WIPO GREEN:
Case Study of Green Technology Transfer from Japanese Industry

30th May 2012
Topic 5: Case Studies of Transfer of ESTs
WIPO Regional Forum, Colombo, Sri Lanka

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Japan Intellectual Property Association

Agenda

- Introduction of TEIJIN Group
- A Case Study of Green Technology Transfer
  – Multi-Stage Activated Biological Process (MSABP) Waste Water Treatment Technology of TEIJIN Group
- Expectations on WIPO GREEN from Japanese Industry

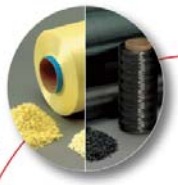
Technology Seeds in WIPO GREEN Database (As of May 2012)

	Technology Name	Provider	Country
1	Vertical Green Biobed for the efficient degradation of pesticides	University of Geneva	Switzerland
2	Organic adsorption heat pump system	Honda Motor Co., Ltd.	Japan
3	**MSABP: Multi-Stage Activated Biological Process Treatment System**	**TEIJIN Ltd.**	**Japan**
4	Home appliance recycling technologies	Hitachi Ltd.	Japan
5	Biological oil production from unused woody biomass and utilization networks	Waseda Environmental Institute (WEI)	Japan
6	HEMS, Co-benefit type environmental consideration action support system and program	Waseda Environmental Institute (WEI)	Japan
7	ULV, Ultra Lightweight Vehicle	Waseda Environmental Institute (WEI)	Japan
8	Method of Paper fastening and Document Preparation Device	Fujitsu Limited	Japan
9	Lead(Pb)-free solder	Fujitsu Limited	Japan
10	Pinapple Paper	UTM Innovation and Commerciallisation Centre	Malaysia
11	Pinapple Plastic	UTM Innovation and Commerciallisation Centre	Malaysia
12	Hybrid Lagoon System ("HLS")	Rural Environmental Research Association	Japan
13	Parabolic Solar Concentrators Using Optimized bands	Massachusetts Institute of Technology (MIT) TLO	United States
14	Biomimetic Spiral Pattern for Heliostat Layouts	Massachusetts Institute of Technology (MIT) TLO	United States
15	CSPonD: Concentrated Solar Power on Demand	Massachusetts Institute of Technology (MIT) TLO	United States
16	Solar Power Tower with Direct Absorption of Solar Radiation in a Salt Bath with Nanoparticles	Massachusetts Institute of Technology (MIT) TLO	United States
17	Improvements on Horizontal-Axis Wind Turbines	Massachusetts Institute of Technology (MIT) TLO	United States
18	Secure prepaid payment platform for clean energy	Simpa Networks, Inc.	India

Human Chemistry, Human Solutions TEIJIN

Introduction to the Teijin Group

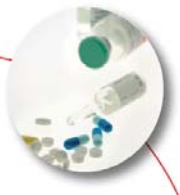
Business Group Structure



Advanced Fibers & Composites BG

High Performance Fibers BU
- Teijin Techno Products Limited
- Teijin Aramid B.V.
- DuPont Teijin Advanced Papers (Japan) Limited

Carbon Fibers & Composites BU
- Toho Tenax Co., Ltd.
- Toho Tenax Europe GmbH

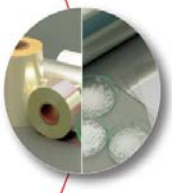


Healthcare BG
- Teijin Pharma Limited
- Teijin Home Healthcare Ltd.
- Braden Partners L.P.

Electric Materials & Performance Polymer Products BG

Films BU
- Teijin DuPont Films Japan Limited
- Teijin Films Limited
- DuPont Teijin Films U.S. Limited Partnership
- DuPont Teijin Films U.K. Limited
- DuPont Teijin Films Luxembourg S.A.

Resin & Plastic Processing BU
- Teijin Chemicals Ltd.
- Teijin Polycarbonate Singapore Pte Ltd.
- Teijin Polycarbonate China Ltd.



New Business Development Group

TEIJIN

IT BG
- Infocom Corporation

Products Converting BG

Products Converting BU
- N.I. Teijin Shoji Co., Ltd.

Polyester Fibers BU
- Teijin Fibers Limited
- Teijin Polyester (Thailand) Limited

* BG : Business Group, BU :Business Unit

Corporate Data

Corporate Outline

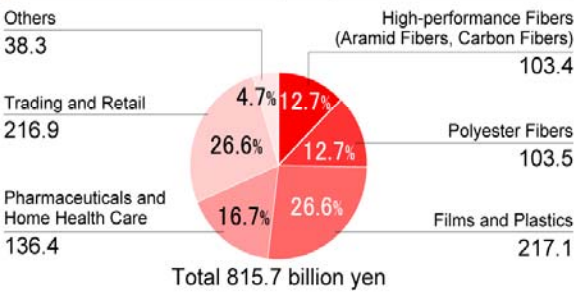
Holding Company	TEIJIN LIMITED
Established	June 17, 1918
Capital	70,816 million yen
Head Offices	Osaka, Tokyo
Number of Teijin Group Companies	Japan: 72 Overseas: 78 Total: 150
Number of Teijin Group Employees	Japan: 9,954 Overseas: 7,588 Total: 17,542

(As of March 31, 2011)

