"Business and the Environment" International Workshop 2005

Conference Report

Businesses for a Reduce-Reuse-Recycle Economy

- Current Status and Future Prospects / A Japanese and German Dialogue -

IGES Kansai

2005 2006 Deutschland in Japan 日本におけるドイツ

IGES

March, 2006

Institute for Global Environmental Strategies (IGES)
Kansai Research Centre

（財）地球環境戦略研究機関 (IGES)　関西研究センター
「産業と環境」国際ワークショップ2005

IGES Kansai Research Centre's International Workshop 2005 on "Business and the Environment"

循環ビジネスに関する日独対話

ー地域社会における環境保全と産業振興の統合の視点からー

Businesses for a Reduce-Reuse-Recycle Economy

- Current Status and Future Prospects / A Japanese and German Dialogue -

IGES Kansai

2005 2006 Deutschland in Japan 日本におけるドイツ

IGES

日　　時:　2005年11月22日（火）14:00～17:30

場　　所:　JICA兵庫国際センター　2F ブリーフィングルーム
（神戸市中央区、HAT神戸地区）

主　　催:　(財)地球環境戦略研究機関（IGES）
(財)兵庫県環境クリエイトセンター

Date:　November 22, 2005 (Tue.)　14:00-17:30

Venue:　JICA Hyogo International Centre
Kobe, Hyogo prefecture, Japan

Organizer:　Institute for Global Environmental Strategies (IGES)
Hyogo Prefectural Environmental Create Center Public Corporation

開催にあたって

この国際ワークショップでは、先駆的な取組みで注目されるドイツおよび日本における資源循環政策の動向などについて最新の報告を行うとともに、日独双方の地域産業の振興についてご紹介し、循環ビジネスにおける現状と今後のあり方等についてともに考え、日独間の理解を深めることを目的としています。

このワークショップは「日本におけるドイツ年 2005/2006」の一環として開催されます。

Objectives

This workshop intends to provide an opportunity to think together about current status and future prospects of businesses for a 3R (Reduce-Reuse-Recycle) economy in Germany and Japan through dialogue between specialists from both countries. Topics include trends in 3R policy in Germany and Japan and initiatives to promote local 3R industry in the two countries.

This workshop is organized as part of "Deutschland in Japan 2005/2006."

後援：

環境省、兵庫県、神戸市、大阪神戸ドイツ連邦共和国総領事館、（株）エヌ・アール・ダブリュージャパン（ドイツ NRW 州日本代表事務所）、兵庫県国際交流協会、神戸日独協会、アジア太平洋地球変変動研究ネットワーク（APN）、（財）国際エメックスセンター、兵庫県大気環境保全連絡協議会、庫県瀬戸内海環境保全連絡会、関西研究センター推進会議構成団体（10 団体：地球環境関西フォーラム、関西広域連携協議会、（社）関西経済連合会、大阪商工会議所、兵庫県商工会議所連合会、兵庫県商工会連合会、（社）兵庫工業会、（財）ひょうご環境創造協会、兵庫県環境保全管理者協会、（財）新産業創造研究機構）

Sponsors:

Ministry of the Environment, Hyogo Prefecture, Kobe City, German Consulate General Osaka-Kobe, NRW Japan K.K. (Japanese office of the state of Nordrhein-Westfalen (NRW), Germany), Hyogo International Association, Japan-Germany Society of Kobe, Asia-Pacific Network for Global Change Research (APN), International EMECS Center, Hyogo Prefecture Liaison Conference for Air Environment Conservation, Hyogo Prefecture Liaison Conference for Environmental Conservation in the Seto Island Sea,

Organizations of the Advisory Board of IGES Kansai Research Center:

Global Environment Forum-KANSAI, Kansai Council, Kansai Economic Federation, The Osaka Chamber of Commerce and Industry, The Federation of Chamber of Commerce and Industry in Hyogo Prefecture, Hyogo Prefectural Federation of Societies of Commerce and Industry, The Hyogo Industrial Association, Hyogo Environmental Advancement Association, Hyogo Prefecture Association for Corporate Environmental Conservation, The New Industry Research Organization

Profile of speakers

レイモンド　ブライシュヴィッツ　*Raimund Bleischwitz*

ヴッパタール気候・環境・エネルギー研究所　物質フローと資源管理研究部部長（ドイツ）

Co-Director, 'Material Flows and Resource Management', Wuppertal Institute for Climate, Environment and Energy, Germany

経済学者（博士）、政策アドバイザー、研究リーダー。 2003 年 11 月から、ドイツ・ヴッパタール気候・環境・エネルギー研究所の「マテリアル・フローおよび資源管理」研究グループ、ならびにベルギー・ブルージュの College of Europe（欧州大学）「産業と持続可能性のためのトヨタ講座」の共同責任者。前職では、ボンの共有財の法則に関するマックス・プランクグループプロジェクト、ヴッパタール気候・環境・エネルギー研究所、欧州環境政策研究所、ドイツ下院 等に関わってきた。2000 年から日本政府のガバナンス研究に協力。日本、韓国、米国、英国にて特別研究員を務める。専門分野：持続可能な開発のためのガバナンス、資源生産性（ファクター 4）、制度派経済学。

Economist (PhD), Policy Advisor, Research Manager. Since November 2003 Co-Director of the Research Group 'Material Flows and Resource Management' at the Wuppertal Institute in Germany as well as 'Toyota Chair for Industry and Sustainability' at the College of Europe in Bruges, Belgium. Previous positions have been hold at the Max Planck Project Group on the Law of Common Goods in Bonn, at the Wuppertal Institute, at the Institute for European Environmental Policy and in the German Bundestag. Coordination of a governance study on behalf of the Japanese Government since 2000. Fellowships in Japan, Seoul/Korea, USA, and London/UK. Main fields of expertise: Governance of sustainable development.

アストリッド　ベッカー　*Astrid Becker*

（株）エヌ・アール・ダブリュージャパン代表取締役社長
（ドイツ ノルトライン・ヴェストファーレン（NRW）州日本代表事務所所長）

President, NRW Japan K.K.
(Director, Japan office of the state of Nordrhein-Westfalen (NRW), Germany)

1965 年ドイツ・アーヘン郡生まれ。1991 年 ボン大学（東洋言語学及び経済学専攻）卒業後、富士銀行デュッセルドルフ支店入社。1993 年在デュッセルドルフ市ノルトライン・ヴェストファーレン（NRW）州経済振興公社を経て同社日本法人である（株）エヌ・アール・ダブリュージャパンに入社、NRW州と日本における市場開拓・投資促進に係わるコンサルタント業務を担当。1996 年同本社へ再入社、日本部部長代理。1998 年ブリュッセルの欧州委員会対外関係総局日本課へ派遣され、日本との貿易及び経済関係担当。2001年３月本社日本部部長代理。2001年４月より現職。

Astrid Becker was born in 1965 in the county of Aachen and graduated in February 1991 from University of Bonn, Department for South - East - Asian Languages finalizing her studies of Japanese, Chinese and Economics. After starting her business carrier in April 1991 at the Fuji Bank Ltd. Dusseldorf Branch, she in January 1993 joined the Economic Development Corporation of the Federal State of Nordrhein-Westfalen (NRW) and was transferred to the company`s subsidiary in Tokyo NRW Japan K.K. as consultant on business and investment relations. Following her retransfer to the Headquarters in Dusseldorf in January 1996, where she took up a position as project manager for investment and trade promotion, she in 1998 was dispatched to the European Commission in Brussels, where she served as National Expert for trade relations with Japan. Ms Becker took up her current assignment as President of NRW Japan K.K. in April 2001.

郡　嶌　　孝　*Takashi Gunjima*

IGES 関西研究センター　産業と持続可能社会プロジェクトサブリーダー
（同志社大学経済学部教授）

Sub-Project Leader, Business for Sustainable Society Project, IGES Kansai Research Centre
(Professor, Doshisha University)

1947 年 (昭和 22 年) 福岡県生まれ。1969 年（昭和 44 年）同志社大学経済学部卒。1974 年 (昭和 49 年) 同大学大学院経済学研究科経済政策専攻（博士課程）修了。同大学経済学部助手。1976 年 (昭和 51 年) 同専任講師。1979 年 (昭和 54 年) 同助教授。1984 年 (昭和 59 年) 同教授。1994 年 -1996 年 (平成 6 年 - 平成 8 年) 同経済学部長。環境経済・政策学会理事、日本経済政策学会副会長、廃棄物学会評議員等を歴任。主な著書に『ポイ捨て社会への挑戦』(ぎょうせい)、『循環型社会の制度と政策』（岩波書店）（いずれも共著）等がある。

(1947) Born in Fukuoka. (1969) Graduated from Economics, Department of Economics, Doshisha Univ. (1974) M.A. Graduate School of Economics, Doshisha Univ. Research Associate in Economics, Dept. of Economics, Doshisha Univ. (1976) Lecturer. (1979) Associate Professor (1984-present) Professor (1994-1996) Dean, Member of the board of trustees of Association of Environmental Economics and Policy, Former Vice-President of Japanese Association of Economic Policy, Councilor of Association of Experts of Solid Waste Management. Main books are following: "Challenge to Throw-away Society" (Gyousei), "Institution and Policy in Eco-sound Material Flow Society" (Iwanami Shoten).

日　髙　亮　太　*Ryota Hidaka*

（財）兵庫県環境クリエイトセンター　企画開発部次長兼主任研究員、
ひょうごエコタウン推進会議事務局

Deputy General Manager and Senior Researcher, R&D Division,
Hyogo Prefectural Environmental Create Center Public Corporation/
Hyogo Ecotown Promotion Conference Secretariat

鹿児島県生まれ。電気エネルギー応用技術を専門とし、減圧プラズマ溶射装置、レーザ応用プラズマ計測技術、重金属イオン源、半導体スパッタリング装置、エッチング装置等の開発に従事。その後、環境関連の技術開発に重点を置き、灰溶融炉の開発、誘導加熱炉の開発業務を経て2003年4月より現職。理学博士。技術士。

He was born in Kagoshima prefecture. His major is electrical energy application technology, such as Low Pressure Plasma Spray, Laser Applied Plasma Diagnoses, Metal Vapor Vacuum Arc, Semiconductor Sputtering Equipment, Etching Equipment etc. His current interest includes environmental technology, such as Ash Melting Furnaces, Induction Heating Furnaces. He has taken present post since April 2003. Doctorate of Science. Consulting Engineer.

神　田　泰　宏　*Yasuhiro Kanda*

IGES 関西研究センター　産業と持続可能社会プロジェクト主任研究員

Senior Policy Researcher, Business for Sustainable Society Project,
IGES Kansai Research Centre

1978 年、大阪大学工学部卒業（応用化学科）。1979 年、同大学大学院を中退し、兵庫県庁に入庁。兵庫県の環境行政に携り、一般環境モニタリング、工場の環境管理の指導等の業務を行う。1988 年から2年間、米国ワシントン州立エバーグリーン大学大学院に留学し、MPA（行政管理学修士）を取得。1990 年から兵庫県の企画行政に携り、地域振興、科学技術振興の業務を行う。2001 年から IGES へ出向。研究分野は、環境経営、環境と地域振興。

Graduated from the Faculty of Engineering of the Osaka University in 1978.(Majored in Applied Chemistry.) Entered the Hyogo prefectural government in 1979 after studying at the Graduate School of Engineering of the university. Worked for the government's environmental administration and performed such tasks as environmental monitoring and guidance to companies. Studied at the graduate program of the Evergreen State College during 1988-1990, and received a degree of Master of Public Administration (MPA). From 1990 worked for the government's planning administration and performed such tasks as local development and promotion of science & technology. In 2001 dispatched to IGES. Research area: corporate sustainability management, environment and local development.

プログラム

14:00-14:05

開会の挨拶

天野　明弘
（財）地球環境戦略研究機関 (IGES)　関西研究センター所長

14:05-14:30

研究報告
「日独における循環政策」

神田　泰宏
IGES 関西研究センター　産業と持続可能社会プロジェクト主任研究員

14:30-15:20

セッション I
「循環ビジネスの動向」

ドイツ：レイモンド　ブライシュヴィッツ
ヴッパタール気候・環境・エネルギー研究所　物質フローと資源管理研究部部長

日　本：郡嶌　孝
IGES 関西研究センター　産業と持続可能社会プロジェクトサブリーダー
（同志社大学経済学部教授）

（15:20-15:30　休憩）

15:30-16:20

セッション II
「地域産業の振興」

ドイツ：アストリッド　ベッカー
（株）エヌ・アール・ダブリュージャパン代表取締役社長
（ドイツ ノルトライン・ヴェストファーレン（NRW）州日本代表事務所所長）

日　本：日高　亮太
（財）兵庫県環境クリエイトセンター　企画開発部次長兼主任研究員
ひょうごエコタウン推進会議事務局

（16:20-16:30　休憩、質問票回収）

16:30-17:25

総括セッション

17:25

閉　会

真継　博
（財）兵庫県環境クリエイトセンター 専務理事

Program

14:00-14:05 — **Opening**

Akihiro Amano
Director, Institute for Global Environmental Strategies (IGES) Kansai Research Centre

14:05-14:30 — **Report**
"3R Policy in Japan and Germany"

Yasuhiro Kanda
Senior Policy Researcher, Business for Sustainable Society (BSS) Project, IGES Kansai Research Centre

14:30-15:20 — **Session I**
"3R Business Trends"

Germany: Raimund Bleischwitz
Co-Director, "Material Flows and Resource Management", Wuppertal Institute for Climate, Environment and Energy, Germany

Japan: Takashi Gunjima
Sub-Project Leader, BSS Project, IGES Kansai Research Centre
Professor, Doshisha University

(15:20-15:30 Recess)

15:30-16:20 — **Session II**
"Promoting Local Industry"

Germany: Astrid Becker
President, NRW Japan K.K.
(Director, Japan office of the state of Nordrhein-Westfalen (NRW), Germany)

Japan: Ryota Hidaka
Deputy General Manager and Senior Researcher of R&D Division,
Hyogo Prefectural Environmental Create Center Public Corporation

(16:20-16:30 Recess)

16:30-17:25 — **Concluding Session**

17:25 — **Closing**

Hiroshi Matsugi
Executive Director, Hyogo Prefectural Environmental Create Center Public Corporation

財団法人地球環境戦略研究機関

「21世紀地球環境懇話会」（内閣総理大臣私的諮問機関）の提言（1995年1月）に基づいて設置された、接続可能な開発の実現に向けた革新的政策手法の開発や、環境対策に関する制作づくりのための政策的・実践的研究（戦略研究）を実践する国際的な研究機関。

1998年4月に研究活動を開始し現在、第3期（2004年度～2006年度）戦略研究プロジェクトとして、「気候政策」「都市環境管理」「森林保全」「産業と持続可能社会」（関西研究センター）「長期展望・政策統合」「淡水資源管理」テーマに取り組むとともに「人材開発プログラム」を実施している。また、1999年にはIGES内にIPCC国別温室効果ガスインベトリータスクフォース・技術支援ユニットが設置された。

活動拠点としては湘南国際村本部（神奈川県葉山町）、東京事務所（千代田内幸町）、北九州事務所に次いで、2001年6月に関西研究センターを神戸東部新都心に開設した。

Institute for Global Environmental Strategies (IGES)

Established in response to recommendations made in January 1995 by the Japanese Prime Minister's Ad Hoc Commission on Global Environment in the Twenty-First Century, IGES is an international research institution engaged in developing and formulating innovative policy instruments and environmental strategies for sustainable development ("Strategic Research").

IGES commenced its initial research activities in April 1998. IGES has conducted the following research activities in the third phase (FY2004-2006): Climate Policy, Urban Environmental Manegement, Forest Conservation, Business for Sustainable Society (Kansai Reserch Centre), Long-Term Perspective and Policy Integration, Freshwater Resources, and Capacity Building. In 1999, a Technical Support Unit for the IPCC National Greenhouse Gas Inventories was located within IGES.

IGES's activities are being carried out at the headquarters in Shonan Village, Kanagawa Prefecture; the Tokyo Office in Uchisaiwai-cho, Chiyoda-ku, Tokyo; the Kitakyushu Office; and since June 2001, the Kansai Research Centre in Kobe New Eastern City Center.

お問合せ先：

（財）地球環境戦略研究機関（IGES）
関西研究センター

〒651-0073
兵庫県神戸市中央区脇浜海岸通1-5-1
IHDセンタービル3F

TEL: 078-262-6634
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E-mail: kansai@iges.or.jp
http://www.iges.or.jp

For more information:

Institute for Global Environmental Strategies (IGES) Kansai Research Centre

IHD Centre Bldg. 3F, 1-5-1 Wakinohama Kaigan Dori, Chuo-ku, Kobe, Hyogo 651-0073 JAPAN

TEL: +81-78-262-6634
FAX: +81-78-262-6635
E-mail: kansai@iges.or.jp
http://www.iges.or.jp

注: 掲載情報の一部は暫定訳です。

Note: English translations may contain errors.

"Business and the Environment" International Workshop 2005

Conference Report

Businesses for a Reduce-Reuse-Recycle Economy:

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Date: November 22, 2005 (Tue.) 2:00p.m. -5:30p.m.
Venue: JICA Hyogo International Centre, Kobe, Hyogo prefecture, Japan

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Organizer: Institute for Global Environmental Strategies (IGES)
Hyogo Prefectural Environmental Create Center

Sponsors:

Ministry of the Environment, Hyogo Prefecture, Kobe City, German Consulate General Osaka-Kobe, NRW Japan K.K. (Japanese office of the state of Nordrhein-Westfalen (NRW), Germany), Hyogo International Association, Japan-Germany Society of Kobe, Asia-Pacific Network for Global Change Research (APN), International EMECS Center, Hyogo Prefecture Liaison Conference for Air Environment Conservation, Hyogo Prefecture Liaison Conference for Environmental Conservation in the Seto Island Sea, 10 Organizations of the Advisory Board of IGES Kansai Research Centre:

[Global Environment Forum-KANSAI, Kansai Council, Kansai Economic Federation, The Osaka Chamber of Commerce and Industry, The Federation of Chamber of Commerce and Industry in Hyogo Prefecture, Hyogo Prefectural Federation of Societies of Commerce and Industry, The Hyogo Industrial Association, Hyogo Environmental Advancement Association, Hyogo Prefecture Association for Corporate Environmental Conservation, The New Industry Research Organization]

"Business and the Environment" International Workshop 2005

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Business for a Reduce-Reuse-Recycle Economy: Current Status and Future Prospects | A Japanese and German Dialogue

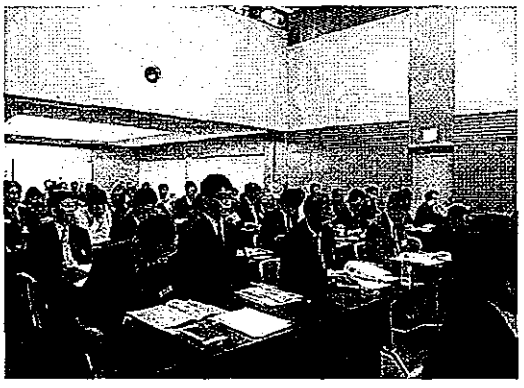
In cooperation with the Hyogo Prefectural Environmental Create Center, the IGES Kansai Research Centre organized an International Workshop on "Business and the Environment" as part of the "Deutschland in Japan" project, at the JICA Hyogo International Centre (Kobe) on November 22, 2005.

