong plays an important role in the development of both the GBA and the BRI
- The practice of GSCM could be promoted internationally

5.1 Green Equity Fund

Private Equity Fund for Green Projects Development, Operation & Maintenance



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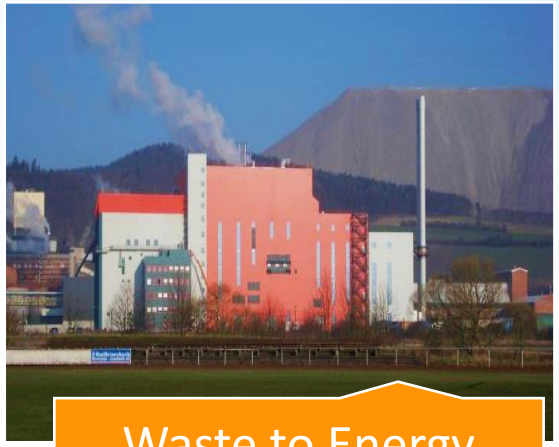
5.1 Green Equity Fund

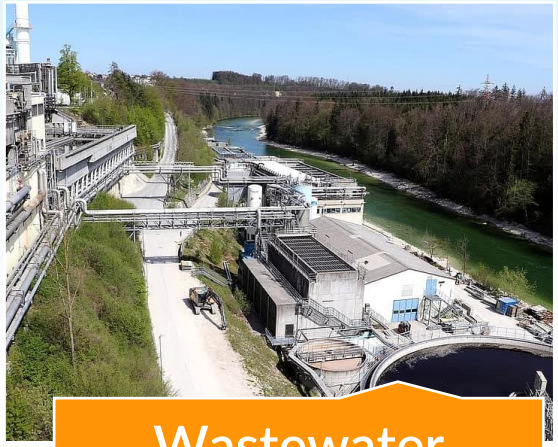
Private Equity Fund for Green Projects Development, Operation & Maintenance

Possible Developments/Projects:

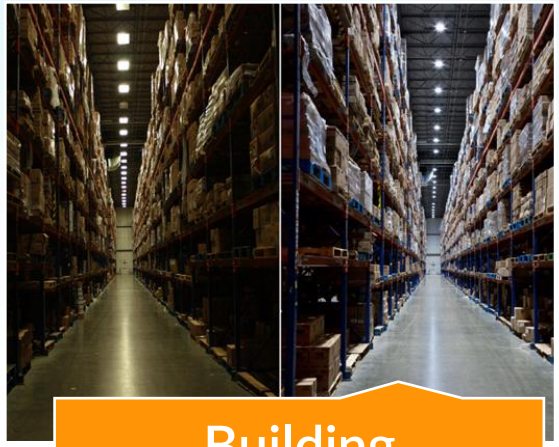
Large-scale Solar Projects



Waste to Energy Projects



Wastewater Treatment Projects



Building Modernization

The PEF will originate, design, build and operate projects which will have the potential to act as the hub of a local circular economy in a defined region.

N.B. Each project will vary from location to location depending on local circumstances.

Thank You

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