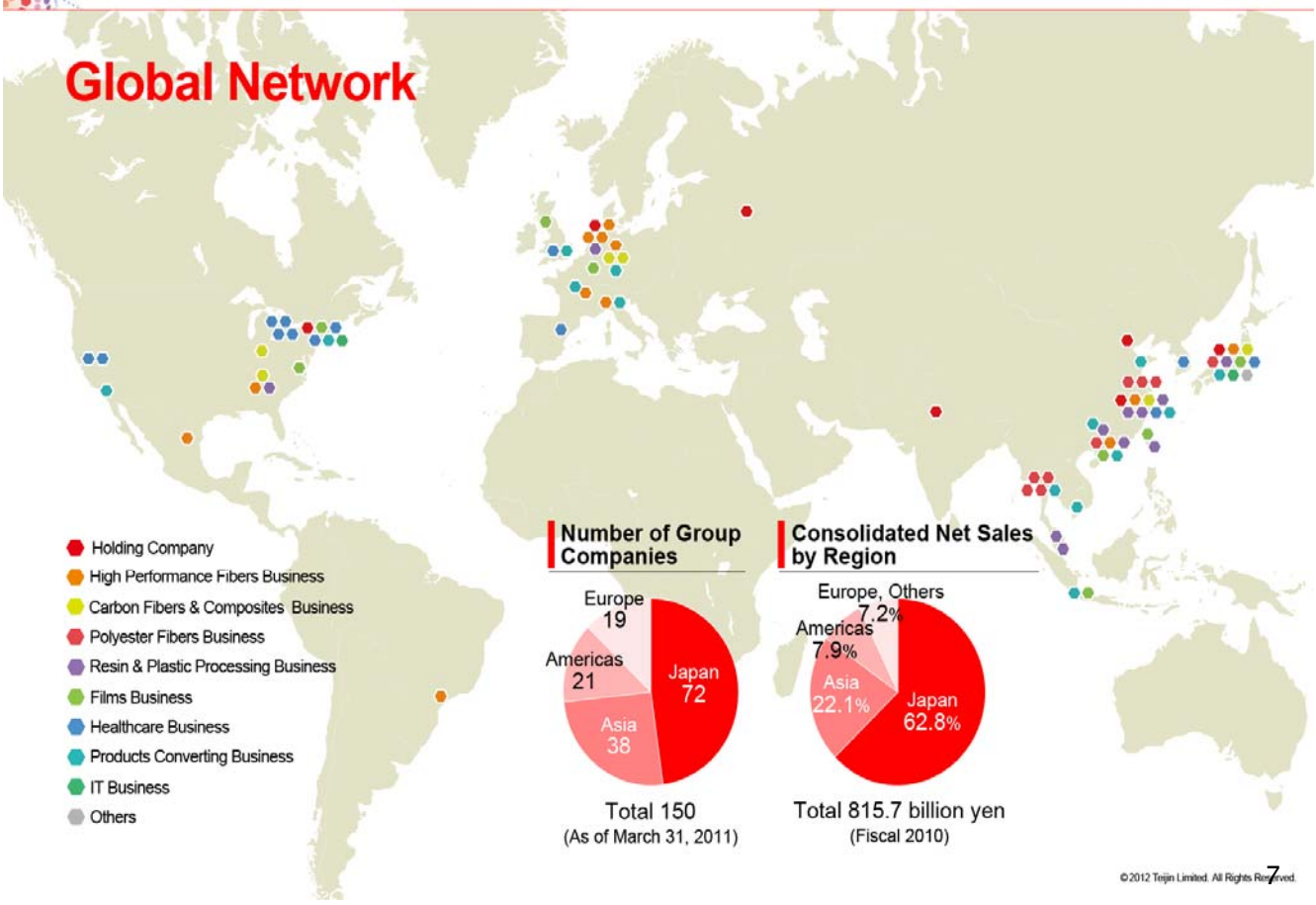
Consolidated Results (Fiscal 2010)

Net Sales	815.7 billion yen
Operating Income	48.6 billion yen
Net Income (Loss)	25.2 billion yen

Consolidated Net Sales by Segment (Fiscal 2010)



Global Network



Number of Group Companies

Total 150
(As of March 31, 2011)

Consolidated Net Sales by Region

Total 815.7 billion yen
(Fiscal 2010)

Corporate Philosophy / Brand Statement

Corporate Philosophy

In Harmony with Society

Quality of Life

The Teijin Group's purpose is to enhance the quality of life through a deep insight into human nature and needs, together with the application of our creative abilities.

Empowering Our People

Brand Statement

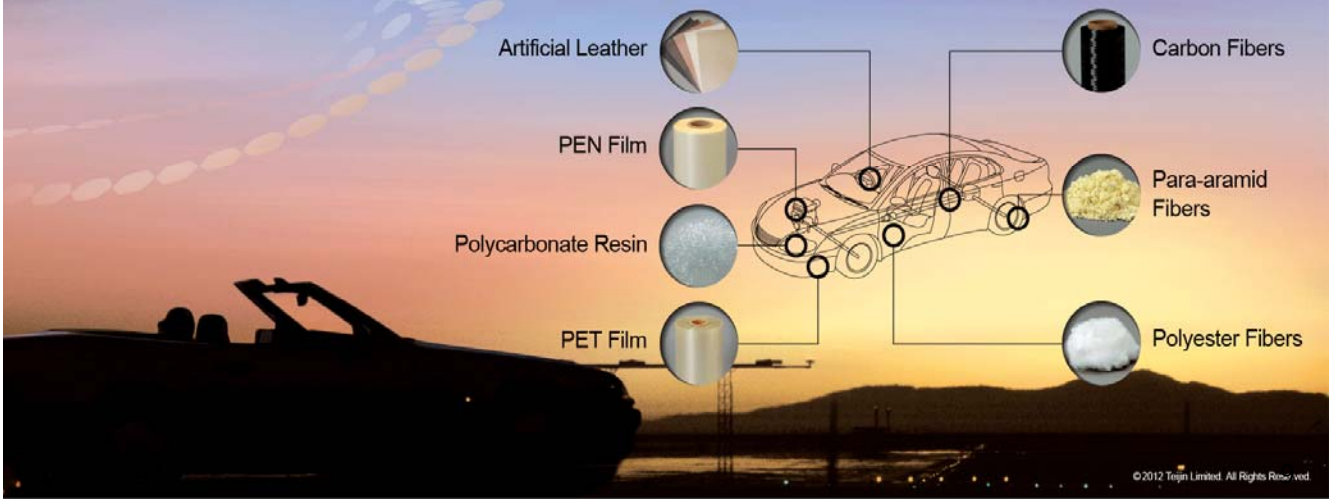
Human Chemistry, Human Solutions

Our promise is to keep delivering real value through the development of chemical technologies that are friendly to both people and the global environment, and through the provision of solutions that society and our customers expect.

Sustainable Transportation

We develop materials with higher functionality and next-generation materials that not only improve comfort and safety, but also realize better environmental performance through reduced CO_2 emissions and energy conservation.