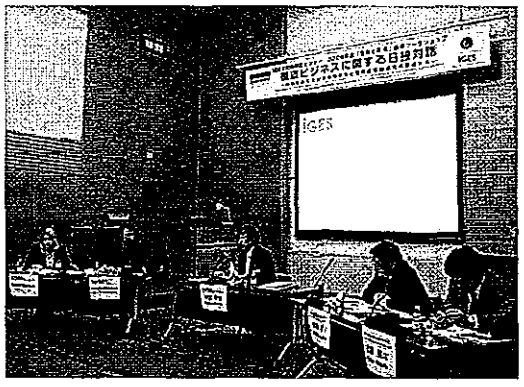
During the workshop, two guest speakers from Germany and three researchers from Japan made presentations on reduce-reuse-recycle economy, which was followed by a lively discussion about the current status and future prospects of environmental businesses in Japan and Germany.

The reports from the German speakers presented advanced examples and future scenarios of "renewable energy" and "resource productivity" as sustainable environment actions in Germany. Germany is currently studying strategies of setting higher environmental goal and using the eco-business as a source of job creation and international competition.

The Japanese reports pointed out how the reduce-reuse-recycle business has grown after the introduction of recycling laws as well as the increasing number of eco-town projects as efforts of the eco-industry. As a specific example, the Hyogo Eco Town Vision was presented. The eco-business is advancing in two directions: services and durability. One issue faced by a reduce-reuse-recycle economy is how to ensure stable demand for raw materials and products.

Germany and Japan lead the world in building a recycle-oriented society. Both countries have much in common to contribute to activities not only in each other's country but everywhere around the world, therefore it will be important to deepen the level of cooperation in the future.





Business for a Reduce-Reuse-Recycle Economy:
Current Status and Future Prospects | A Japanese and German Dialogue

CONTENTS

Opening Remarks

Akihiro Amano
Director, Kansai Research Centre
Institute for Global Environmental Strategies (IGES)

It is a great honor this day to welcome our esteemed cohorts from abroad and all other participants to our International Workshop, "Businesses for a Reduce-Reuse-Recycle Economy - Current Status and Future Prospect | A Japanese and German Dialogue".

This International Workshop is co-sponsored by the IGES Kansai Research Centre and the Hyogo Prefectural Environmental Create Center. As indicated in the program, the Environmental Create Center is in charge of reducing, recycling and researching waste in Hyogo Prefecture.

I would also like to point out that about a thousand events nationwide are underway to commemorate the "Deutschland in Japan 2005/2006". As one such event, the IGES Headquarters co-organized a symposium on "Climate Policy 2005 and Beyond - Japanese-German Impulses" to address the climate policy of Japan and Germany following the ratification of the Kyoto Protocol, together with Wuppertal Institute for Climate, Environment and Energy (WI), last November 1. Incidentally, the Wuppertal Institute is located in the most populated federal state of Germany, Nordrhein-Westfalen, where the cities of Dusseldorf and Cologne are located. The Wuppertal Institute and IGES have had close relations since the preparation stages for establishing IGES. Today, Dr. Raimund Bleischwitz of the Wuppertal Institute and Ms. Astrid Becker, Director of the Japan Offices of the State of Nordrhein-Westfalen have been invited as speakers.

Everyone knows that Japan promulgated the Fundamental Law for Establishing a Sound Material-Cycle Society in 2000 and ever since it has been amending and adopting its waste and recycling laws. This law was greatly influenced by Germany's revolutionary Closed Substance Cycle Waste Management Act, enacted much earlier. It was enacted in 1994, making it more than ten years old today. In the meantime, activities have been promoted around the world in line with the circumstances specific to each region and nation, and it has become widely recognized that we need to gain the constructive participation of regions, businesses and the general public, and integrate the environment and the economic world by means of new innovative programs, in order to enhance the effects of these activities.

Today's Workshop is being staged to cast some thoughts on ways to build a recycle-oriented society by promoting a reduce-reuse-recycle economy and local industry. Following the presentations by the speakers from Japan and Germany, there will be a discussion session at which everyone in the hall is invited and encouraged to ask questions, share comments and join in the discussion.

I am requesting every one of you to take part in this workshop until the very end and provide us an outlook on future directions for businesses and local communities in a recycle-oriented society.

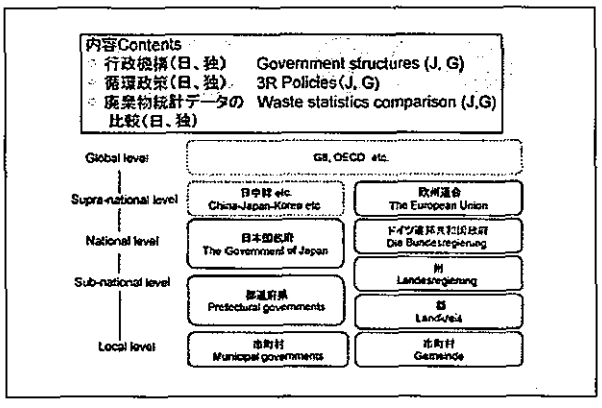
Thank you very much for your attention.

Research Report

"3R Policy in Japan and Germany"

Yasuhiro Kanda
Senior Policy Researcher, Business for Sustainable Society Project
IGES Kansai Research Centre

Today, I would like to outline the "governmental structures" responsible for 3R policy in Japan and Germany, and compare "3R policies" and "waste statistics" between the two.

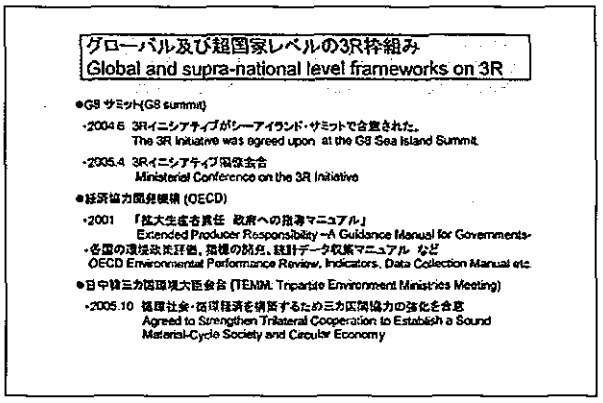


1 Governmental structures (Japan)

3R policies are developed on diverse levels from global to local.

As examples of Japan, I have chosen the activities conducted on the supra-national level by Japan, China and Korea, on the national level by the Japanese national government, on the prefectural level by Hyogo and on the local level by Himeji City. I chose Himeji because that is a core city of the Hyogo Eco Town project.

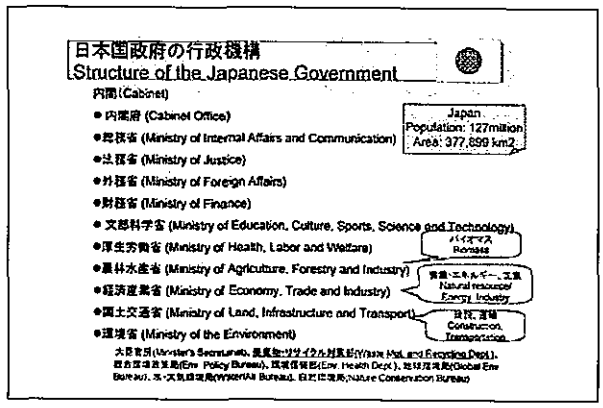
In Germany, I have chosen the European Union, Die Bundesregierung, Nordrhein-Westfalen (NRW) as a federal state and Dusseldorf, which functions as both a district and municipality. Dusseldorf has about the same population and size as Himeji, therefore I chose it.



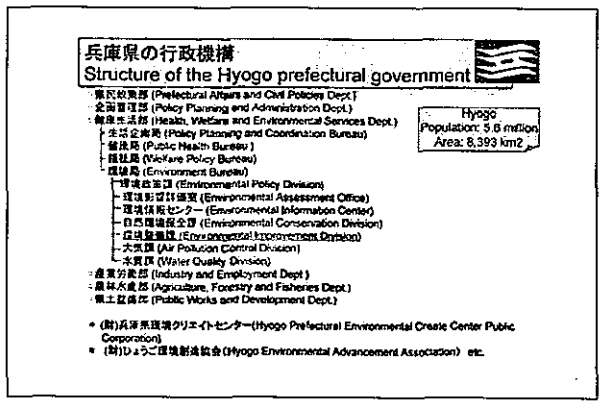
As an activity of the 3R policies on the global level, the 3R Initiative was agreed to at the G8 Summit in June 2004, and a Ministerial Conference of the 3R Initiative took place in Tokyo in April 2005, with 20 countries in attendance. OECD prepared a guidance manual on Extended Producer Responsibility (EPR) in 2001 and also an environmental performance review, indicators and data collection manual for governments. In Asia, the Environment Ministries of Japan, China and Korea hold a meeting every year. At this year's meeting, they agreed to strengthen cooperation towards building recycle-oriented societies and economies.

The Japanese government consists of a Cabinet and 11 ministries. At the core of the 3R policies is the Ministry of the Environment and the Waste Management and Recycling Department is in the ministry.

In Japan's case, multiple ministries develop 3R policies. The Ministry of Economy, Trade and Indus-



try is responsible for coordination with the various industrial sectors and resource and energy policy. The Ministry of Agriculture, Forestry and Fisheries heads up biomass policy. The Ministry of Land, Infrastructure and Transport has jurisdiction over the construction industry and transportation industry.



Let us next look at the structure of the Hyogo Prefectural Government. It is made up of bureaus and departments that roughly correspond to the ministries of Japan, one of which is the Environment Bureau. The heart of 3R is the Environment Improvement Division, but biomass is the responsibility of the Agriculture, Forestry and Fisheries Department, as multiple bureaus and departments overlap one another in conducting 3R activities. And, one organization that is related to the Environment Bureau is the Hyogo Prefectural Environment Create Center Public Corporation.

This is an example of city-level government, Himeji city in this particular case. There is an Environment Bureau, and the Recycle Promotion Division

spearheads 3R policy. The Industry Bureau includes agriculture, forestry, fisheries and industry.

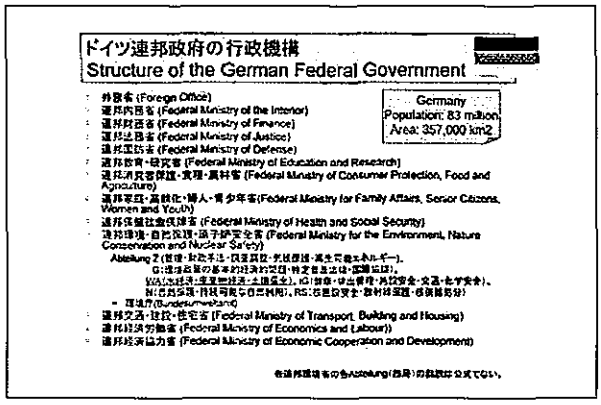
2 Governmental structures (Germany)

Let us next look at government in Germany. I will first discuss the European Union. The European Union (EU) has the European Parliament and the Council of the European Union, and then there is the European Commission that shoulders the administrative functions.

Each administrative area of the European Commission has a Directorate General (DG); for the environment, it's the Environment Directorate General.

One can find out roughly what other directorate generals are doing about environmental policy by visiting the environmental page of their websites, but often those links jump to the homepage of the Environment Directorate General, so the EU's environmental policy seems to be relatively unified.

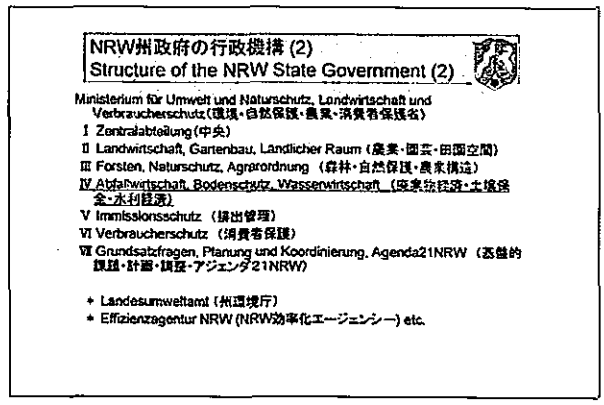
Next is the structure of the German Federal Government. In Germany, the Bundesumweltamt that



implements policy is separate of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. What is very interesting is that the Federal Ministry for the Environment is in charge of resources and energy as well. They oversee nuclear power stations and renewable energies. However, regulations on the energy supply business come under the jurisdiction of the Federal Ministry of Economics and Labor, which equates to Japan's Ministry of Economy, Trade and Industry.

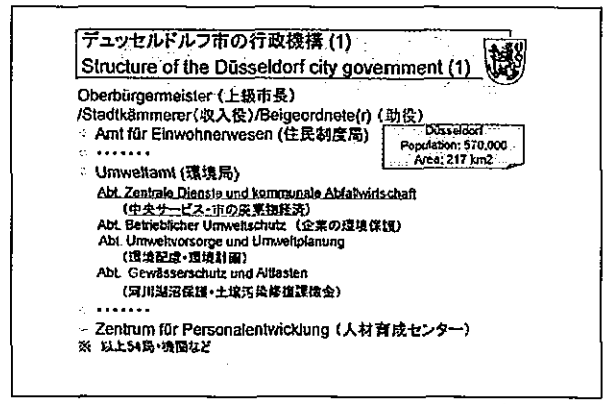
For what regards 3R policies, a bureau of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety named WA for keywords (water economy, waste economy and land conservation) is responsible. Another interesting point is the word Abfallwirtschaf, translated as "waste economy", used in Germany. This term is used widely and not just by the federal government. It would seem that, in Germany, the waste problems are recognized as economic problems.

Let us next look at the governmental structure of the NRW state. Germany is a federation of states, so state governments have the basic functions of the nation. States are involved in energy and justice, which is something you do not see in Japan's prefectures. The environmental administration lumps together nature conservation, agriculture and consumer protection.



This is the internal structure of the Ministerium fur Umwelt und Naturschutz, Landwirtschaft und Verbraucherschutz of NRW. It is divided into seven organizations, I to VII. 3R policies are the responsibility of the fourth organization, the Abfallwirtschaft, Bodenschutz, Wasserwirtschaft.

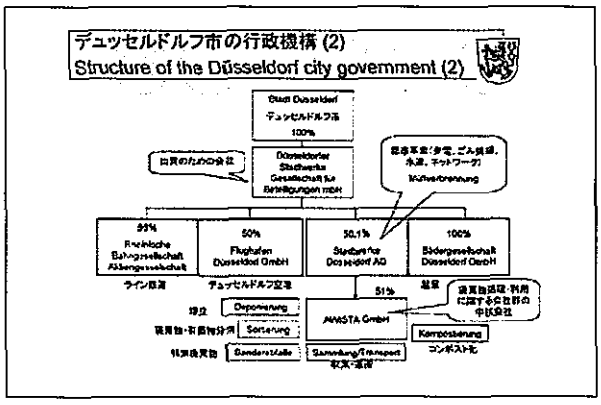
Two policy implementing agencies related to this ministry are the state's Landesumweltamt and Effizienzagentur NRW that runs PIUS, which will be discussed in more detail in session 2.



Let us look at the governmental structure of the Dusseldorf as an example of a city. Dusseldorf is an independent city that functions as both a district and municipality. The mayor is called Oberburgermeister.

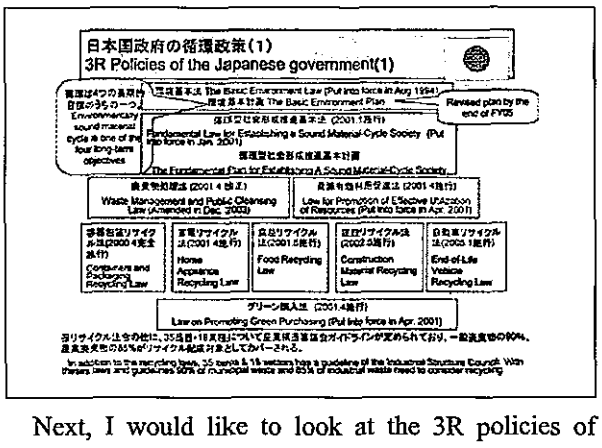
They have more than 54 bureaus and organizations, each of which performs different jobs.

One of the bureaus is the Umweltamt and one of the organizations underneath it takes care of waste economy, etc.



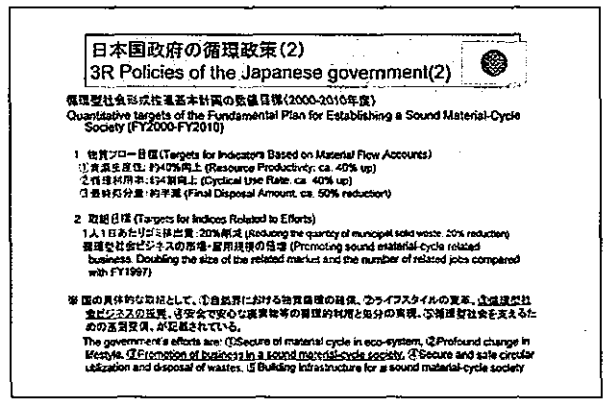
As in Japan, the city is responsible for the treatment of municipal waste. This figure shows the city-owned companies that take care of the waste treatment business in Dusseldorf and their ownership shares. In the case of Dusseldorf, power generation, waterworks and so forth are handled by a public corporation in which the city owns 50.1% via an investment company. The core entity involved with waste treatment is AWISTA, which is 51% owned by the public corporation. So, the companies and systems are built by sharing capital. The network of companies handles waste treatment in the city.

3 3R policies (Japan)



Next, I would like to look at the 3R policies of Japan.

The crux of Japan's 3R policies is the Basic Environment Law, based on which the country drafts a Basic Environment Plan. The current plan sets four long-term targets, one of which is the "environmentally sound material cycling". Directly concerning 3R policies are the Fundamental Law for Establishing a Sound Material-Cycle Society and the Fundamental Plan for Establishing A Sound Material-Cycle Society that is based upon it. There are laws governing resources that serve as the input of economic activity as well as the output, which is waste, and recycling of the various materials. They are the Containers and Packaging Recycling Law, Home Appliance Recycling Law, Food Recycling Law, Construction Material Recycling Law and End-of-Life Vehicle Recycling Law. And, there is a Law on Promoting Green Purchasing so that governments, large and small, promote green purchasing in their consumer behavior.

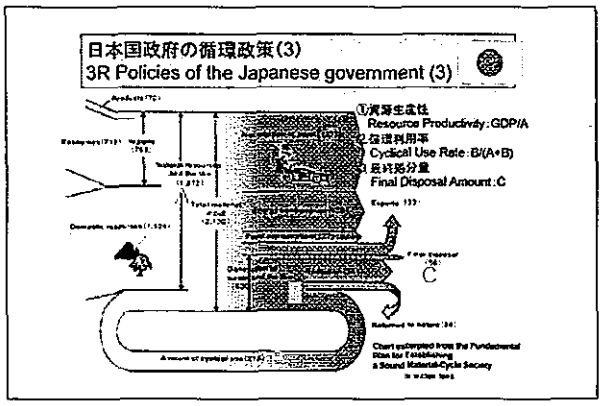


There are two kinds of numerical targets set forth in the Fundamental Plan for Establishing A Sound Material-Cycle Society; one is for material flow, while the other is for efforts.

Material flow targets specify three types of targets in "resource productivity", "cyclical use rate" and "final disposal amount".

Effort targets are set for the "reduction of waste per capita per day", "doubling the size of related markets and jobs" and so forth.

The next slide shows material flows in Japan. It shows how the three material flow targets I just mentioned fit in.



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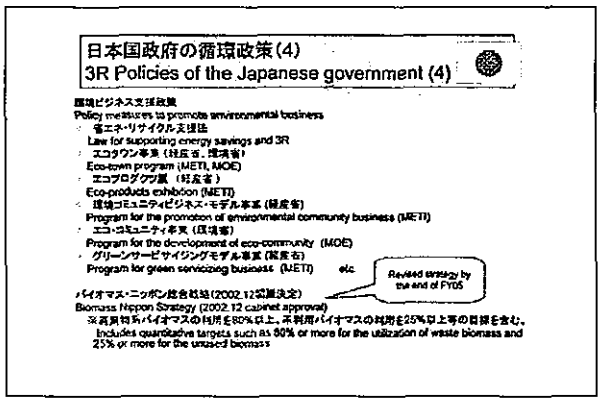
The Wuppertal Institute has been studying material flows for some time, so this is an area of specialty for them. In Japan, the National Institute for Environmental Studies is involved with this and is researching material flows via an international network.

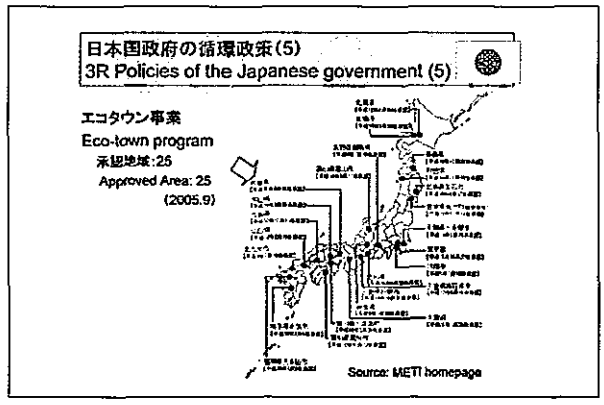


Japan also develops policies from the perspective of promoting business rather than regulations.

The Ministry of Economy, Trade and Industry and the Ministry of the Environment have various supporting policy measures. For example, there are the "eco products exhibition", "eco community program" and "green servicizing business program".

And, for what concerns biomass, the Cabinet adopted a Biomass Nippon Strategy in 2000.

This is a map of eco-town projects, one of the policy measures I just mentioned. Currently, 25 locations have been approved by the Ministry of the Environment and the Ministry of Economy, Trade and Industry.



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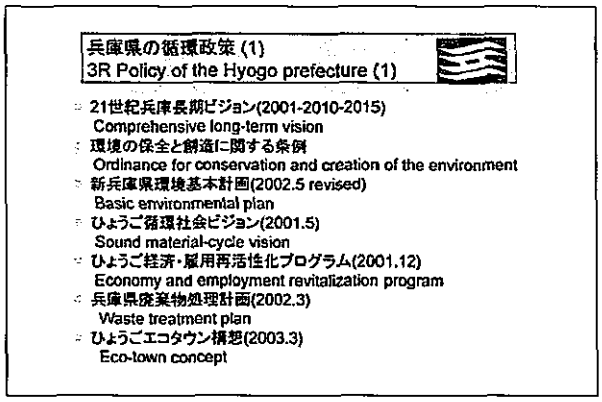
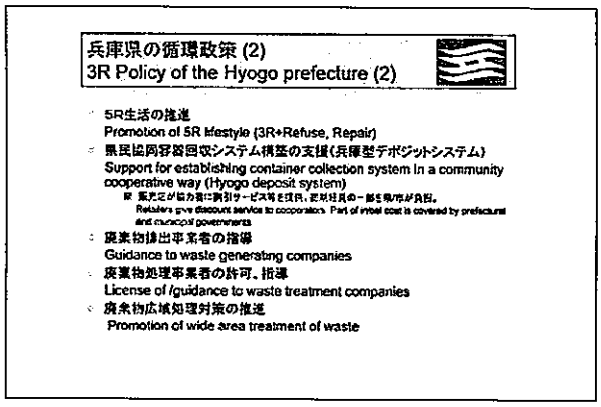


Here are the 3R policy and related measures of Hyogo Prefecture. The policies of local governments basically comply with national policy. Also, local governments in Japan draft long-term comprehensive plans, which in Hyogo Prefecture is the "21st Century Long-Term Vision".

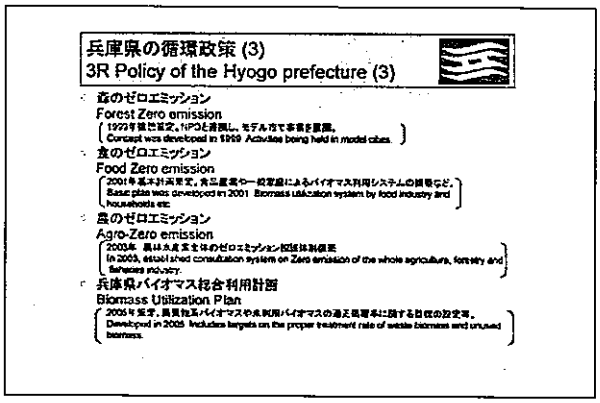
The Ordinance for conservation and creation of the environment compares to the Basic Environment Law of Japan. Hyogo's equivalent of the Basic Environment Plan is the "New Hyogo Basic Environmental Plan", while their version of a Fundamental Plan for Establishing A Sound Material-Cycle Society is the "Hyogo Sound Material-Cycle Vision".

Other than that, there are programs for economics and employment, waste treatment plans, and so forth. Within this structure of policies and programs is the Hyogo Eco Town Concept.

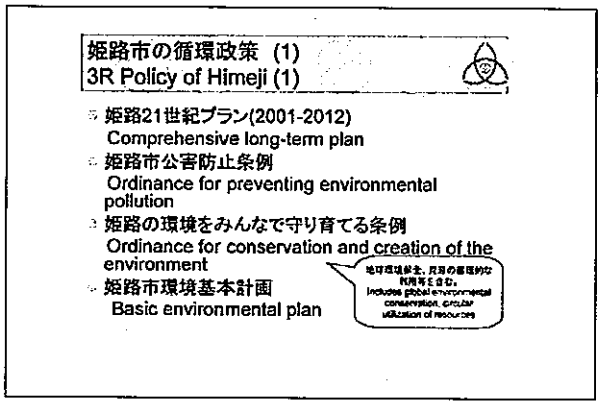
The slide lists some other initiatives. For example, there are the "promotion of 5R lifestyles (3Rs + Refuse and Repair)", "support for establishing container collection systems in community cooperative ways"



and "guidance to waste generating companies".

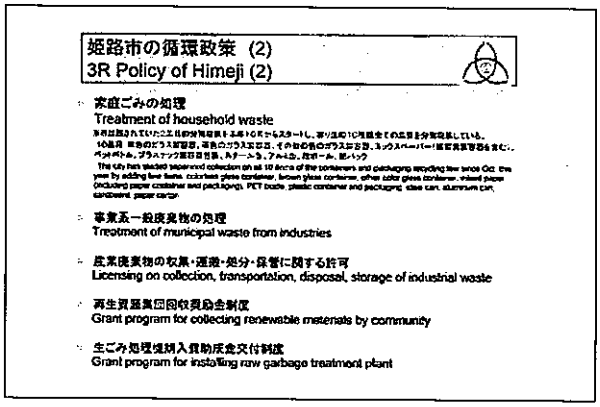


This slide shows some 3R programs for agriculture, forestry and biomass in the "Forest Zero Emission", "Food Zero Emission", "Agro-Zero Emission" and "Hyogo Biomass Utilization Plan".



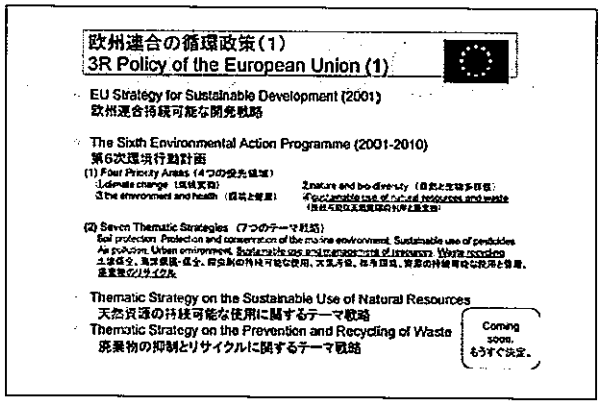
The long-term comprehensive plan of Himeji City is the "Himeji 21st Century Plan". Moreover, they have two ordinances on pollution and the environment, and have adopted the "Himeji Basic Environmental Plan".

This slide explains specific operational aspects of



Himeji's 3R policy. In regards to waste treatment, Himeji has started sorting and collecting ten types of containers and packaging waste. Raw waste such as food scraps are incinerated as combustible waste.

4 3R policies (Germany)

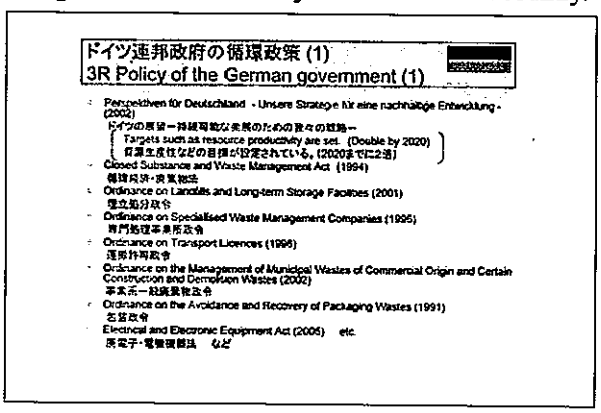


Next, let us look at 3R policy in the European Union. The European Union develops environmental programs in line with the Sixth Environmental Action Programme and the EU Strategy for Sustainable Development. The Action Plan consists of four priority areas and seven thematic strategies. Resources and waste are one of the four priority areas. Thematic strategies are currently under study for each area. These thematic strategies are very important towards understanding the long-term direction of EU policy.

This slide gives the 3R policy of the European Union. The "Council Directive on Waste" at the very top is looked at as setting the framework for other directives by defining waste and related keywords. Then, the "Council Directive concerning Integrated

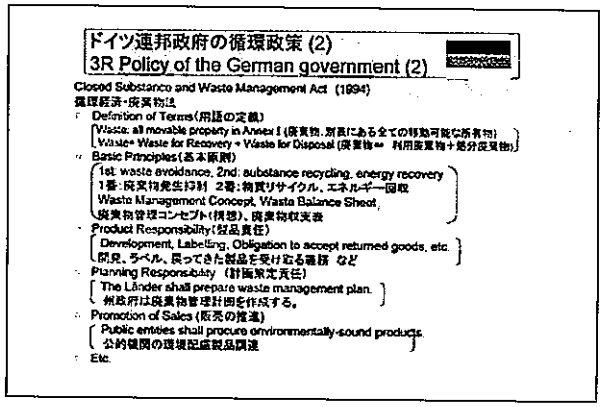
Pollution Prevention and Control" regulates industrial activity of high environmental load, therefore waste management is also dealt with. Other than that, there are individual directives for landfill, incineration, container and packaging recycling, and so forth.

The EU has various kinds of laws, but the word "directive" is frequently used in environmental administration. In the relationship between the EU and EU nations, there is debate as to how much power the EU has over its member states. A directive binds the member states to attaining targets, but the method for doing that is determined by the laws of each country.



The overall strategy of the German Government is a "Sustainable Development Strategy". This strategy sets numerical targets and manages progress. Though Japan has governmental strategies for global warming prevention, biomass and the like, none exists for sustainable development.

The Closed Substance and Waste Management Act is the legal core of Germany's 3Rs. This law incorporates provisions on landfill, waste processors, packaging and so forth.



This slide shows the makeup of the Closed Substance and Waste Management Act that lies at the center of Germany's 3R policy. It is packed with terminology definitions, basic provisions, product liabilities, waste planning responsibilities, sales promotions of eco-friendly products, and more. Accordingly, it has elements of Japan's Basic Environment Law, Waste Management and Public Cleansing Law, Law for Promotion of Effective Utilization of Resources and Law on Promoting Green Purchasing.

The basic principle is first to prevent waste from occurring. Generators of waste above a certain volume are obliged to prepare a waste management concept and waste balance sheet.

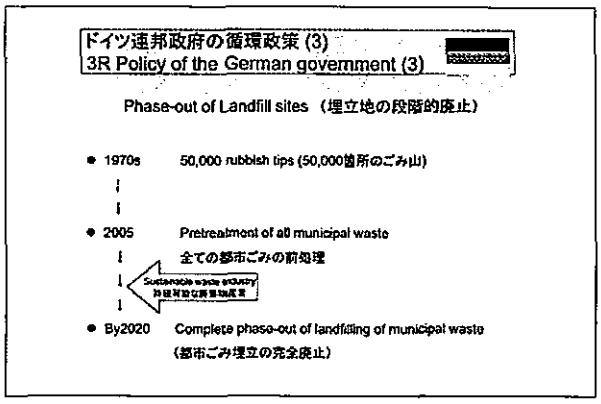
廃棄物の定義
Definition of Wastes

Japan	Germany (EU)
・廃棄物かどうかが議論 Point: Waste or not ・廃棄物の定義 Definition of Wastes 一産業廃棄物の定義 Definition of Industrial Wastes 一一般廃棄物の定義 Definition of Municipal Wastes (産業廃棄物以外) (Wastes other than Industrial Wastes)	・利用廃棄物か処理廃棄物かが議論 Point: "Waste for Recovery" or "Waste for Disposal" ・廃棄物分類(categories of waste)、処理とは(disposal operation)、利用とは(recovery operation) ・廃棄物目録(list of wastes) ①鉱業・・・からの廃棄物 Waste resulting from mining... ..... ⑳都市ごみ Municipal wastes

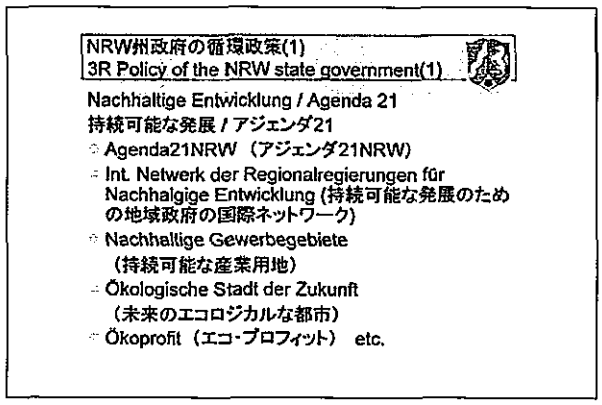
This slide shows how Germany and Japan define various wastes, and let me point out their differences. Germany's definition of waste carries over from the broad meaning of waste concepts of EU laws on waste.

As for this definition of waste, whereas Japan de-

bates whether or not a substance is waste, Germany mainly debates whether it is waste for recovery or waste for disposal. In categorizing waste, Japan first defines wastes, then defines industrial wastes and categorizes the remainder as municipal waste. On the other hand, Germany has a waste list that divides waste into roughly twenty categories, the twentieth of which is municipal waste. Accordingly, the wastes numbered from one to nineteen on the list in Germany equate to industrial waste in Japan.



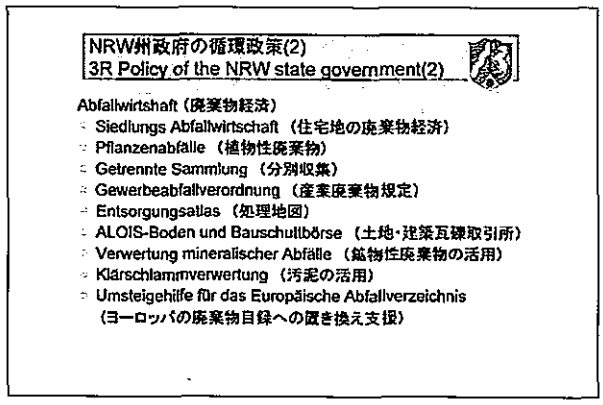
Germany has set a target to completely phase out the burying of municipal waste by the year 2020. To attain that target, it is essential that they promote a sustainable waste industry.



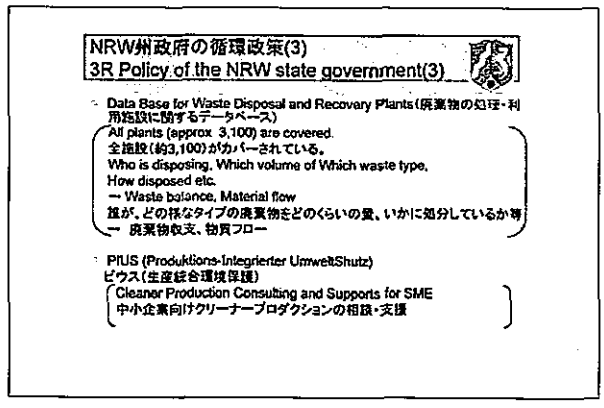
This slide shows the comprehensive environmental policy of NRW (Nordrhein-Westfalen). "Agenda 21 NRW" is an activity imparted by a state legislature initiative and participated in by not only state government but also residents and businesses. This can be looked at as equivalent to the long-term comprehensive plans of local governments in Japan.

One division in the state Ministry for the Environment is promoting "Agenda 21 NRW". This division develops activities between local governments over an international network and general undertakings for certain areas and cities.

They are promoting a sustainable industrial site project called "Nachhaltige Gewerbegebiete", which is similar in content to Japan's Eco-Town Program. They are also implementing activities for general environmental measures called "Ökologische Stadt der Zukunft".

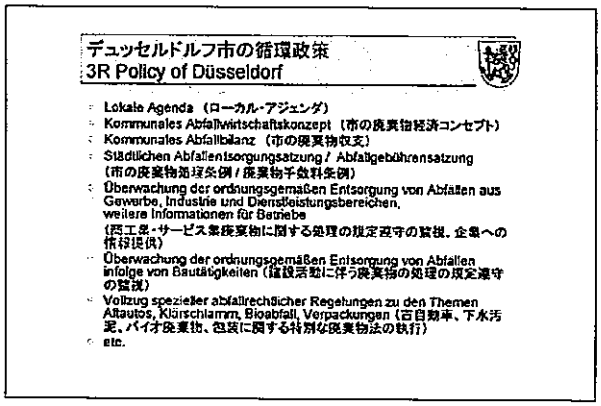


This slide gives some specific activities of the NRW Abfallwirtshaft. Municipal waste is handled in Siedlungs Abfallwirtschaft. Pflanzenabfalle takes care of plant waste. Metal resources come under Verwertung mineralischer Abfalle, and Klarschlammverwertung makes use of sludge.