Carbon Fibers



Information and Electronics

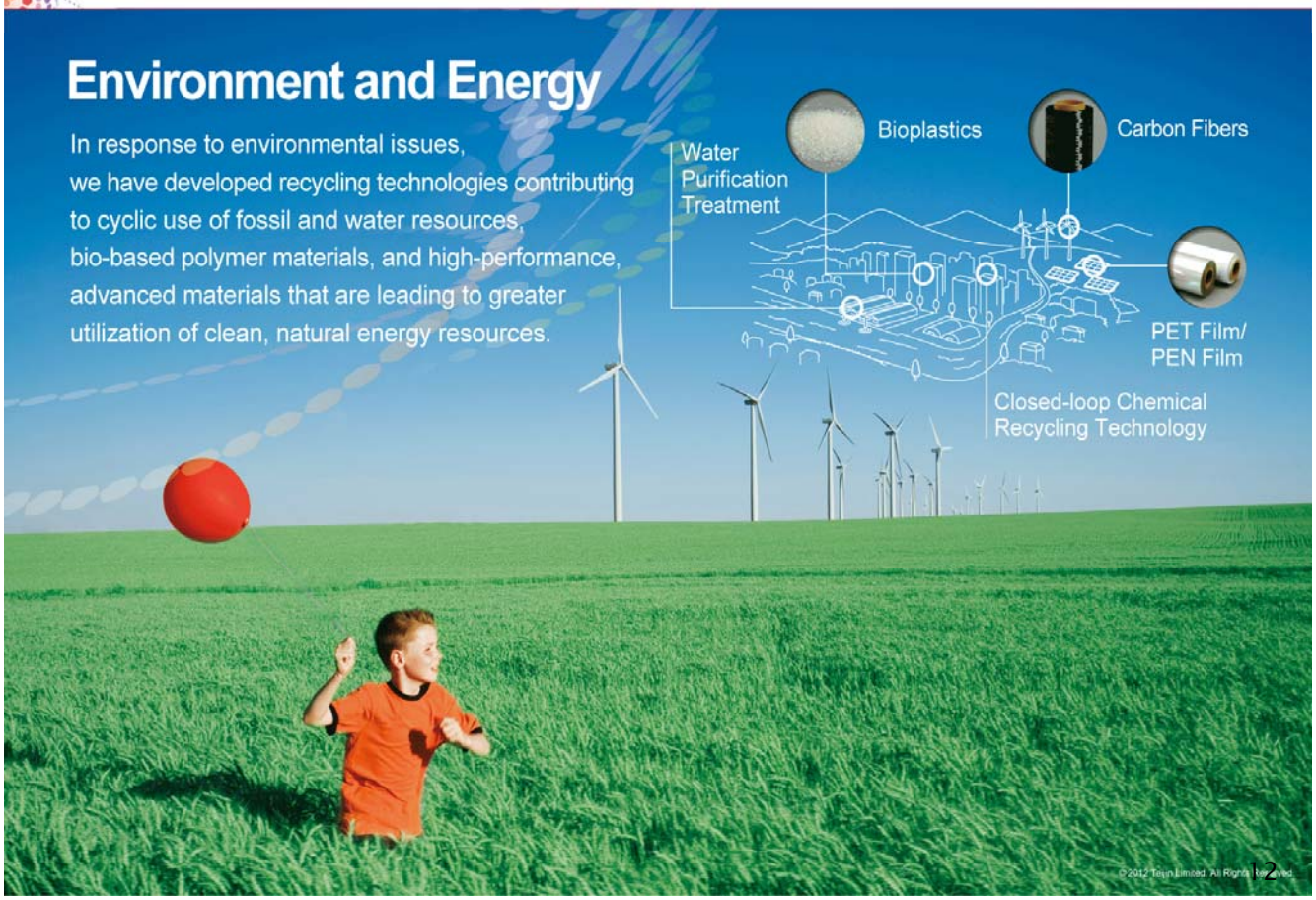
Our high-performance films, plastics and other materials contribute to increased functionality and quality in the development of tomorrow's information and electronics devices.

Health Care

We provide unique and revolutionary solutions in the fields of pharmaceuticals and home health care, with a focus on three key therapeutic areas: bone and joint, respiratory, and cardiovascular and metabolic diseases.

Environment and Energy

In response to environmental issues, we have developed recycling technologies contributing to cyclic use of fossil and water resources, bio-based polymer materials, and high-performance, advanced materials that are leading to greater utilization of clean, natural energy resources.



Environmental Initiatives

The Teijin Group Global Environmental Charter was established in 1992.
In July 2007, we announced our Declaration of Sustainable Environment Initiatives and we are promoting this declaration from the perspective of three core elements: environmental conservation, design for environment, and environmental business.

Environmental Conservation

Activities aimed at reducing the negative impact our daily business activities have on the environment.

Design for Environment

Activities reflected in product and process design aimed at reducing the negative impact on the environment.

Environmental Business

Business activities aimed at contributing to environmental improvement.

Principal Environmental Targets of the Teijin Group for 2020

Item	Scope	Minimum Target
CO_2 emissions	Japan	20% reduction from the 1990 level
Chemical substance emissions	Global	80% reduction from the 1998 level
Disposal of unusable industrial waste	Global	85% reduction from the 1998 level