This slide is about the operations performed by agencies of NRW. A database of waste treatment and usage facilities has been built and small to medium size businesses are provided with counseling and sup-

port for cleaner production in a program called PIUS.

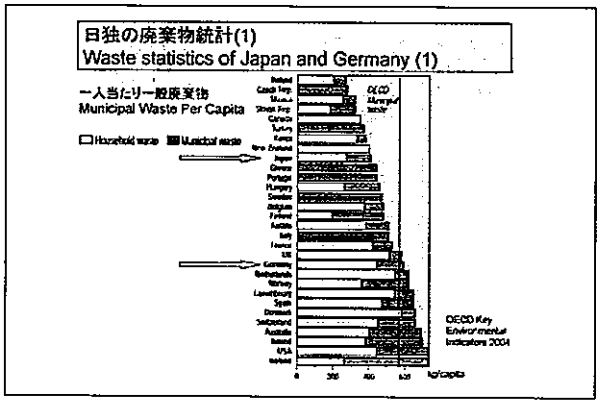


This slide shows the 3R policy and operations of Dusseldorf. Dusseldorf has a Local Agenda 21. This Agenda focuses activities on processes; it does not end after plans have been drafted.

Processors of municipal waste must by law prepare a waste concept and waste balance. Moreover, Dusseldorf provides information on waste not only to residents but also businesses.

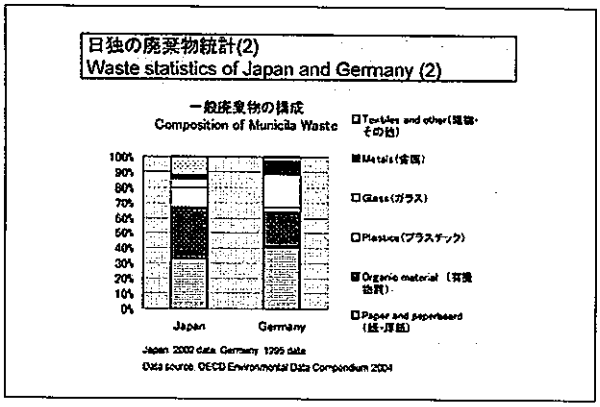
5 Japanese and German waste statistics

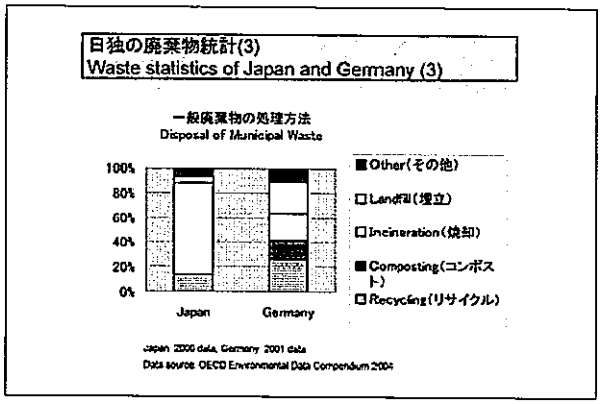
Lastly in my presentation, I would like to compare Japan and Germany by waste statistics.



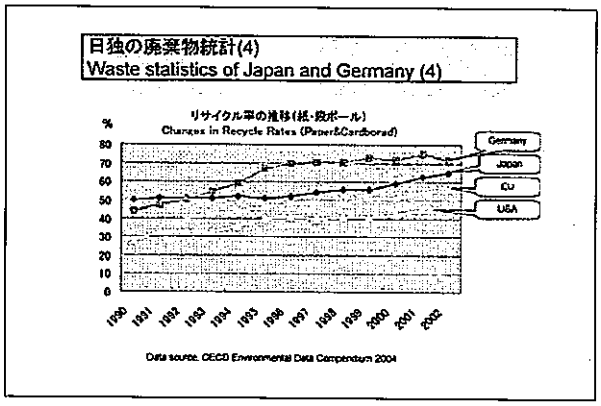
The numerical figures of this bar graph came from OECD and indicate the amount of waste per capita. The USA is one of the largest waste producing nations. Japan is still low, but Germany generates a comparatively high level of general waste.

The next graph compares the composition of general waste. In Japan, plastics are abundant, whereas in Germany, glass is abundant.

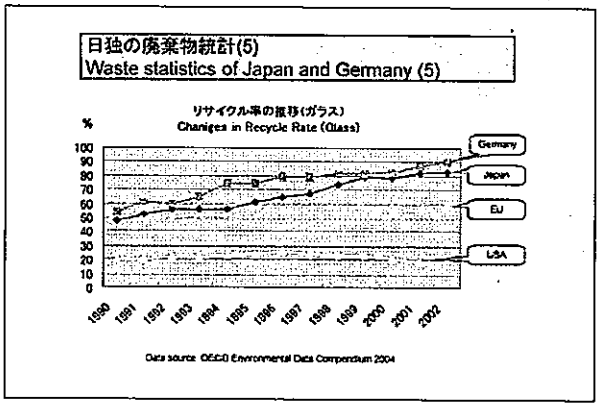




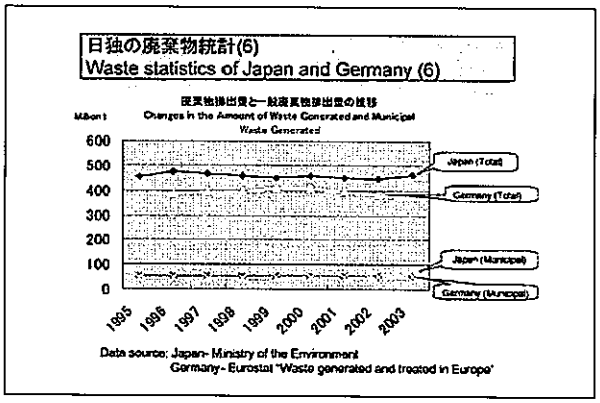
This graph shows the percentages of treatment methods of general waste. Japan uses a high level of incineration, whereas Germany turns to composting and landfill. Germany has decided to eliminate the use of landfill entirely by the year 2020.



This broken line graph compares the change in recycle rate of paper and cardboard amongst Germany, Japan, the EU and USA. Recycle rate is increasing across the board. Germany has the highest recycle rate, followed by Japan, then the EU and finally the USA.



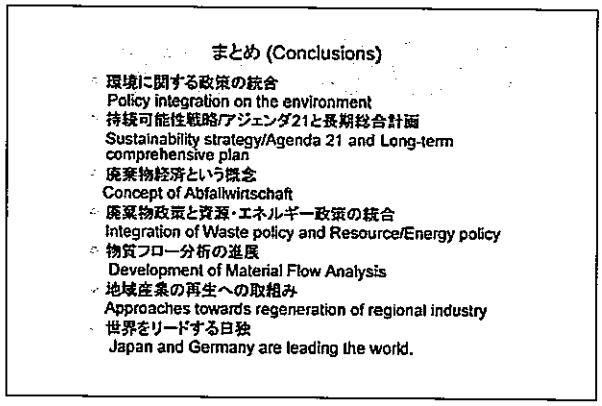
This graph compares the change in recycle rate of glass amongst the same four countries and territories. As with paper and cardboard, Germany has the highest recycle rate, followed by Japan, the EU and the USA in that order.



This graph shows the change in industrial waste generation and general waste generation. Perhaps because Japan and Germany define it differently, I was unable to find statistical data for comparing industrial waste. Therefore, I compared the total amount of waste between industrial waste and municipal waste against the amount of waste in Germany, then came up with this graph. The difference between the total and municipal waste can be considered the industrial waste as Japan defines it.

Germany produces about 80 to 90% the total waste of Japan. Considering Germany has about 60 to 70% of Japan's population and GDP, Germany generates more total waste than Japan, as was the case with general waste per capita. However, Germany may be producing more waste because they have a broader definition of waste.

As a conclusion, I would like to raise seven points on the 3R policies of Japan and Germany.



First all, Germany and Europe are pushing integrated environmental policy. When the environment is recognized as important, it is conceivably possible to develop integrated policy on the environment. Japan, however, does not seem to have gotten that far.

Next, perhaps because Japan has had long-term comprehensive plans for some time that concepts like a sustainability strategy or agenda 21 have not spread.

Germany looks at waste as an economic issue.

Germany devises 3R policies from a total perspective by looking not just at waste as the output but also resources and energy as inputs.

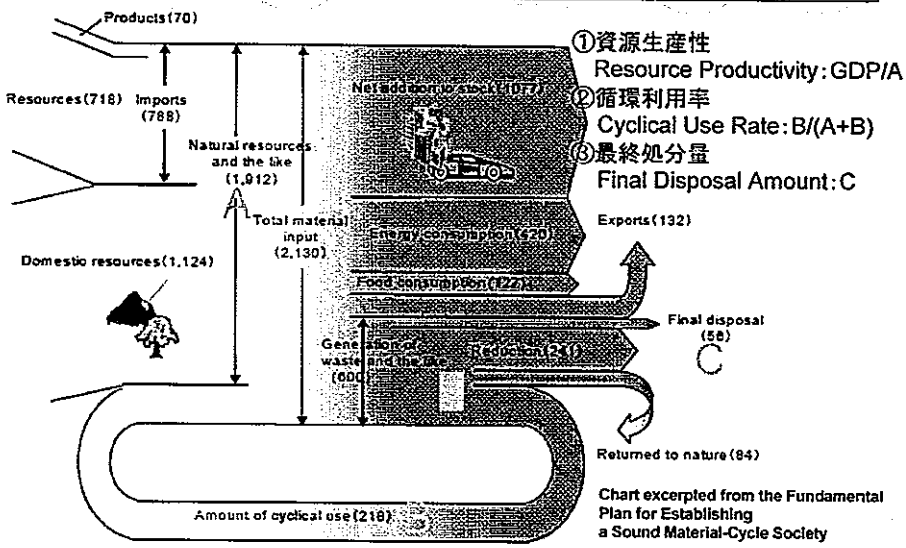
Both Japan and Germany are applying material flow analysis. Both Japan and Germany are working to revive local industry in each their own way.

Lastly, in terms of recycle rate, Japan and Germany lead the world. Cooperation between the two is very important.

Reference sites

- Japanese Ministry of the Environment: http://www.env.go.jp/
- Environment Bureau of the Hyogo Prefectural Government: http://www.pref.hyogo.jp/JPN/apr/
- City of Himeji: http://www.city.himeji.hyogo.jp/
- Environment DG, European Commission: http://europa.eu.int/comm/environment/index_en.htm
- German Federal Ministry for the Environment: http://www.bmu.de/english/aktuell/4152.php
- Ministry for the Environment, NRW: http://www.munlv.nrw.de/index.html
- Environment Agency, NRW: http://www.lua.nrw.de/
- Efficiency agency, NRW: http://www.efanrw.de/
- City of Dusseldorf: http://www.duesseldorf.de/de/
- Environment bureau, Dusseldorf: http://www.duesseldorf.de/umweltamt/index.shtml

日本国政府の循環政策(3)
3R Policies of the Japanese government (3)

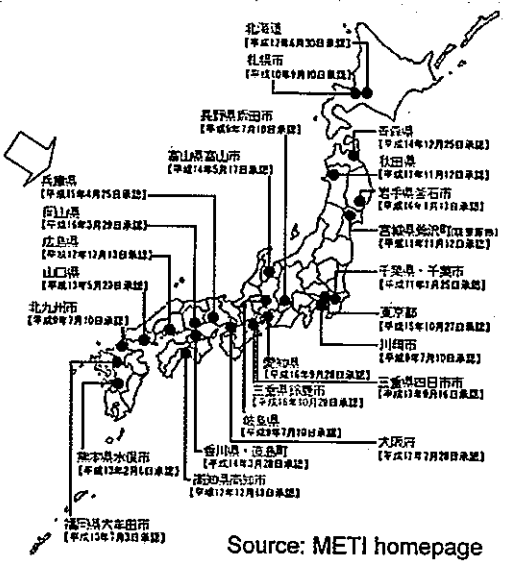


①資源生産性
Resource Productivity: GDP/A
②循環利用率
Cyclical Use Rate: B/(A+B)
③最終処分量
Final Disposal Amount: C

Chart excerpted from the Fundamental Plan for Establishing a Sound Material-Cycle Society
In million tons

日本国政府の循環政策(5)
3R Policies of the Japanese government (5)

エコタウン事業
Eco-town program
承認地域:25
Approved Area: 25
(2005.9)



Source: METI homepage

Session I: 3R Business Trends

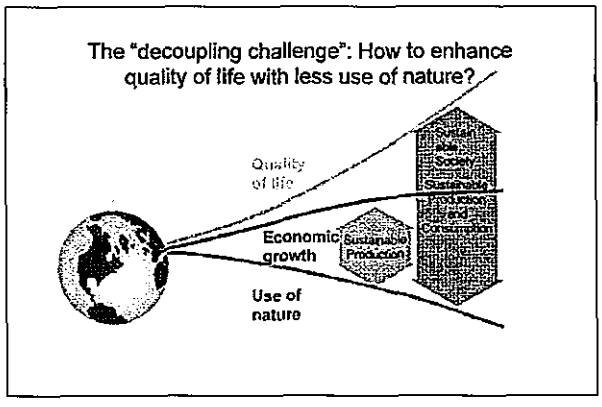
"3R Business in Germany and Europe: Trends and Emerging Policies"

Raimund Bleischwitz

Wuppertal Institute for Climate, Environment and Energy (Germany)

I will be reporting today on trends and emerging policies in the 3R business of Germany and Europe.

1 Decupling the environment and economy

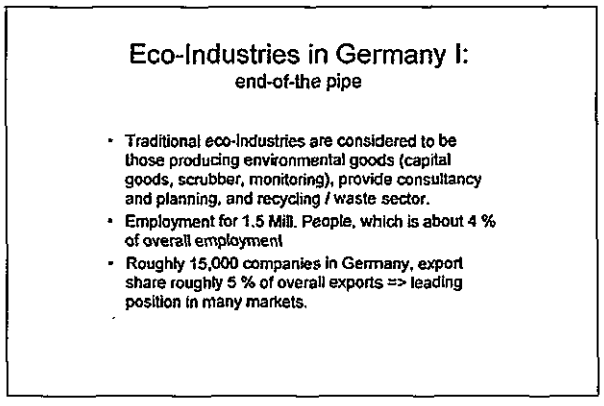


This slide illustrates the decoupling between economic growth and material consumption and the quality of life, through which the use of natural resources is reduced to a minimum, a high standard of living is guaranteed for all members of society and economic growth is good. This is the development of a sustainable society.

2 Eco-industry in Germany

Here, I would like to present the various types of eco-industries.

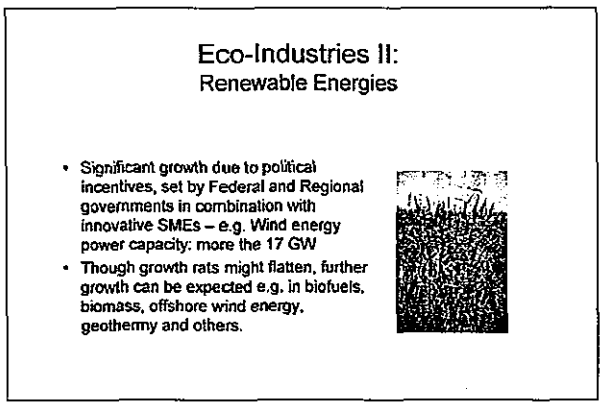
This slide summarizes the end-of-the-pipe type of eco-industry in Germany. Traditional end-of-the-pipe industry has been a very important industry for some



time. This end-of-the-pipe industry removes and treats the air pollutants or wastes generated at the end of production processes. For example, there is the manufacture of capital assets such as incinerators and exhaust gas scrubbers, as well as consulting, water treatment and the waste field.

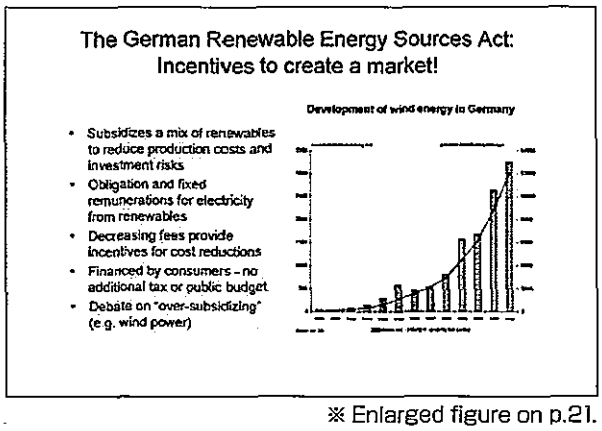
In Germany, there are 15,000 such businesses employing 1.5 million people, accounting for 4% of all employment. Though this is an older way to look at it, it is a very important industry for both domestic and export markets. Moreover, environmental technology accounts for 5% of all exports. This German environmental technology is in a leading position world wide.

One area of the eco-industries that is growing strongly is renewable energies. This, too, is one type of eco-industry. Because measures for reducing the emission of greenhouse gases are needed, the German



Federal Government is providing incentives, and which, combined with business innovation activities, is spurring strong growth in renewable energies. For example, today, wind power generation systems have a capacity of 17 GW.

Though growth rate in land-based wind power energy may flatten, biofuels and biomass, sea-based wind power energy and geothermal energy are expected to grow further.



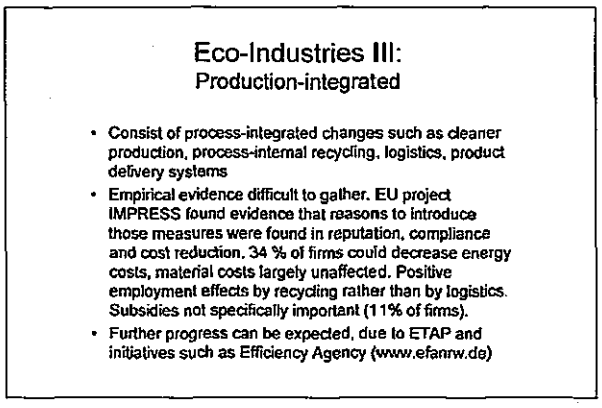
※ Enlarged figure on p.21.

From a long-term perspective, hydrogen may replace oil as a strategic energy in the year 2020 and beyond. However, the demand for energy-saving technology will not decrease. Instead, renewable energies and energy-saving technologies are being looked at as a complementary strategy that requires one and the other.

Germany put into force the Renewable Energy Sources Act in 2000. A similar law existed before that, but the new law provides subsidies for activities that use renewable energies and allows revenues to be earned by selling electricity. As a result, it is helping to lower production costs of power companies and reduce investment risks for investors. Moreover, energy providers are required to purchase renewable energies at a fixed price. This scheme is reducing production costs and utility rates for renewable energies.

An important note is that electricity rates are borne by the consumer and not the taxpayer. With public subsidies, budgets are limited and approval is needed from the European Commission. Germany's Renewable Energy Sources Act cleverly bypasses this. Spain has a similar legal framework. With this scheme, incentives work and renewable energies are solidly introduced on the market.

Taking example, some German states have started introducing policies that make it harder to establish new wind farms. The Federal Government claims that the subsidies of the Renewable Energy Sources Act are not in excess. In any case, some cases of success can be seen.