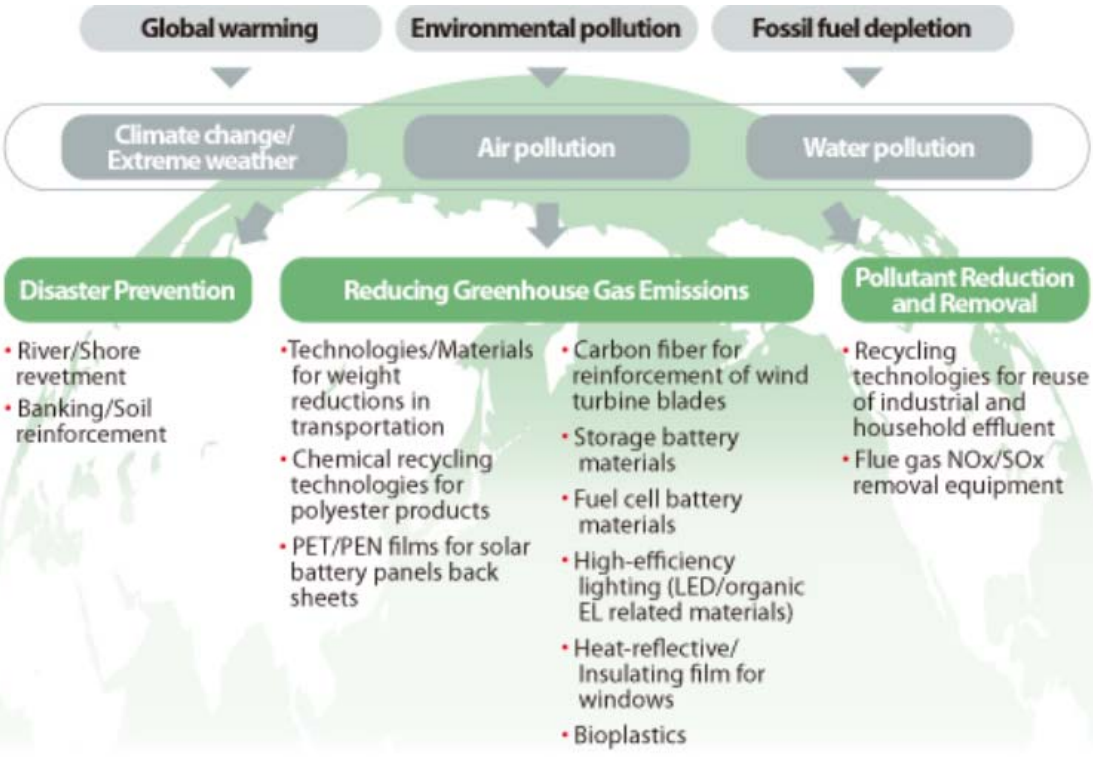
Brand Logo of Design for Environment

TEIJIN Earth Symphony

Earth Symphony®
This logo represents our initiative for achieving harmony with the environment through environmentally friendly corporate activities based on the Teijin Group Design for Environment Guidelines.

Sustainability Initiatives

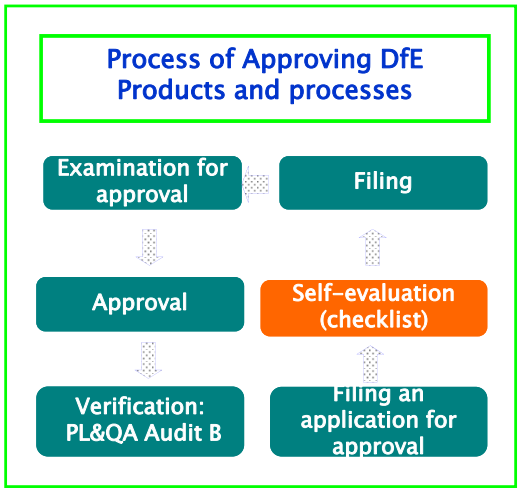
- Closed-loop Recycling of Polyester Products — ECO CIRCLE
- Bioplastics, Carbon-neutral Materials — BIOFRONT
- Water Purification Treatment Aiming for Wastewater Recycling/Reuse



Design for Environment (DfE)

Human Chemistry, Human Solutions TEIJIN

TULC(スチール缶)



Teijin Group Guidelines for DfE
(Established in January 2008)

TEIJIN Earth Symphony

Approved Products/Processes
: 31 products (As of 1 May, 2012)

Creating IP Vision for the World

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Water Treatment Business

focusing on wastewater treatment (WWT) utilizing natural biological purification mechanism

Business Concept

Environment – Friendly Technology

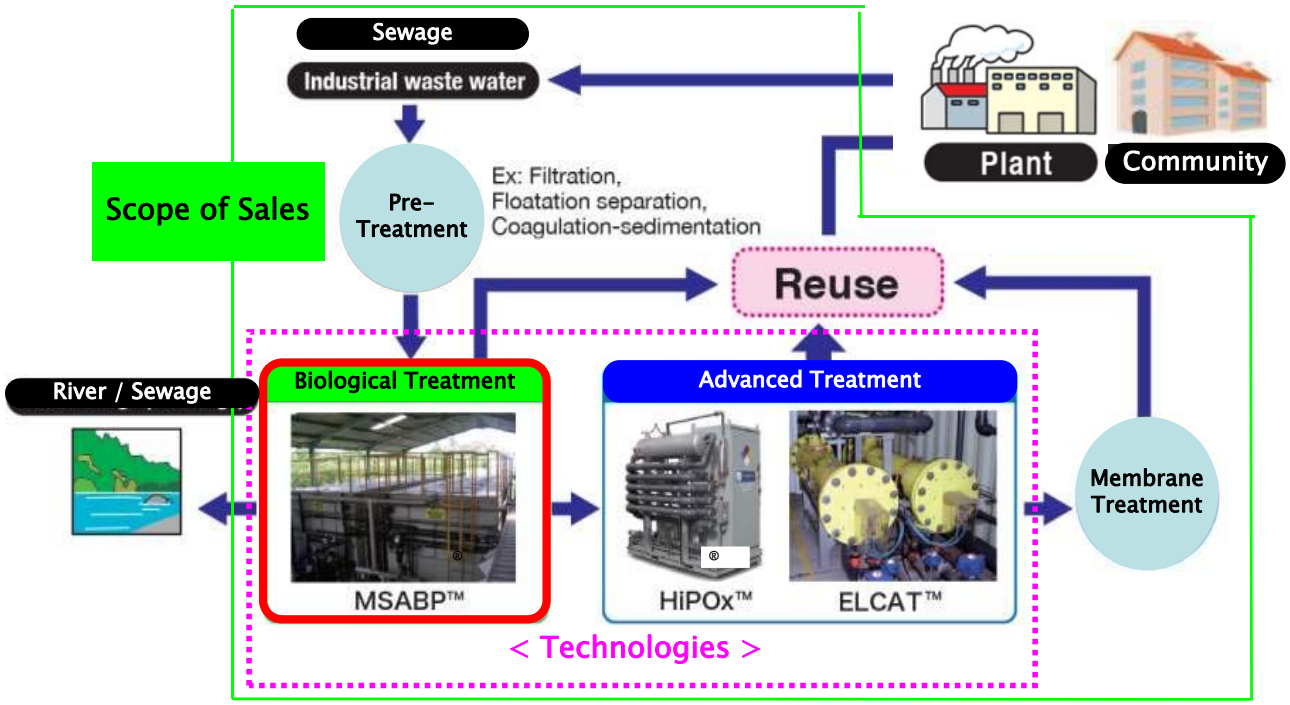
1. Biological treatment : Sludge-less, Low CO2 Discharge
2. Advanced treatment : for Recycle, Reuse

➔ Achieve “Energy saving”, “Low Initial/Running cost”

Analysis
Consulting
Engineering

Offer total solution for Wastewater treatment

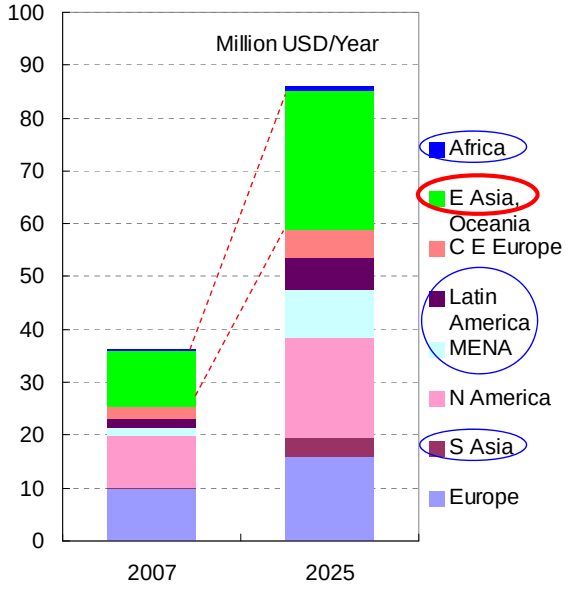
The scope of business & application



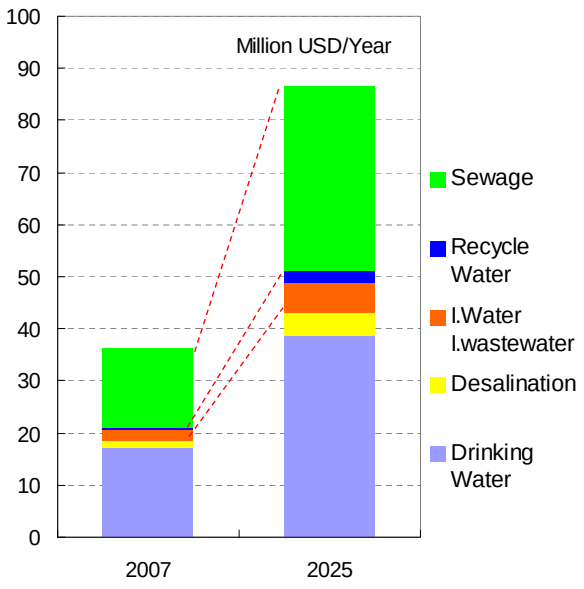
Expansion of the world wide water demand

Source : Global Water Market 2008

[Water demand by regions]



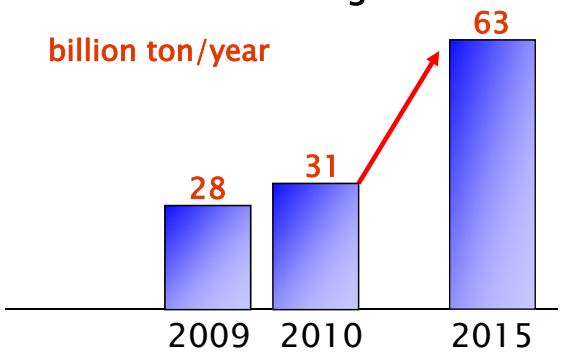
[Water demand by applications]



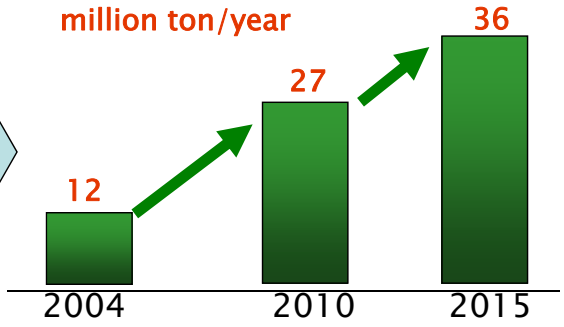
Regions : East Asia (China)
Newly Developing Countries
Application : Wastewater Treatment (Sewage / Industrial)
Recycle / Reuse

Increasing excess sludge in China

■ Wastewater discharge in China



■ Sludge production in China



■High sludge incineration cost

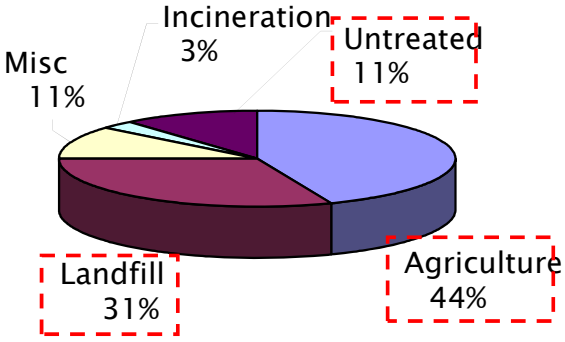
As 42 to 75 &/ ton-sludge

2010	2015
1.25-1.75 bn $ / year	2.6-3.5 Bn $ / year

Reduce sludge and save energy for the whole WWT plant.

➔How to reduce sludge?

■Actual sludge treatment condition



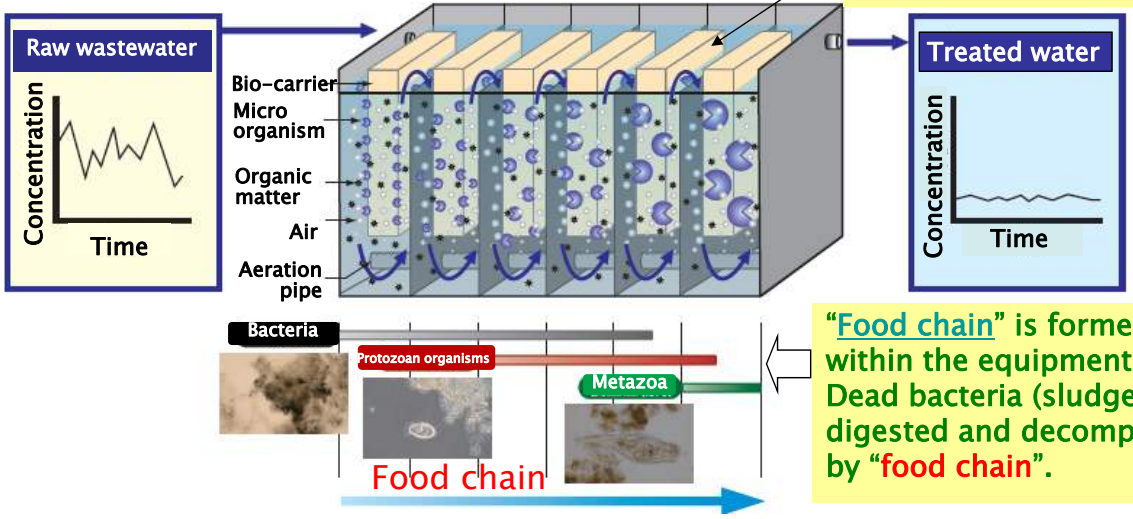
Source; CWR (open information of china institute for environment sciences and internet)

MSABP is a Sludge-less WWT Technology

MSABP® : Multi-Stage Activated Biological Process

✧Principle

Microorganisms proliferate on fiber carriers



"Food chain" is formed within the equipment. Dead bacteria (sludge) are digested and decomposed by "food chain".