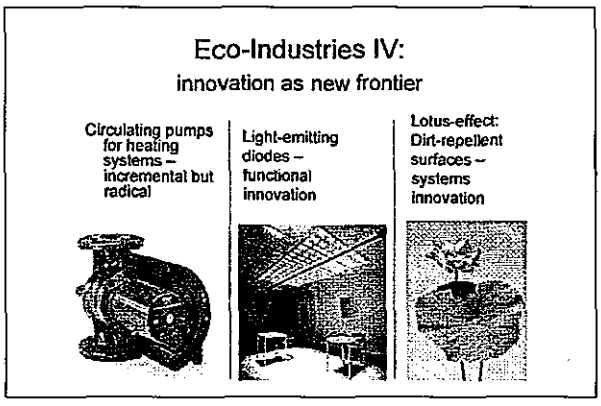


The third type of eco-industry is production-integrated. It consists of process-integrated changes such as cleaner production, in-process recycling, logistics, product delivery systems, and so forth.

Nevertheless, it is hard to gather empirical evidence that integrated production is reducing environmental load. The EU research project IMPRESS found that these measures were introduced because of business brand, compliance and to reduce costs. Businesses that have introduced integrated production have reduced their energy consumption and material

costs, and found that recycling rather than logistic has a positive effect on employment.

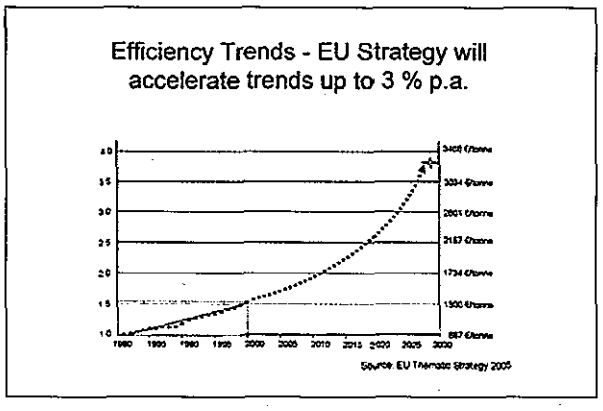
Integrated production is expected to spread further because of the Environmental Technology Action Plan (ETAP) and incentives such as the Efficiency Agency.



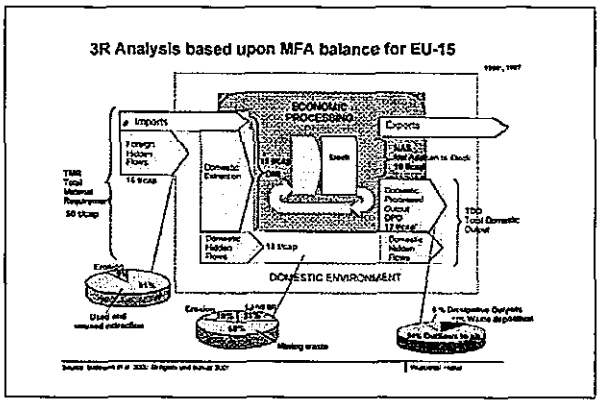
The fourth type of eco-industry is an innovative type that serves as a new frontier. For example, there are circulating pumps for heating systems that slightly but radically improve performance, functional innovation such as light emitting diodes (LED), and bio-mimicry, which applies mechanisms of plants such as the surface of the lotus leaf that repels dirt.

3 Material flow analysis and 3R policy

Material efficiency is a new trend in 3R policies. At the call of the German Ministry for Economy, large conferences have been held on raw material security with the participation of the German Federal Industry Association (BDI). Behind this activity is the rising cost of raw materials for industry, such as copper and iron ore. Moreover, the EU is studying thematic strategies for sustainable resource management. Concrete policies will be devised from these thematic strategies. One sustainability strategy being promoted by the EU and Germany is "resource productivity and material efficiency".



The EU is studying strategies to accelerate material efficiency. The current material efficiency is 1.5%, but the target is to raise it by 3% annually every year up through 2030. Within the thematic strategies for sustainable resource management, studies are looking at creating a hub organization for material flow information in EU, and having each sector and nation develop action plans.



Our research institute has been thinking about how to measure and manage resources exploited in economic activity from the cradle of a product to its grave. We are now measuring resource flow using a tool known as Material Flow Analysis (MFA). It is used by the Statistics Bureaus of the EU and Germany, member states of the European Union, and

Japan's National Institute for Environmental Studies. Material flow analysis is supported by OECD, as well.

The slide shows a material flow analysis of the 15 member states of the EU. It measures all types of materials whether for agriculture or industry.

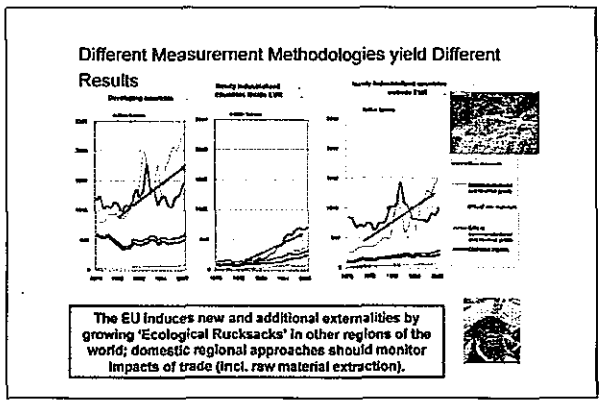
The Total Material Requirement (TMR) per person required by the average EU resident in a year is 50 tons. Within that are 16 tons of foreign hidden flows that come with imports.

There are 19 tons of domestically extracted materials per person and 15 tons of Domestic Hidden Flows; mining waste fits in here. As a part of the input, 10 tons are added to stock. These are used for infrastructure such as construction and roads. However, if looked at from a 3R perspective, this infrastructure itself becomes waste. Therefore, it is necessary to raise construction field in policy management.

On the right of the slide is the nation's output, which measures waste and gas emissions including CO_2.

Material flow analysis will eventually be necessary for countries, businesses and regions to get involved with material productivity. That is because 3R management is not possible without understanding material flow.

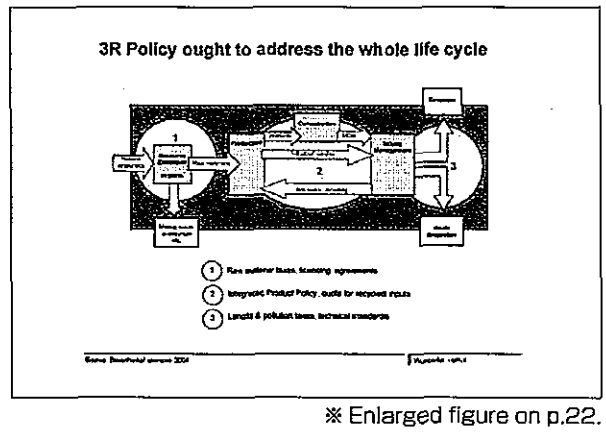
Hidden flows are complicated. A breakdown of hidden flows is given in the pie chart at the bottom. Foreign hidden flows include both that which is not used and that which is used; domestic hidden flows consist of mining waste, soil erosion and landfill. A large portion of the hidden flows on the output side comes as outflows to the air. Hidden flows are even more complicated in regional and business strategies.



※ Enlarged figure on p.21.

Without hidden flows, the total foreign material use has been flat since 1976. However, the result is completely different when hidden flows are added in. The line indicating the ecological rucksacks of intermediate and finished products rises to the right. If compared against a materials-only line, a large difference is easily recognized. Results are very different when all materials are measured and when materials are measured in a narrower sense.

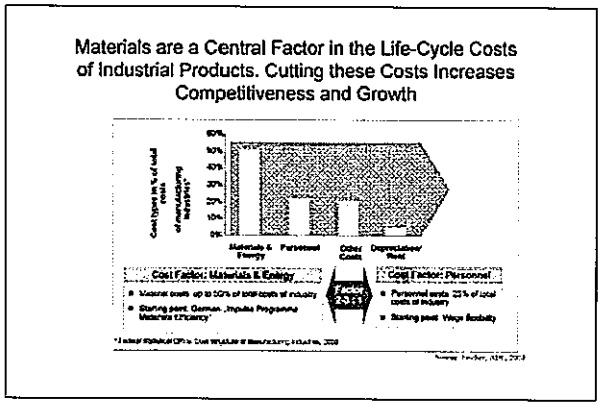
In order to measure all materials, foreign hidden flows must be included. And, measured values must be used in statistics. In order for this measurement method to become an international standard, cooperation is needed amongst statistics bureaus, experts, etc. Businesses, too, need material flow analysis to measure material investment from an international perspective.



※ Enlarged figure on p.22.

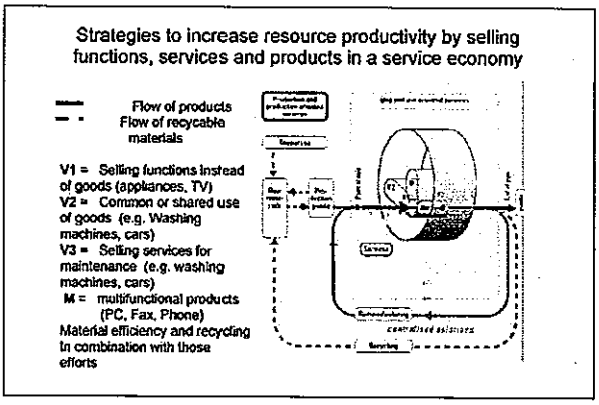
This slide shows the target areas of policies. It is questionable whether or not existing policies are sufficient for each lifecycle stage of a product, but waste management of the third stage is working well. Nonetheless, the transition from material extraction of the first stage to production of the second stage is not sufficiently managed. Policy tools should be applied more to managing the first stage.

Materials are a central factor of the lifecycle costs of a product. This figure illustrates what percentage



of the costs of an average product are material costs. Resultantly, the material costs and energy costs account for about 50% of product costs, which is more than the percentage of manpower costs.

If business managers are asked where they can cut costs, most respond by "cutting personnel expenses". This is shocking. By reducing material costs and energy costs, production costs as a whole can be decreased, but this has always been looked at lightly.



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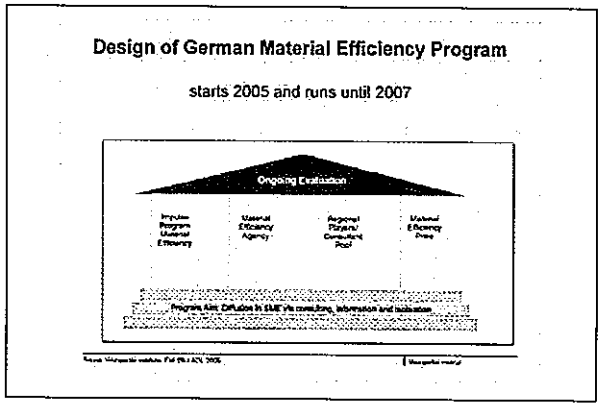
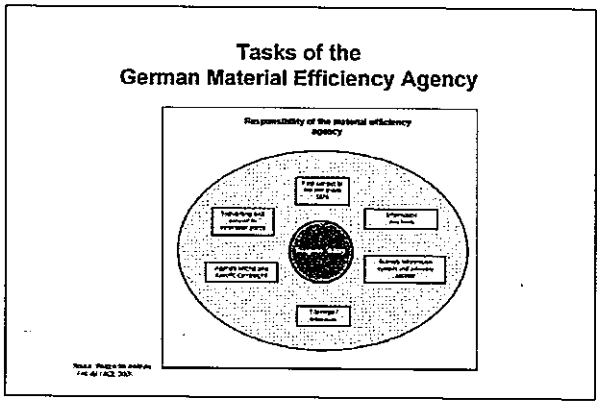
The figure conceptualizes Product Service Systems (PSS), which businesses in Germany, Europe, Japan and elsewhere are getting into.

V1 provides function rather than goods. One example is rental services for home appliances or TVs. V2 is about common or shared use of goods such as washing machines and cars. V3 provides maintenance services for washing machines, cars, etc. M is about selling multifunctional products such as PCs and faxes. It is also important in these types of business to consider material flow over a product's lifecycle.



As a proposal to Germany's Federal Ministry of Economy, the Wuppertal Institute created a Material Efficiency Program this summer in cohort with Arthur D. Little, Inc. and the Fraunhofer Institute.

The program deals with material efficiency. Studies are underway to create a Material Efficiency Agency on the federal level, provide consulting on how to increase material efficiency and give awards.



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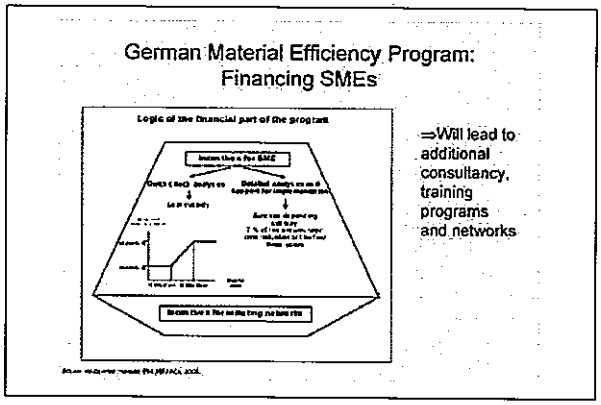

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The operations of the envisioned German Material

Efficiency Agency would be consulting and advice for particularly small and medium size businesses. They would first visit the site and then provide financial assistance for implementing improvements on the spot. Furthermore, they would provide expert consulting and educational programs.

Insights from recent Research

- Policy coherence important: integration of waste, resource management, climate and other policies.
- Regional clusters of technology and networks.
- Regional competitiveness driven by other factors too. Business participation is pivotal for any success. Efficiency Agency can be a supportive factor.

Some things that have been learned from recent research are shown here. In other words, not only waste and resource management but also integration with climate and other policies is important towards a 3R economy. Climate policy is a big theme in Europe and emissions trading is already being done. Moreover, harmony with overall economic policy and employment policy is important.

On the regional level, it will become important to form clusters of technologies and networks.

Because regions will need to be more competitive, it is important to strengthen networks and improve material efficiency of the region in addition to reducing production costs and material costs; the participation of the business world will be absolutely essential. An organization like an Efficiency Agency in NRW could be supportive.

The 3R trend has appeared markedly in German and European policy. And, it does not stop with conventional waste management and end-of-the-pipe technologies. One particularly hopeful area is material efficiency. This is not only because of environmental concerns but also because it reflects on material costs. With support for businesses in the form of new incentives, material efficiency will become the driving force of further innovation in Europe.

Conclusions

- 3R trends emerging, go clearly beyond waste and end-of-the pipe technologies.
- Concern for raw materials costs as a new driving factor.
- Policy might enhance materials efficiency via learning tools – German program ready for take off.
- Measurement schemes should be clarified.
- Business efforts integrate sustainability management, procurement, strategic R&D, customer relationships, stakeholder dialogues, value chain management.
- Approaching sustainable growth for sustainable societies !

Germany has just launched a Material Efficiency Program. Businesses are making efforts to maximize the potential of existing processes and crank up existing management tools.

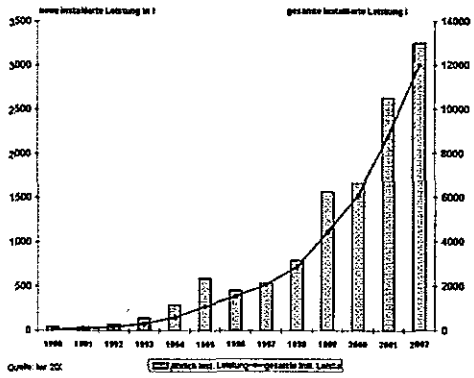
However, problems remain in measurement concepts, performance indicators, targets and so forth, and they must be resolved.

The undertakings in Japan, Germany and Europe are looked at as promising efforts that will enable sustainable societies to attain sustainable growth.

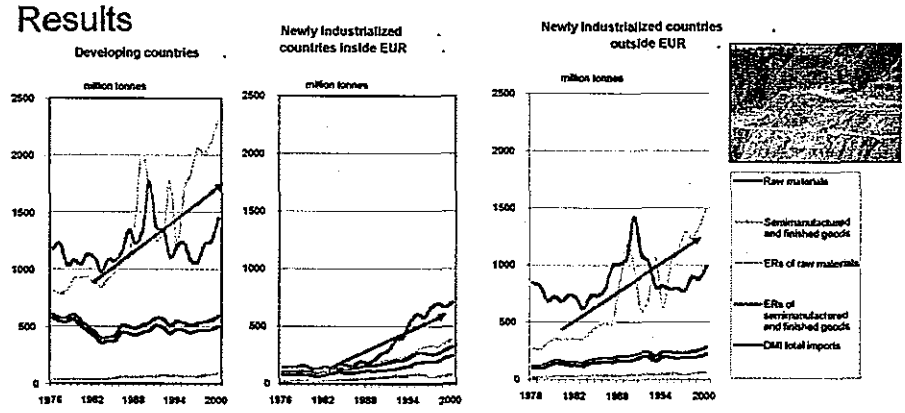
The German Renewable Energy Sources Act: Incentives to create a market!

- Subsidizes a mix of renewables to reduce production costs and investment risks
- Obligation and fixed remunerations for electricity from renewables
- Decreasing fees provide incentives for cost reductions
- Financed by consumers - no additional tax or public budget
- Debate on "over-subsidizing" (e.g. wind power)

Development of wind energy in Germany

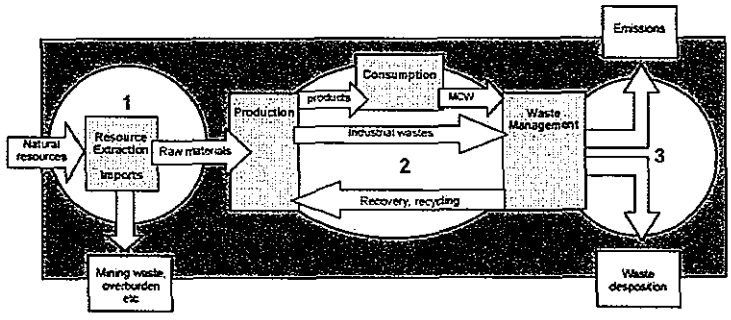


Different Measurement Methodologies yield Different Results



The EU induces new and additional externalities by growing 'Ecological Rucksacks' in other regions of the world; domestic regional approaches should monitor impacts of trade (incl. raw material extraction).