✧Features

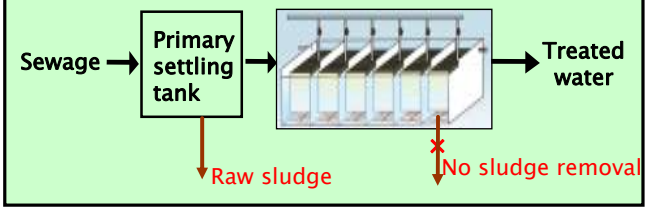
1. Sludge-less: Greatly reduced sludge disposal cost
2. Stable treatment ability: Less impact of fluctuation and easy maintenance
3. High performance ability: to treat high-concentration wastewater (difficult-to-decompose substances, and bio-inhibitory)

Performance assessment study with JSW*

JSW* : Japan Sewage Works

[Test 1] Target : Activated sludge process

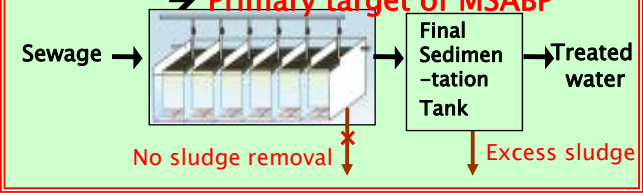
Market: for large scale treatment plant (more than 20,000 T/D)



[Test 2] Target : OD process

Market: Medium-scale treatment plants (not more than 5,000 T/D)

➔ Primary target of MSABP



Item	Targets	Test results
Performance	BOD : less than 15 mg/L Total Nitrogen : 50% reduction	Achieved
Sludge less	To reduce by more than 70%	△ 87% reduction (total: △ 43%) [Test 1] △ 77% reduction (total: △ 77%) [Test 2]
Energy saving	To achieve 10% energy saving	Up to 8% saving (vs activated sludge) [Test 1] Up to 12% saving (vs OD) [Test 2]
Operation	Easy operation and control	without volume control and return of sludge.

Demonstrated basic performance

Sludge reduction & energy-saving

Two product types of MSABP

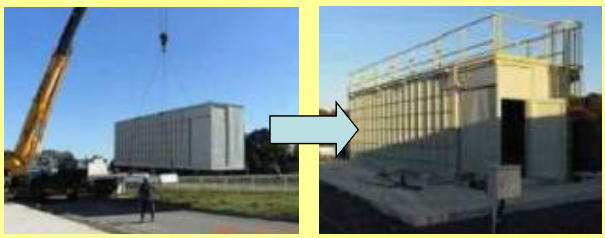
Fixed mount type (concrete reactor)

1.Capabilities:
- 5,000 m3/day (Approx. 20,000 residents)

2.Characteristics : against OD process
- Full-scale, centralized WWT plant
- Less energy consumption
- Less CO2 generation

Mobile type (steel reactor)

- 1.Capabilities:
  - Less than 150 m3/day (1,000 residents)
- 2.Characteristics
  - Short construction period (pre-fabricated)
  - Foundation and utility works only at sites
  - Decentralized, village by village treatment



Tailored solution in accordance with customer needs and installation conditions

Examples for MSABP implementation

◆Favorable cases

①Great difficulty in treating sludge

②Wastewater containing persistent and/or bio-inhibitory compounds

③Medium and small-scale treatment plants (smaller than 5,000 m3/D)

④Need for introducing decentralized wastewater treatment.

➔ No need of in-situ sludge dewatering

⑤Need for introducing movable equipment

➔ Temporal use during refurbishment of existing facilities

➔ Treatment plants with relocation plan

⑥Difficulty in on site civil engineering works

➔High local material and labor cost

➔Few local skilled workers

⑦Need for refurbishing existing reactor.

◆Unfavorable cases

①Large-scale treatment plants (more than 10,000 m3/D)

➔ MSABP needs large amount of initial investment

②Sludge can be used as resources

➔ MSABP has disadvantage in total cost.

③No room for installation area

➔ Unable to installed MSABP

④Existing sludge treatment facilities can be available

⑤Unstable power supply

➔ Leads to unstable treatment performance

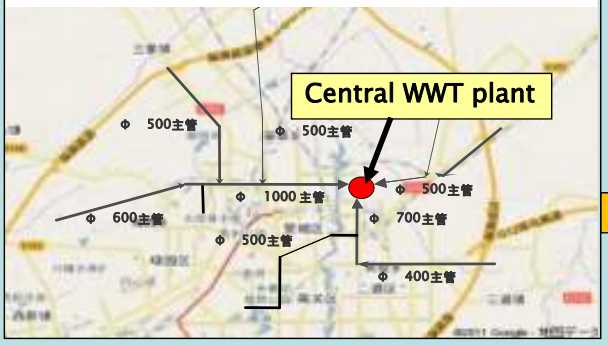
⑥Need for reuse of treated water.

➔ Membrane treatment is required.