3R Policy ought to address the whole life cycle



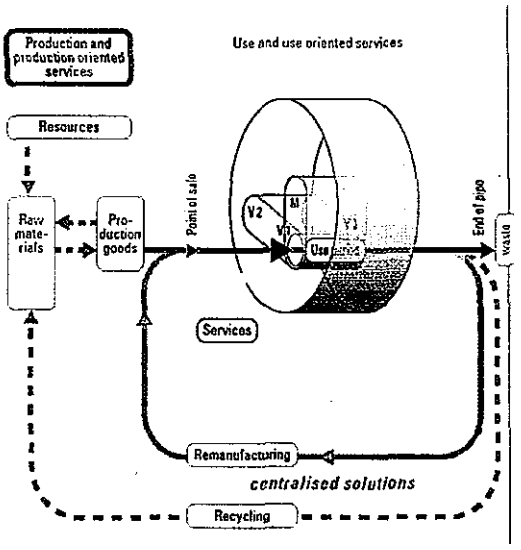
1. Raw material taxes, licencing, agreements
2. Integrated Product Policy, quota for recycled inputs
3. Landfill & pollution taxes, technical standards

Source: Bleischwitz/Hennicke 2004 | Wuppertal Institut

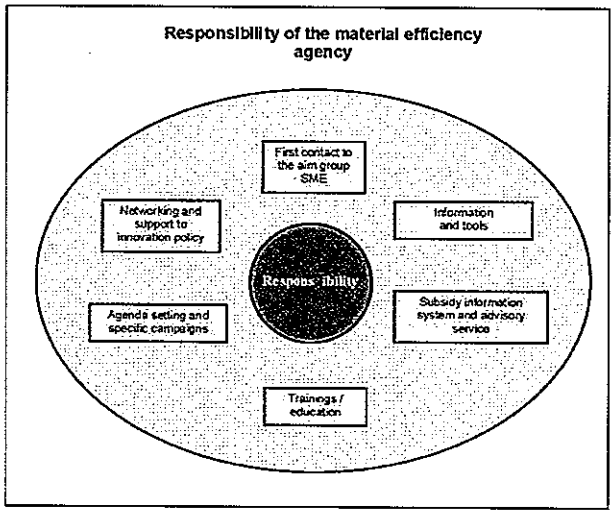
Strategies to increase resource productivity by selling functions, services and products in a service economy

Flow of products
Flow of recycable materials

V1 = Selling functions instead of goods (appliances, TV)
V2 = Common or shared use of goods (e.g. Washing machines, cars)
V3 = Selling services for maintenance (e.g. washing machines, cars)
M = multifunctional products (PC, Fax, Phone)
Material efficiency and recycling In combination with those efforts

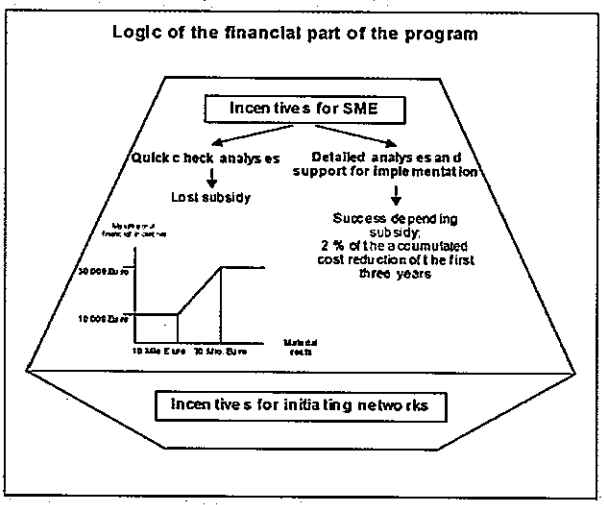


Tasks of the German Material Efficiency Agency



Souce: Wuppertal Institute , FHI ISI / ADL 2005

German Material Efficiency Program: Financing SMEs



⇒Will lead to additional consultancy, training programs and networks

Souce: Wuppertal Institute, FHI ISI / ADL 2005.

Session I: 3R Business Trends

Trends of 3R Businesses in Japan

Takashi Gunjima
Sub-Project Leader, Business for Sustainable Society Project
IGES Kansai Research Centre

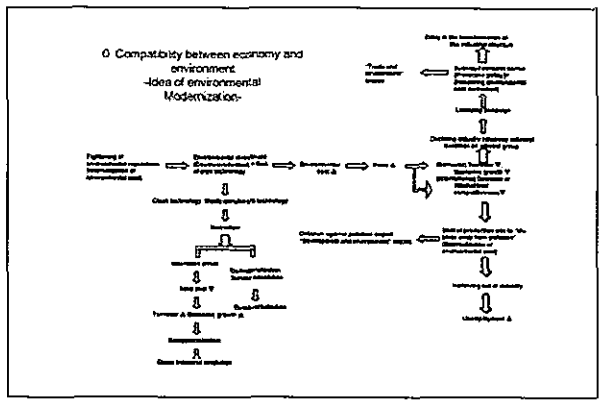
I would like to report today on the status and trends of the 3R business in Japan.

1 New trends in the 3R business

Currently, the Ministry for the Environment and the Ministry of Economy, Trade and Industry are conducting a market survey for the eco-business. In March this year, a committee meeting was held to decide upon the basic concepts for conducting this survey. As usual, interviews in line with OECD categories will be the core of forecasts, but the first point to be raised here is that globalization of the eco-business is moving in a new direction. What this means is that recycling in Japan is globalizing because of growing economic relationship with China. Moreover, the Chinese economy is growing dynamically and environmental limitations are gradually emerging. Japan's eco-business can prove useful in China, so it is predicted that the eco-business will grow further.

The second point concerns the 3R business. Untill now, the "3Rs" have been grasped as something static that appears in the basic environmental plans only. But the 3R business is becoming dynamic unto itself. That is because of the emergence of dematerialization that replaces goods with services, as is the case with servicizing and PSS (Product Service Systems). We should only begin to think about the eco-business after properly understanding the way the eco-business got started. The secretariat will watch the directions in which the eco-business goes as they conduct their market survey, which they plan to wind up before the end of this financial year.

2 Compatibility between economy and environment



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The background to the formation of the 3R business and eco-business is shown here. Until now, "economics and the environment were not compatible" and "raising economic profits and protecting the environment were a trade-off", but around the mid 1980s the idea of targeting "compatibility between economy and the environment" was conceived.

In Europe, the idea pops up in the debate over "ecological modernization". Moreover, Europe has seen a trend towards not only "compatibility between economy and the environment" but also "integration of the environment, economy and society".

The concept of ecological modernization goes like this. Business must invest more in the environment as

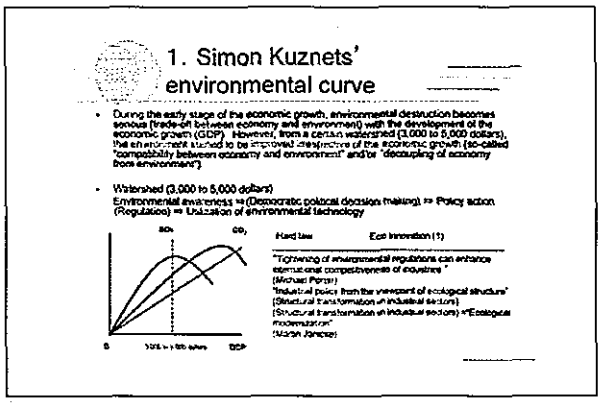
environmental costs is getting more and more internalized because of stronger environmental regulations. If they respond with end-of-the-pipe technology, that kind of environmental investment is non-productive. Under that scenario, if environmental costs rise and cannot be absorbed by internal efforts, the blame will be shifted to prices causing sales to drop, which slows economic growth on the domestic front and lowers competitiveness in international markets. One way to deal with this is, if domestic regulations are stiffened, to move production centers to a country or so-called "pollution heaven" where regulations are more relaxed or non-existent. This equates to the export of pollution. The business survives, but the pollution was moved from the country to abroad, which effectively externalizes environmental costs and postpones the efforts to find solutions to the problem to a later date. In consequence, domestic industry hollows and unemployment increases.

Another way to deal with increasing environmental costs is the lobbying activities of the steel industries, though they are in decline today. The steel industry was regulated heavily during its heydays of the 1960s through 1970s. In the industrial structures of the time, the steel industry carried a lot of influence, so they pooled their assets and started lobbying for subsidies. And, they tried protecting themselves by calling for non-tariff barriers. These lobbying activities emasculated environmental costs. This greatly delayed the conversion of industrial structure. Though the export of pollution and lobbying activities may help a business to survive, the macro-view of finding compatibility between economics and the environment becomes difficult.

In contrast to this, "eco-innovation" has become a recent trend. Instead of adopting non-productive end-of-the-pipe technologies, there are towards, preventative type "clean technologies" and "waste enrichment technologies" that make rich use of untapped resources.

By stirring eco-innovation, the costs that were spent on ex post facto end-of-the-pipe measures can be offset elsewhere, even if investment is required, to bring down the overall cost. And, by addressing the environment, economic profits rise and industry can be reactivated via reindustrialization and become more eco-friendly.

Another approach is to conserve resources and switch to services to promote "dematerialization". Because of servicizing and PSS (Product Service Systems), "deindustrialization" and "service economy" are growing.

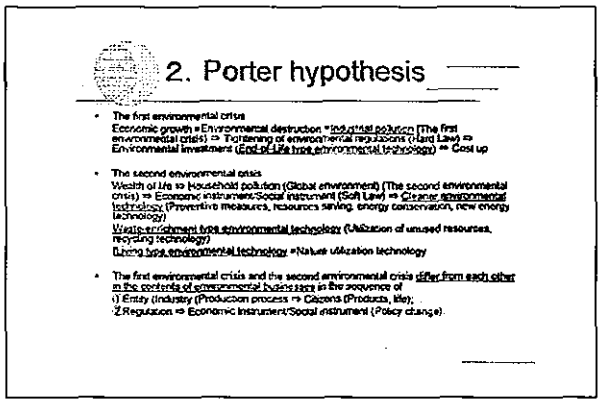


This describes Simon Kuznet's environmental curve. Kuznet's curve does not indicate the environment per se, as Kuznet himself argued that "in the early staged of economic development, the difference in income level is great, but the gap closes as a certain level of income is attained". Nonetheless, when expressed in terms of environmental problems, though environmental destruction becomes severe alongside economic growth, at a certain point (GDP$3,000 to 5,000), the environment improves despite economic growth. The economy and the environment become compatible or decoupled. There are various explanations as to why Kuznet's environmental curve works. One is that, if the economy develops, the environmental awareness of the people increases to some degree. If there is a democratic process for making decisions, policies are formulated to counter the problems and basic regulations are set. Business then technically responds to the environ-

ment by means such as eco-innovation, making compatibility between economics and the environment possible. This can be seen in Japan's environmental policy. Based on that, Michael Porter of Harvard University claimed that "tightening of environmental regulations can enhance international competitiveness of industries". Later, Porter rephrased himself to say "appropriate regulations", but he still advocates that "appropriate regulations spur eco-innovation and lead to corporate profits".

Martin Janicke of Berlin University said something similar. He grabs the situation from both sides by advocating two policies, one that converts industry to a low environmental load structure by the "structural transformation between industrial sectors" and one that reduces use of resources and energy on a source basis, as "structural transformation within industrial sectors". This, as he puts it, would promote ecological modernization and convert industry to a structure that exist in harmony with the environment.

The Kuznet's curve phenomenon concerning environmental pollution measured in ppm such as air and water pollution takes effect roughly in the GDP $3,000 to 5,000 range. By the way, with CO_2 and waste, GDP offers an even better position. Owing to international conventions, the CO_2 gap has finally started to close little by little. Accordingly, for what regards pollutants, there is correspondence in the first and second environmental crises. As a recycle-oriented society and carbon-neutral society develop, Kuznet's curve is expected to gradually lower because of waste



and global warming measures.

In Porter's theory, the first environmental crisis was met with end-of-the-pipe technologies, but the second has brought out cleaner technologies, waste enrichment technologies and living technologies.

Cleaner technologies are not the conventional therapeutic approach to pollution outbreaks; they are preventive technologies that conserve resources and energy. Waste enrichment technologies look at waste as an untapped resource and renewable resource. Living technologies use the natural environment itself. They smartly use natural elements in what is known as "bio-mimicry".

For example, there are technologies that develop biodiesel fuels (BDF) as alternative fuels by using oil from vegetable flowers or palm oil. Also, the wax from scale insects, which are harmful to agriculture, is being used as a raw material for the shiny side of thermal paper. Also, the fats- in natural chocolate separated when chocolate solidified, is being used as an emulsifier.

New energies such as solar power and wind power qualify as living energies. These technologies both support the environment and help reduce costs.

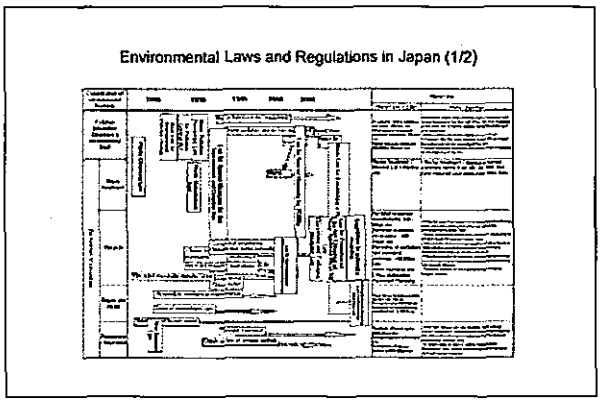
Whereas industry took action to reduce environmental load in production processes in the first environmental crisis of the 1960s and 1970s, the second environmental crisis changed to action aimed at reducing environmental load in the way people live. Moreover, regarding policy, not only regulations (hard law) but social instruments such as economic measures and volunteer action (soft law) were also introduced, converting the essence of the eco-business.

Along this line of development, not only do the economy and the environment become compatible but also the eco-business increases jobs. Some welfare states today are converting from welfare to workfare by changing their policy of helping the unemployed ex post facto to a preventative policy that prevents unemployment. Scandinavia has started to "integrate the environment, economy and society"

to protect the environment and secure new jobs. They are promoting the conversion to an industrial structure that will foster businesses of low environmental load, by shifting the tax base from goods that increase jobs to the bads that destroy the environment.

3 Background to Japan's eco-business

The development of the eco-business in Japan is related to the country's environmental laws and regulations. In the 1970s, the Air Pollution Control Law and the Water Pollution Prevention Law came out, stirring business in the pollution prevention systems to support that.



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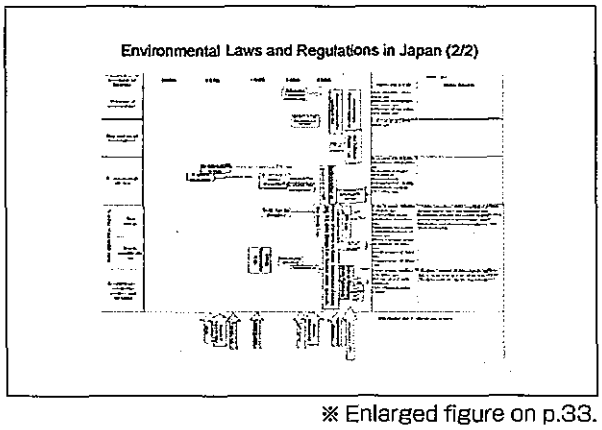

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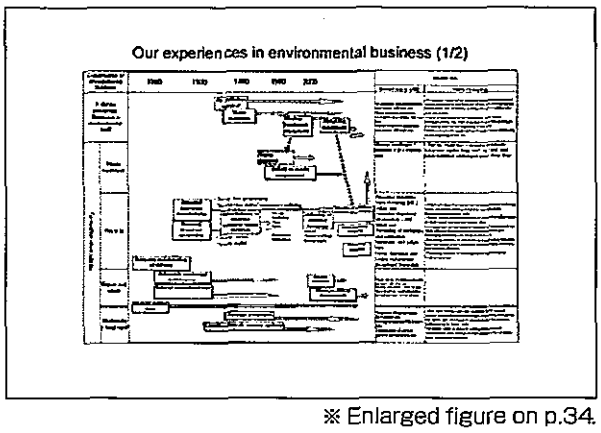

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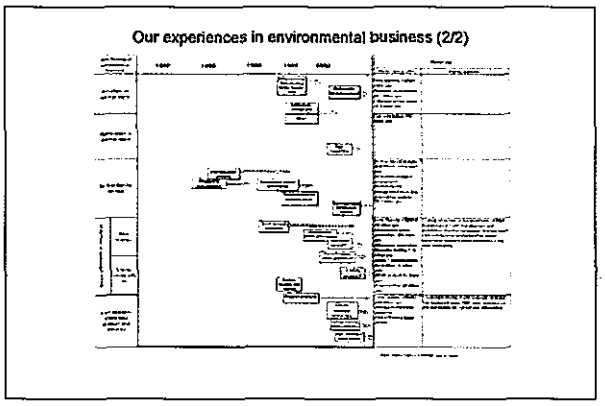

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In the year 2000, the Fundamental Law for Establishing a Sound Material-Cycle Society, which supports the 3R business, the theme of today's conference, was established. Also, in and around 2000, several laws were passed to address global warming. If you compare this to the following slides on "Our Experiences in Environmental Business", you can see how the eco-business emerged alongside regulations.

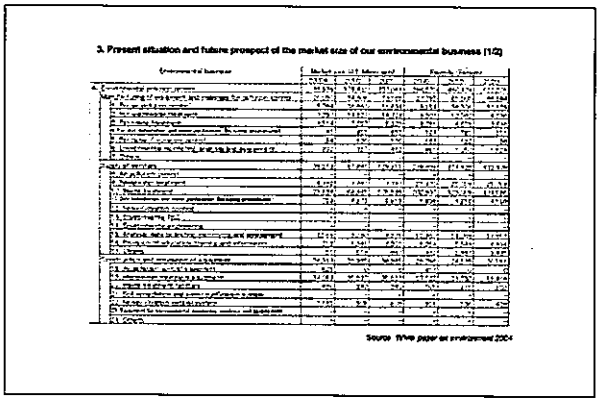
In particular, a number of recycling laws related to the 3R business came out in the mid 1990s. The Containers and Packaging Recycle Law, Home Appliance Recycling Law, End-of-Life Vehicle Recycling Law, Food Recycling Law and Construction Material Recycling Law were established. These laws were all significant in the development of the eco-business. For example, after the establishment of the Containers and Packaging Recycle Law, the development of monomerization technology for PET bottles progressed and technological development picked up for high temperature furnace reducing agents (chemical recycling) and gasification for plastics.

Regarding home appliances, after the oil crisis of 1973, energy conservation technology progressed and, following later amendments to the Energy Con-

servation Law, the "top runner" system further pushed energy conservation with home appliances. Also, material recycling technology progressed because of the Home Appliance Recycling Law.

With regards to vehicles, emissions regulations and the End-of-Life Vehicle Recycling Law promoted the development of fuel conservation and recycle technology, and led to the development of internationally competitive vehicles.

With the Food Recycling Law, technologies were developed for composting, fertilizer production and methane gas fermentation as a biomass strategy. However, biomass has not gone well, therefore biodegradable plastics were developed using the poly lactic acid in raw waste.