Decentralized treatment

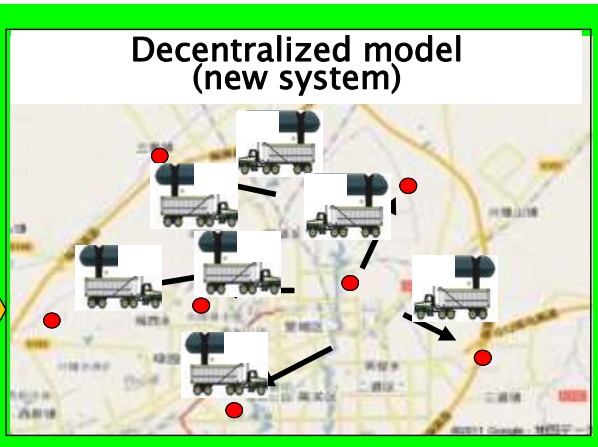
Installation of WWT plants will be changed from centralized to decentralized

Centralized model (conventional system)



- Long-distance, large-diameter sewer pipes
- Long construction period

Decentralized model (new system)



- Short-distance, small-diameter sewer pipes
- Short construction period

MSABP solves following problems related to decentralized treatment !

[1] Efficient arrangement of sludge treatment facilities

[2] Reduction in burden of expense for sludge transportation

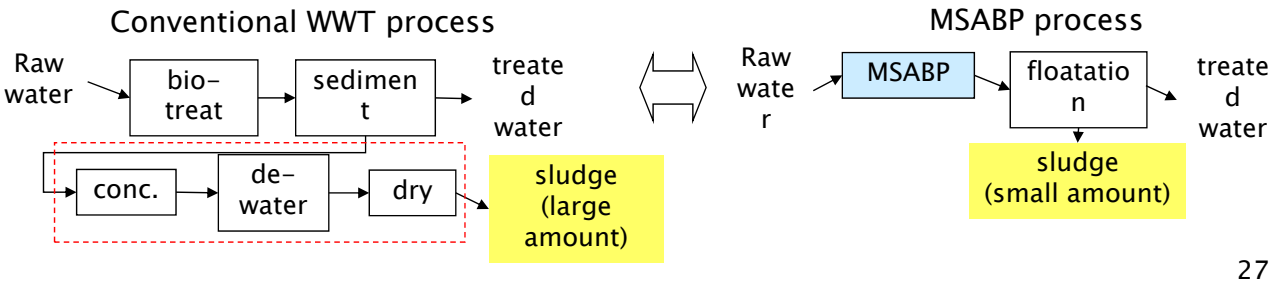
Case of difficult site construction: Angola

WWT cap. : 1,300 m3/day
Target : Dye works facilities
Equipment : Installation of multiple MSABP units
Background : Difficulty in site construction works
→ High construction cost
→ Shortage of skilled workers
Finish date : End of June, 2012

■Mobile type unit

- Pre-fabricated in Turkey.
- Transported after test run.
- Site installation

■Simplification of wastewater treatment process



Refurbishment/Upgrade with MSABP media

■Before remodeling:
Non-uniform aeration

■Before remodeling:
Broken racks and carriers were dropped.

■After remodeling:
Uniform aeration

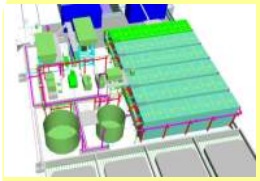
■After remodeling:
Carriers are neatly arranged inside the tanks.

Track Record of MSABP

Cosmetic wastewater
China

Food wastewater
China

Dye wastewater
China



Dye wastewater
Angola

Dye wastewater
Indonesia

Finechemical
Israel

Chemicals
Israel

Industrial wastes (oil containing wastewater)
Israel

Dye wastewater
China

Cosmetics
Japan

Public sewage
Israel

Public sewage
Spain

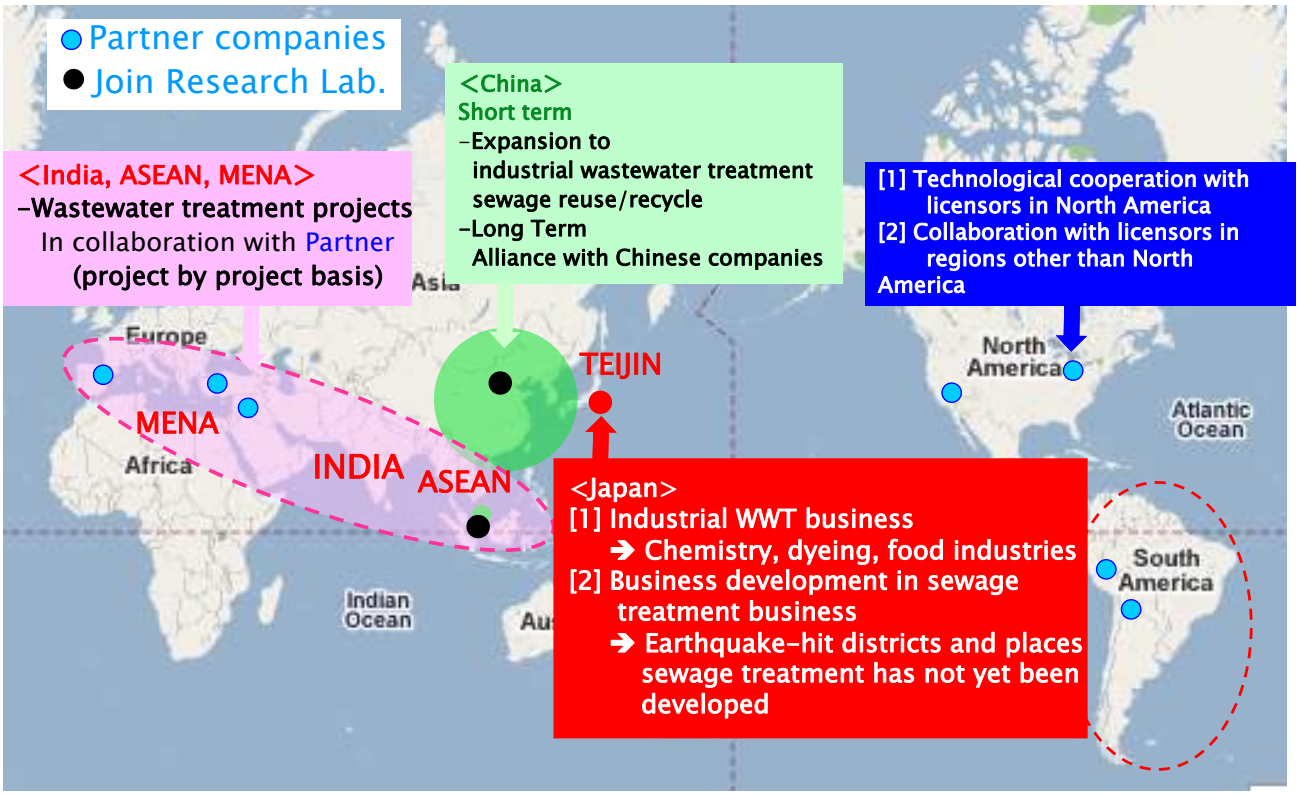
Public sewage
United States

Sewage
(under construction)
China

Sewage
(earthquake-hit area)
Japan

Worldwide Strategy

Concept : Solution Business with Biological Process as Key Technology



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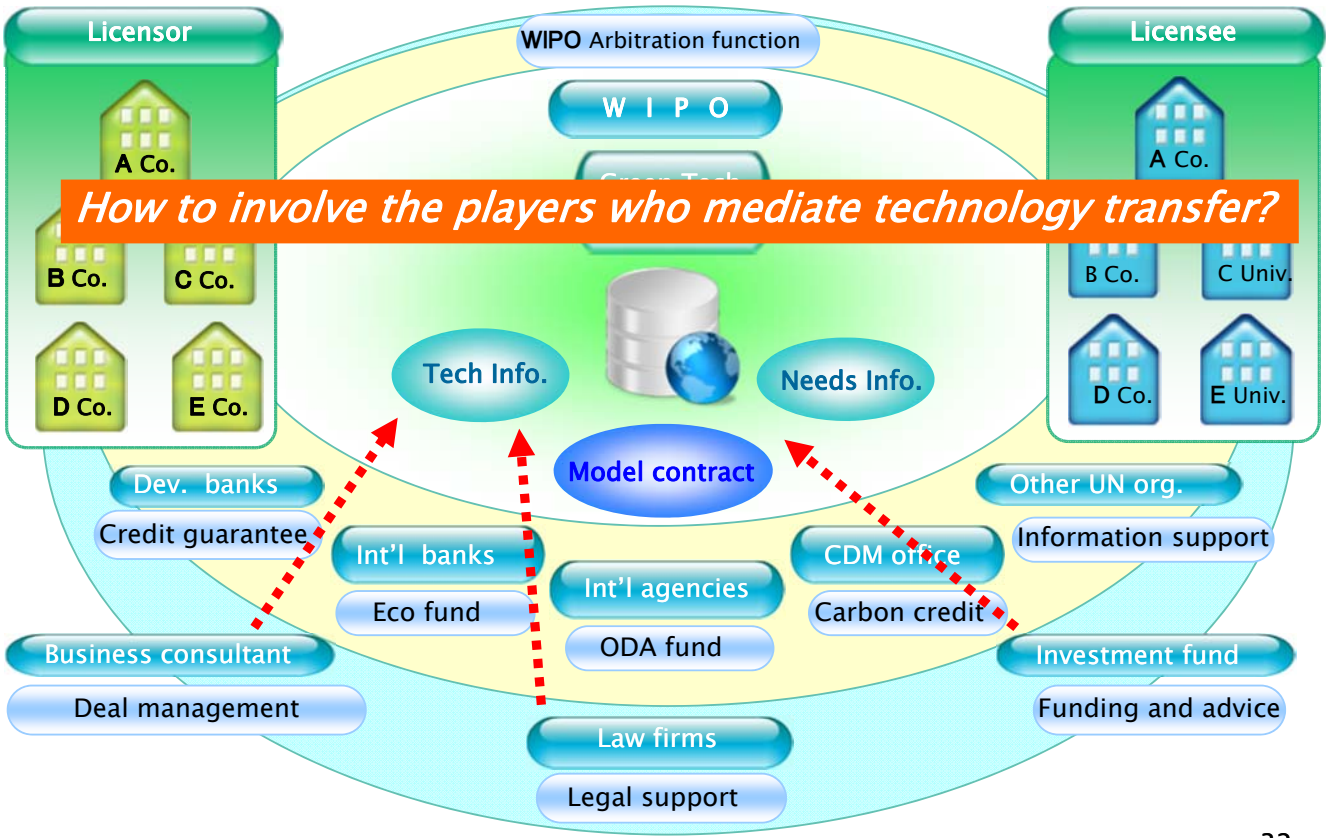
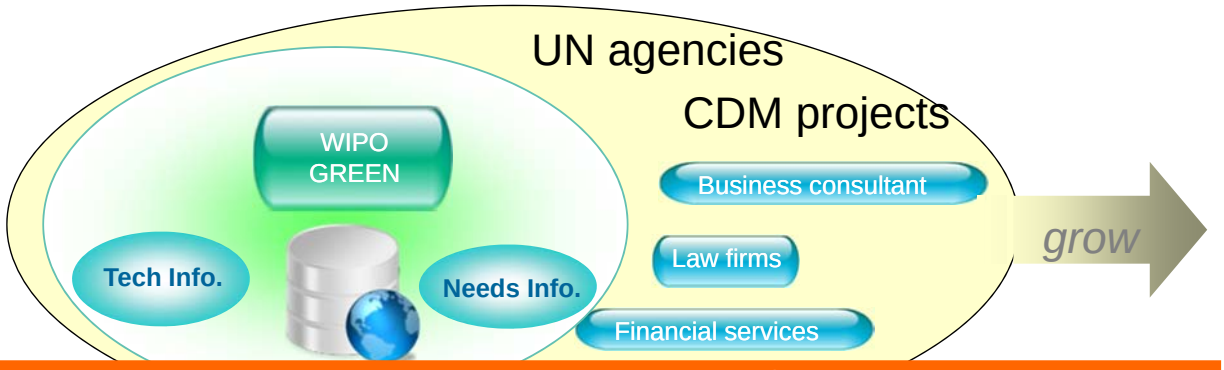
Comprehensive Image of WIPO GREEN



Future Growth of WIPO GREEN



How to construct the global network of technology seeds and needs?

- *特許流通データベース（INPIT）*
- *Smart Energy & Technology (JASE-World)*
- *ECO Patent COMMONS*
- *Yoi-kensetu.com*
- *ICETT*
- *Yet2.com*
- *TTPP(JETRO)*
- *KAST*
- *Corporate web site*
- *APEC-VC*
- *中国技術交易所(CTEX)*
- *北京国際技術移転センター*
- *ECO Products Directory*
- *University web site、TLO*
- *Corporate web site*
- *日本環境取引機構（JCTX）*

Creating IP Vision for the World

Thank you for your attention.

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