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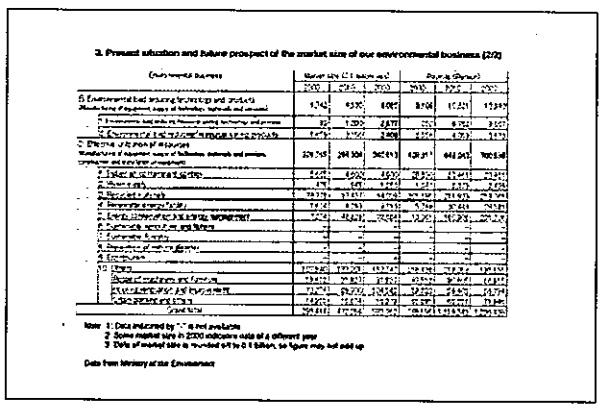

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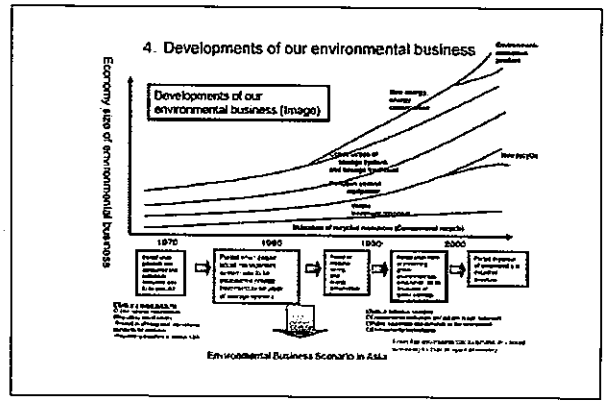
This table summarizes the current and forecasted size of Japan's eco-business market in the year 2010 and 2020. It can be understood that business involved with the effective utilization of resources (C) is growing against the businesses of environmental pollution control (A) and environmental load reducing technologies and products (B). If looked at individually, the market size for renewable energies and eco-friendly products is growing over technology for preventing air pollution and treating wastewater. The environmental pollution control business (A) in Japan is already matured, but these technologies are expected to develop in Asia and particularly in China. In contrast, what is important to Japan is the global warm-



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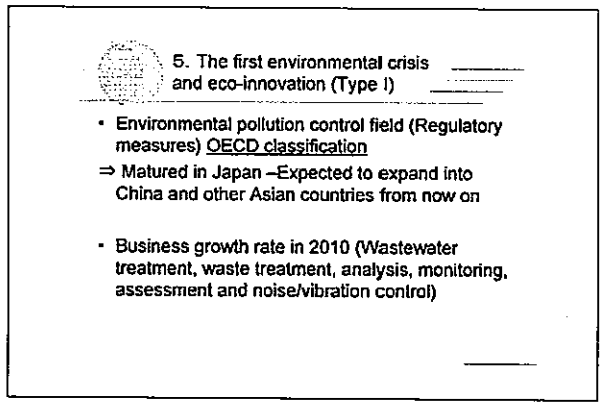
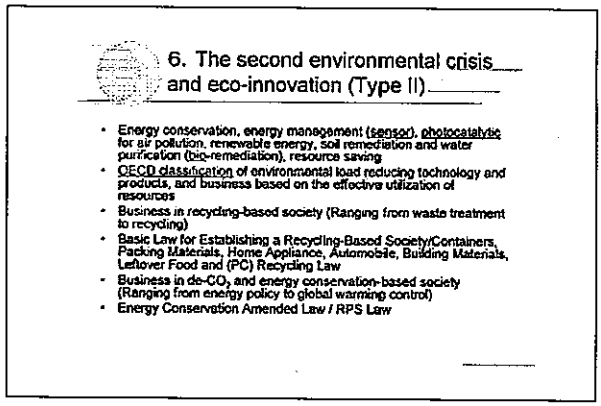
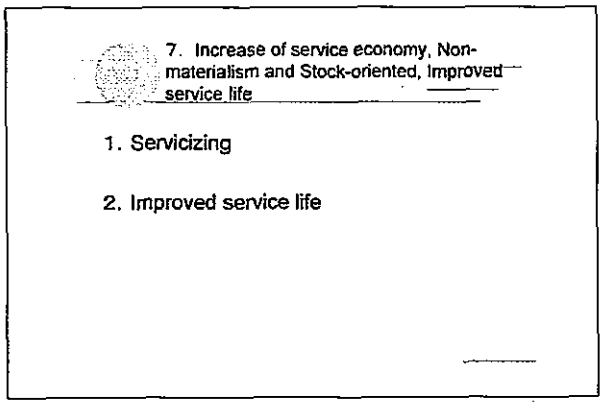


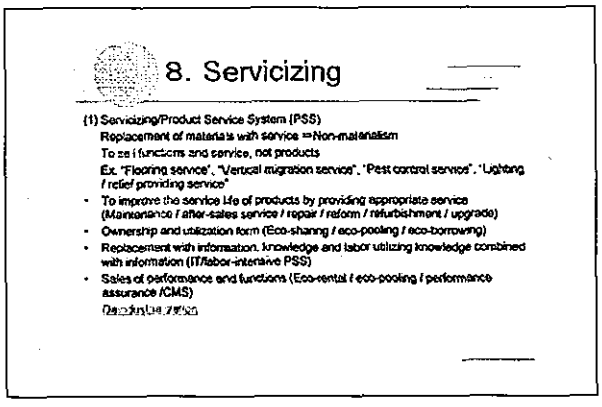


ing prevention business and 3R business.

4 "Servicizing" and "improved service life"



Two important aspects of the 3R business are "servicizing" and "improved service life".



Servicizing and PSS (Product Service System) sell services as opposed to products. Business is converting from eco-friendly products that reduce environmental load to reducing environmental load in the processes that make those products and "dematerialization" via innovation in how things are sold and purchased and service-based alternatives. For that reason, services and functions are sold instead of products. Various kinds of business have emerged because of servicizing and PSS.

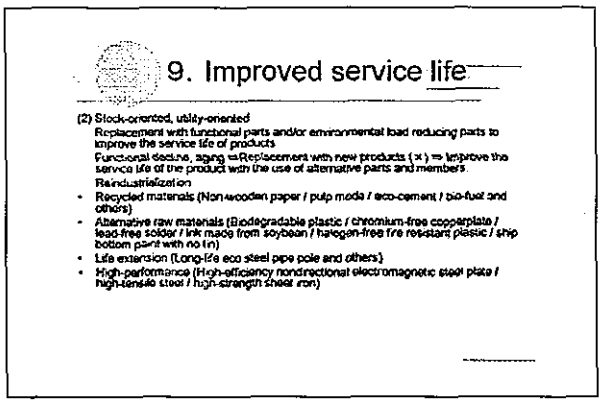
For example, instead of selling agrochemicals, insect removal services eradicate insects using minimal chemicals and, instead of selling fluorescent bulbs, the lighting/relief providing service provides lighting.

As services that improve the service life of products, there are maintenance, after-sales services, repairs, renovation, refurbishing, upgrades, etc.

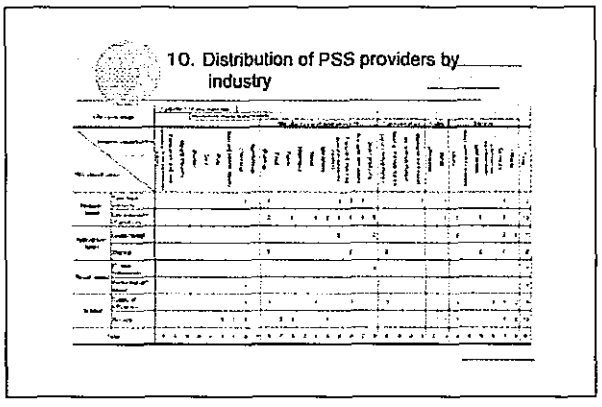
As ownership and usage type businesses, there are car-sharing, car-pooling, car-borrowing and so forth. There area also IT and labor intensive PSS as well.

As examples of servicizing, there are services that sell performance and functions such as car-rental, car-pooling, performance assurance and CMS (Chemical Management Systems).

Because of servicizing, a 3R business that aims at deindustrialization is likely to progress.



Another idea is "improved service life": prolonging the service life of products. With it, product usage is prolonged with recycled materials and alternative materials of low environmental load. Also, long-life (i.e., long-life eco-steel pipe pillars, etc.) and sophisticated products are emerging.



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In our BSS Project at IGES, we are currently doing case studies of PSS development in Japan. The vertical axis in this figure represents the PSS in Japan, while the horizontal axis is the industries throughout

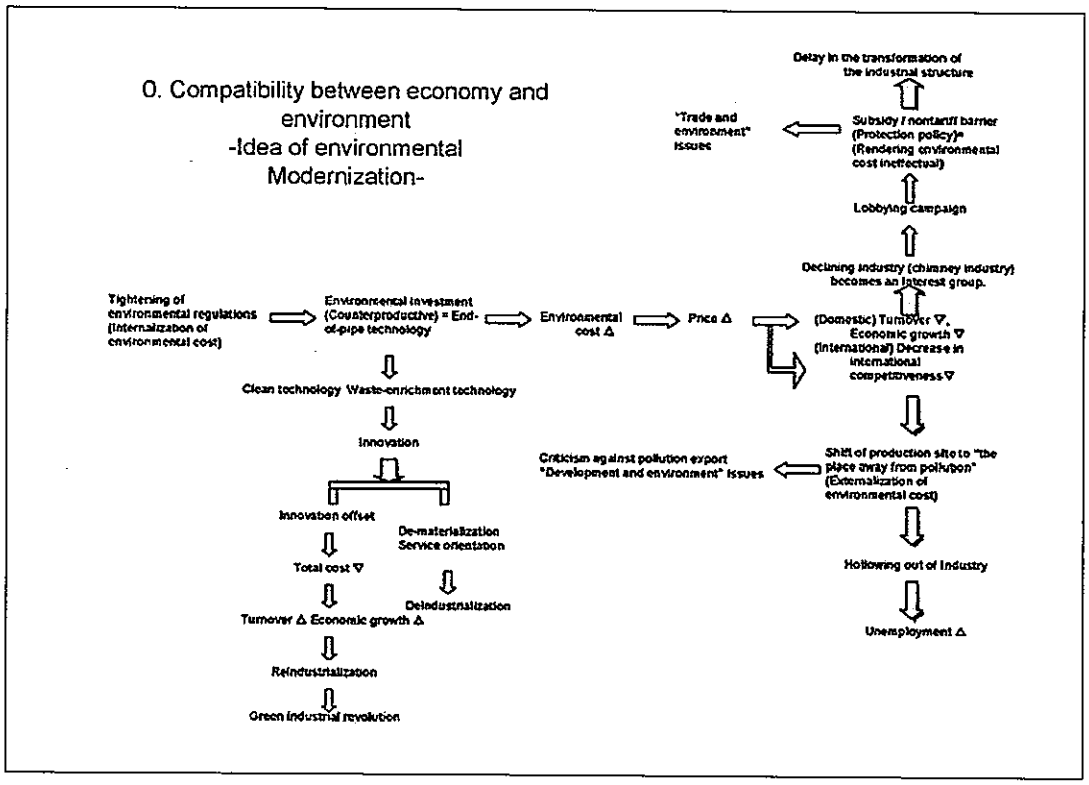
the lifecycle of a product. Here, PSS is overwhelmingly strong in sales and services areas, which have little upstream materials.

An innovative material-based PSS would be material leasing, which leases raw and processed materials. Material leasing leads to the ultimate 3R in services. Nevertheless, cascade recycling is done in Japan because the quality of the materials worsens. Via this cascade recycling, the sphere of recycling has gone beyond Japan to the entire world with materials going everywhere. Accordingly, the material industry is not recycling along horizontal lines as before but in a cascade form, therefore few PSS cases are found in the materials industry.

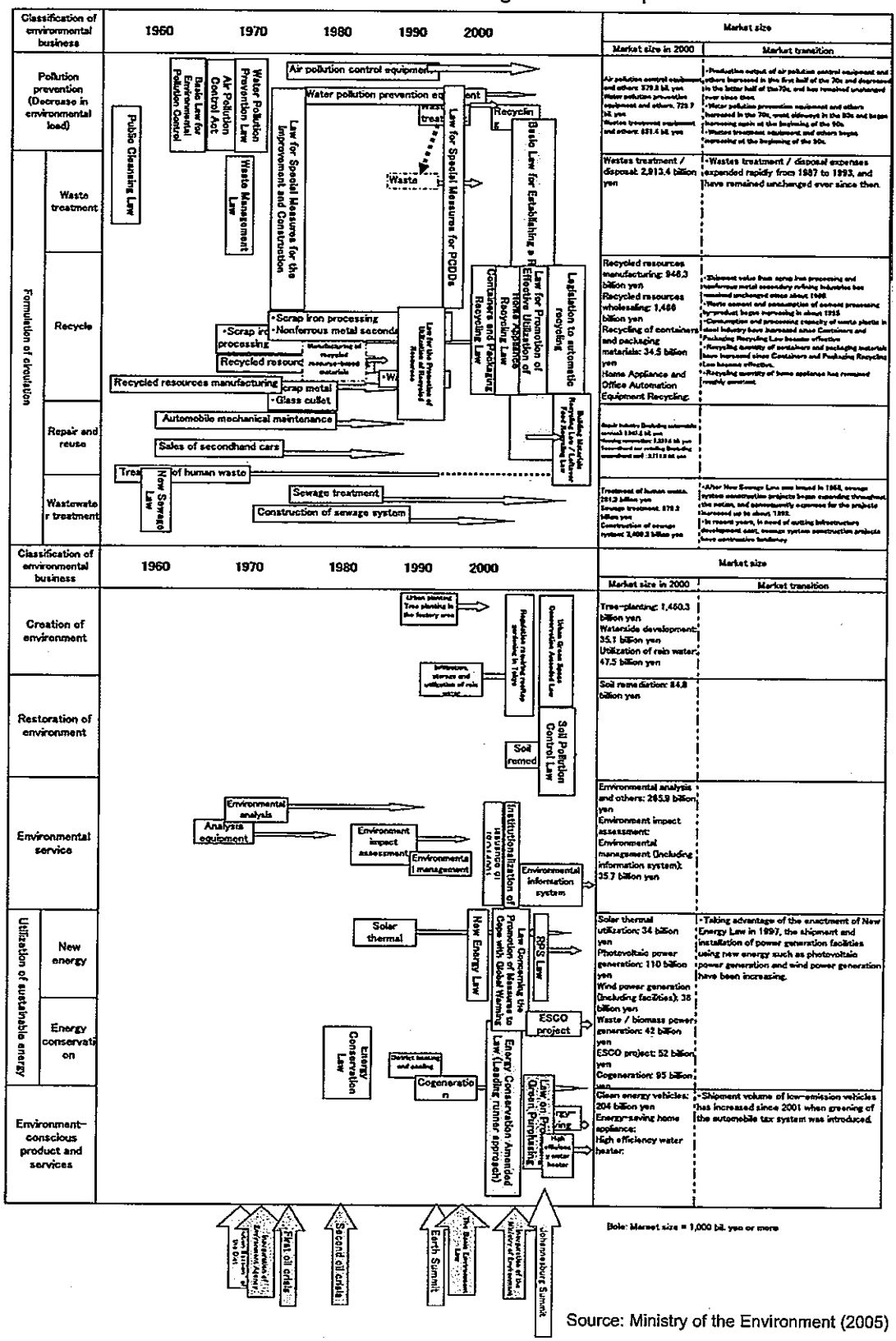
However, it is not completely zero; in ceramics producing areas, waste ceramic is being recycled into new ceramics. A community business has been launched to collect broken ceramic ware and mix it with clay to create recycled ceramic works.

The reason why there are so few cases of PSS in the materials industry is that the search for alternative materials, such as functional materials that prolong service life and recyclable materials of biological origin, is being promoted as an industry.

In the recycle-oriented society of the future, servicizing will likely be developed as a business and industries that enhance the functioning of materials and prolong the service life of materials of low environmental load will likely emerge. By looking at the eco-business dynamically rather than statically, the next direction of the 3R business will likely become clear.

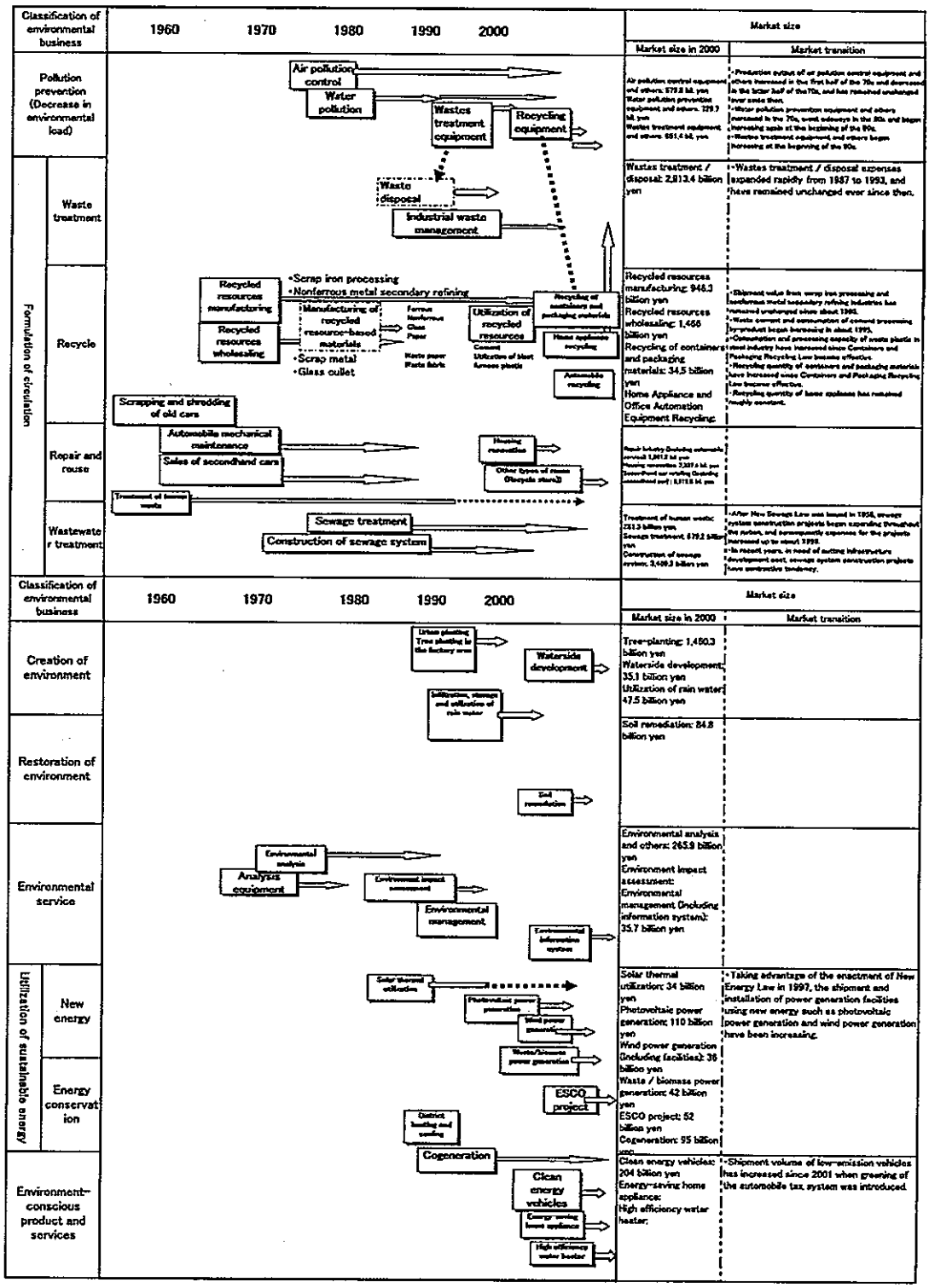

0. Compatibility between economy and environment
-Idea of environmental Modernization-
Tightening of environmental regulations (Internalization of environmental cost)
Environmental investment (Counterproductive) = End-of-pipe technology
Environmental cost Δ
Price Δ
(Domestic) Turnover ▽, Economic growth ▽
(International) Decrease in international competitiveness ▽
Delay in the transformation of the industrial structure
Subsidy / nontariff barrier (Protection policy)= (Rendering environmental cost ineffectual)
"Trade and environment" issues
Lobbying campaign
Declining industry (chimney industry) becomes an interest group.
Clean technology Waste-enrichment technology
Innovation
Innovation offset
De-materialization
Service orientation
Total cost ▽
Deindustrialization
Turnover Δ Economic growth Δ
Reindustrialization
Green industrial revolution
Criticism against pollution export "Development and environment" issues
Shift of production site to "the place away from pollution" (Externalization of environmental cost)
Hollowing out of industry
Unemployment Δ

Environmental Laws and Regulations in Japan



Source: Ministry of the Environment (2005)

Japanese Experiences in Environmental Business



Bold: Market size = 1,000 bil. yen or more

Source: Ministry of the Environment (2005)

3. Present situation and future prospect of the market size of our environmental business (1/2)

Environmental business	Market size (0.1 billion yen)			Payrolls (Person)		
	2000*	2010	2020	2000	2010	2020
A. Environmental pollution control	95,936	179,432	237,064	296,570	460,479	522,201
Manufacturing of equipment and materials for pollution control	20,030	54,606	73,168	27,785	61,501	68,684
1. For air pollution control	5,788	31,660	51,694	8,154	39,306	53,579
2. For wastewater treatment	7,297	14,627	14,728	9,607	13,562	9,696
3. For waste treatment	6,514	7,037	5,329	8,751	6,676	3,646
4. For soil remediation and water purification (including groundwater)	95	855	855	124	785	551
5. For noise / vibration control	94	100	100	168	122	88
6. Environmental monitoring, analysis and assessment	232	327	462	981	1,050	1,124
7. Others	-	-	-	-	-	-
Supply of services	39,513	87,841	126,911	238,889	374,439	433,406
8. Air pollution control	-	-	-	-	-	-
9. Wastewater treatment	6,792	7,747	7,747	21,970	25,059	25,059
10. Waste treatment	29,134	69,991	105,586	202,607	323,059	374,185
11. Soil remediation and water purification (including groundwater)	753	4,973	5,918	1,856	4,218	4,169
12. Noise/vibration control	-	-	-	-	-	-
13. Environmental R&D	-	-	-	-	-	-
14. Environmental engineering	-	-	-	-	-	-
15. Analysis, data collecting, monitoring and assessment	2,566	3,280	4,371	10,960	14,068	17,617
16. Provision of education, training and information	218	1,341	2,303	1,264	5,548	8,894
17. Others	50	519	987	332	2,487	3,481
Construction and installation of equipment	36,393	36,985	36,985	29,796	24,539	20,111
18. Air pollution control equipment	625	0	0	817	0	0
19. Wastewater treatment equipment	34,093	35,837	35,837	27,522	23,732	19,469
20. Waste treatment facilities	490	340	340	501	271	203
21. Soil remediation and water purification system	-	-	-	-	-	-
22. Noise/vibration control system	1,185	809	809	956	536	439
23. Equipment for environmental monitoring, analysis and assessment	-	-	-	-	-	-
24. Others	-	-	-	-	-	-

Source: *White paper on environment 2004*

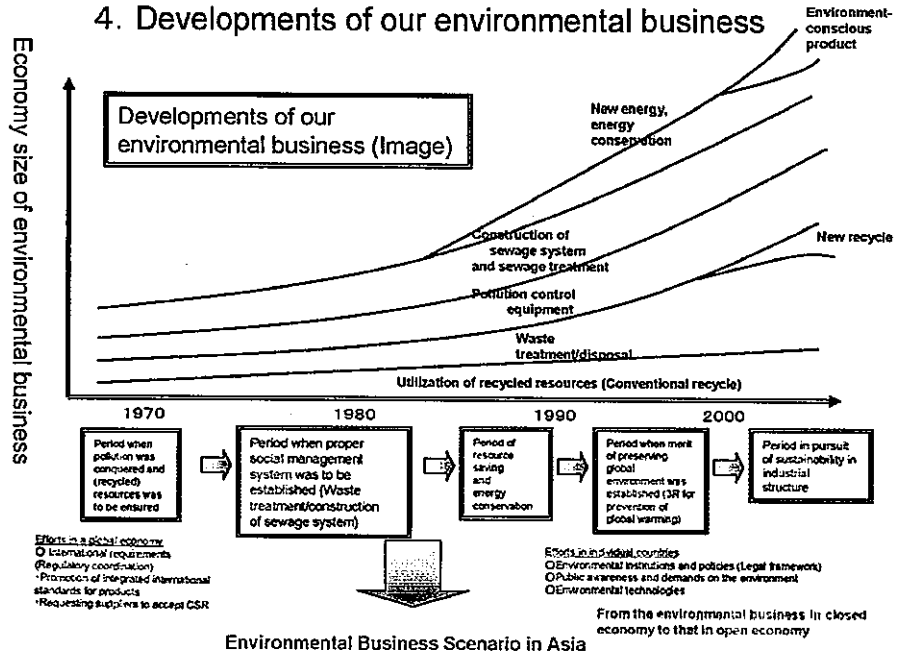
3. Present situation and future prospect of the market size of our environmental business (2/2)

Environmental business	Market size (0.1 billion yen)			Payrolls (Person)		
	2000	2010	2020	2000	2010	2020
B. Environmental load reducing technology and products (Manufacturing of equipment, supply of technology, materials and services)	1,742	4,530	6,085	3,108	10,821	13,340
1. Environmental load reducing/resource saving technology and process	83	1,380	2,677	552	6,762	9,667
2. Environmental load reducing/resource saving products	1,659	3,150	3,408	2,556	4,059	3,673
C. Effective utilization of resources (Manufacturing of equipment, supply of technology, materials and services, construction and installation of equipment)	201,765	288,304	340,613	468,917	648,043	700,698
1. Indoor air contaminant control	5,665	4,600	4,600	28,890	23,461	23,461
2. Water supply	475	945	1,250	1,040	2,329	2,439
3. Recycled materials	78,778	87,437	94,039	201,691	211,939	219,061
4. Renewable energy facility	1,634	9,293	9,293	5,789	30,449	28,581
5. Energy conservation and energy management	7,274	48,829	78,684	13,061	160,806	231,701
6. Sustainable agriculture and fishery	-	-	-	-	-	-
7. Sustainable forestry	-	-	-	-	-	-
8. Prevention of natural disaster	-	-	-	-	-	-
9. Eco-tourism	-	-	-	-	-	-
10. Others	107,940	137,201	152,747	218,436	219,059	195,655
Repair of machinery and furniture	19,612	31,827	31,827	93,512	90,805	66,915
Housing renovation and improvement	73,374	88,700	104,542	59,233	59,403	56,794
Urban planting and others	14,955	15,674	16,379	65,691	68,851	71,946
Grand total	299,444	472,266	583,762	768,595	1,119,343	1,236,439

Note 1: Data indicated by "-" is not available.
2: Some market size in 2000 indicates data of a different year.
3. Data of market size is rounded off to 0.1 billion, so figure may not add up.

Data from Ministry of the Environment

4. Developments of our environmental business



Environmental Business Scenario in Asia

10. Distribution of PSS providers by industry

Life cycle stage		Collection of raw materials	Manufacturing of end-products																			Transportation			Sales		Service							Total
Industry classification / PSS classification		Agriculture, forestry and fishery	Petroleum and coal	Mining industry	Rubber	Iron	Pulp	Glass and ceramic industry	Chemical	Nonferrous	Building	Food	Fabric	Pharmacy	Metal	Machinery	Transport machine	Precision instruments	Other products	Land transportation	Marine transportation	Air transportation	Warehouse and transport	Wholesale	Retail	Library	Real estate	Services	Others					
Product-based	Take back products								1		1						3	3	1				1		1				1					12
	Life extension of products										2		1		1	3	1	1	1	5					1	1		1		1				19
Application-based	Lease/rental																2			2						2			2	2			10
	Sharing										1							2			2							2		1				8
Result-based	IT, non materialism																			1														1
	Performance-based									1																								1
Related	Supply of efficiency									1	1					1			3		3							1		3	1	2		16
	Recycle							1	1	1		2	2			1									1			1			1	2		13
Total		0	0	0	0	0	1	1	4	0	5	2	3	0	2	4	6	9	2	8	5	0	0	1	0	3	5	0	3	3	7	6		80

Session II: Promoting Local Industry

Protection of the Environment and its Promotional Effects on Economic Development and Revitalization in Nordrhein-Westfalen

Astrid Becker
NRW Japan K.K.
(Japan Office of the State of Nordrhein-Westfalen [NRW], Germany)

Nordrhein-Westfalen has already pursued for a few decades now the recovery of the environment and its further protection from pollution by promoting environmental technologies, introducing ecological and resource-efficient processes, enhancing waste collection and recycling, as well as improving the recovery of resources. Today, I would like to report on the roles and objectives of Nordrhein-Westfalen in these fields.

1 Overview of Nordrhein-Westfalen

Let me begin with a brief introduction to Nordrhein-Westfalen (NRW).

NRW is located in the western most part of Germany where bordering with The Netherlands and Belgium. With 18 million inhabitants and a GDP of 481 Billion Euro, NRW accounts for one fifth of the population and GDP of Germany and thus represents the biggest economic power of our country. Nevertheless, NRW is not well known in Japan for this fact, as it is more known for its capital Dusseldorf. Dusseldorf is home to the largest Japanese community in Europe at 7,000 strong. Almost 10,000 Japanese live in all of NRW. Over the past few decades, more than 500 Japanese companies have settled in and around Dusseldorf, providing employment to about 30,000 people. In short, this shows how important NRW is for Japanese businesses as a business location and hub, and illustrates the significance of the Japanese business's engagement in NRW. It is well understood how important new developments in the rules and regulations regarding environmental policy in the European Union are for Japanese industry and their concerns are taken very seriously.

The source of Nordrhein-Westfalen's economic power dates back even before the establishment of the state in 1946, and it is mainly the result of the development of the Ruhr Industrial Area. For decades since, the Ruhr Industrial Area has functioned as an industrial and economical engine not only for Germany but also for the whole of Europe.

After World War II, this region contributed considerably to the recovery from the war and the creation of Germany's mesmerizing postwar industrial growth. However, this growth and development depended heavily on the coalmining and steel industries.

Nowadays, the service industries account for 70% of NRW's GDP, while the chemical industry and mechanical engineering remain the leading industrial sectors. Despite the structural problems that arose from such industrial concentration, rapid and concentrated industrial growth also provided an excellent basis for technological development and innovation. This potential has proven to be of benefit not only for big players of the heavy industry, but also for small and medium sized companies, who actually account

for 70 % of NRW's GDP and for 60% of its exports. The small and medium-sized companies in German provide, through their diversification, a very important fallback position in the event of a crisis in a certain industrial sector. Because of this, the government is very much concerned about promoting economic conditions for small and medium-sized companies.

2 The start of environmental protection

The area of technologies, systems and services related to the protection and recovery of the environment turned out to be in the long run a promising field for the promotion of small and medium-sized businesses.

After a period of rapid growth and development following WWII, NRW faced two severe challenges: first with the coal crisis of the late 1950s and early 1960s, and then again with the oil crisis in the beginning of the 1970s, both accompanied by steel crises. These crises led to a downturn of the steel, mining and related industries, and resulted in a rapid rise in unemployment, thus affecting society as a whole.

The downturn of the main industries of NRW forced the state to consider measures to counterbalance the rapid destabilization. Strategies for providing infrastructure more suitable for modern industries, better education and qualifications for workers and employees, and countermeasures against unemployment became necessary.

As industries withdrew from their production sites, the high price that had been paid for industrial prosperity became visible; many of the production sites and dumping sites used by industry were polluted beyond imagination and in a state that was neither suitable for the settlement of new industries nor private households.

Against this backdrop, the state decided, at the beginning of the 1970s, to take up measures of revitalization by investments in infrastructure, including the regeneration of polluted areas and living environments. For the first time, measures for industrial revitalization were combined with ecological recovery and protection.

At the beginning of the 1970s, when the Club of Rome expressed the first warning of threatening shortages of physical resources, the concept of "Kreislaufwirtschaft" (Economy with a Closed Cycle of Resources) was first mentioned in Germany.

However, at that point in time, a combination of environmental recovery and economical recovery had yet to be looked at as a strategic idea.

3 Environmental protection and industrial revitalization

This approach of "both environmental protection and industrial development" became a political strategy only after reviewing the results of the measures in the early 1980s and the general public started becoming conscious of the need for environmental protection. This also led to new demand for solutions, systems and services to solve these problems.

In effect, environmental protection became an industry unto itself. New services were created first dealing with the disposal of waste and, later on, more and more with the prevention of waste.

The NRW State Government promotes a future-oriented policy of waste management based on the concept of sustainability. It combines ecological responsibility, economical feasibility and social acceptability. To this end, the classical approach to waste management has reached its limits. With regards to waste disposal, sustainable concepts have to take into consideration first efficient recycling and second environmentally-friendly treatment methods. Good results have been produced so far by applying coherent standards for thermal disposal and dumping. In addition to that, the management of closed-cycle use of resources is needed as a future-oriented style of waste management.

In order to achieve this, products themselves must be put more in the focus of attention. These new and innovative products require an integrated approach for

providing an environmentally-friendly lifecycle of products. This is the responsibility of the manufacturers.

On the other hand, we also have to pay more attention to the reusability of waste, which contributes to the protection of our natural resources. To that end, it is necessary to further promote technologies for the efficient recovery of resource materials from waste and develop the markets for such materials.

The separation of waste especially by households has proven to be an efficient tool towards the effective recovery of resource materials from waste. We now need to develop new methods to further improve the quality of such recovered materials in order to achieve more suitable substitutes for primary resources. Here, we see another possible field of enhanced activities by our small and medium-sized businesses.

Nowadays, legal provisions concerning waste management are generated more and more on the EU level, namely by the European Commission in Brussels.

It is important for NRW to actively influence and take part in the decision-making process of these legal provisions. NRW sees need for action especially in the areas of "clear directives for a distinction between waste and non-waste", "clear directives for the distinction between the reuse of waste and waste disposal" and "a clear definition of equal standards of recycling processes and their implementation".

Competition on equal terms can only be ensured if all parties fulfill equal requirements. It is the view of the NRW Government that a mere harmonization of environmental standards would not suffice to meet this precondition. The government sees the need to include equal environmental standards as well as a clear distinction between waste recycling and waste disposal in the proposed directives. It is our view in NRW that there exist many opportunities to support economic revitalization and job creation through the promotion and implementation of strategies for environmental protection. The government aims at making use of these opportunities, for example, through ecological innovation in the environmental industry and in the field of alternative energy.

Many companies from Nordrhein-Westfalen are strongly represented in the global environmental product and technology market. The environmental sector by now counts as one of the major branches of industry. The same is true for the renewable energy sector. Many enterprises and businesses have become role models of a sustainable economy.

In NRW alone, there are 2,100 small and medium-sized enterprises that are engaged either directly or indirectly in the field of renewable energy. Their annual revenues amount to 3 billion euro. And, they employ upwards of 200,000 people. Moreover, among these companies, there are firms that have moved their focus away from mining technology to specialize in solar and biomass gas technologies. Furthermore, we expect a significant effect on the number of jobs in the machine and plant construction industries.

We are equally optimistic about the generation of electricity from biomass. Biomass, we believe, could become an important source of revenue for many farmers, who are currently depending, to a large degree, on incentives on the EU-level.

The shape and content of environmental politics have changed dramatically in the last few decades. The main focus point at the outset was to establish environmental standards and to create a minimum amount of protection, both for the environment and for human health. Today, we have progressed to strategies that avoid environmental harm by business activities from the start and at the same time take into consideration a sound basis for business.

We believe it necessary to increase the economic and ecological efficiency of our production processes, products and services, which should be done in a cooperative process between government and industry. We need to mobilize the innovative strengths available. By doing so, we can make decisive progress.

4 Roles of the efficiency agency

The rising prices of raw materials and energy on a global scale clearly show that we have to deal with this situation quickly and comprehen-sively. Only referring to new environmental strategies is not sufficient; we are in need of integrated concepts to promote innovation, to boost competitiveness and - last but surely not least - to create and safeguard jobs.

The scarcity of resources and thus the rising prices of raw materials are presenting a real challenge for companies. The problem is particularly grave in nations with few raw materials reserves and comparatively high labour costs - a situation equally relevant to Japan and Germany.

While many large companies have already made concerted efforts to improve their resource efficiency, small and medium-sized enterprises often do not have the necessary capacity available to do this. This is why, in 1998, the state of Nordrhein-Westfalen established the Effizienz-Agentur - or efficiency agency - as an institution to support small and medium-sized enterprises in the field of clean and resource-efficient production. We abbreviate this concept of the "integration of resource efficiency and environmental protection in products and their production process" with the acronym PIUS, short for "Produktionsintegrierter Umweltschutz". Please allow me to use the term PIUS in the following.

One of the key services the Effizienz-Agentur offers to small and medium-sized companies is the so-called PIUS check. What a PIUS check is, is a low-cost and easily accessible counselling and evaluation tool.

This is how it works. During a nine-day period, the environmental performance of the company's production processes is analyzed by an external adviser. The company is checked to assess its potential for optimizing processes and cost reductions. Having finished the check-up, a plan of action is drafted.

The measures that are implemented on the basis of the PIUS check range from simple organizational improvements to completely new production facilities. Approximately 350 PIUS Checks have been performed since the Effizienz-Agentur was established. Actions for improvement were implemented in 120 enterprises. As of July 2005, investments of approximately 19 million euro were made. In the meantime, annual savings of 4.7 million euro have been achieved by the enterprises. A significant part of these investments paid off already within two years.

The PIUS-Check concept is currently being tested in five Japanese companies and its transferability is being reviewed.

A new tool offered by the Effizienz-Agentur is currently being tested; it is called "resource-cost accounting". Based upon the existing internal cost accounting system of each company, resource-cost accounting facilitates cost transparency for all resource-related costs, and thus provides more options to tap potentials for savings.

As the next step, we are currently increasing our efforts beyond the production process and onto the product itself. The objective is a product-related approach to environmental protection - or an "Integrated Product Policy (IPP)" as it is referred to by the European Union. Therefore, beyond production processes, we also are considering aspects such as product development, the selection of materials, and the use, disposal and recycling phases of a product.

The Effizienz-Agentur is developing a consultancy tool for small and medium-sized enterprises that will enable companies to optimize product development processes while giving due consideration to ecological requirements.

5 Use of biomass energy

Besides saving resources and energy in production and consumption, power generation is a key issue for global development. In view of the limitations of our natural resources, it is clear that we have to promote alternatives to fossil fuels, particularly to petroleum, and to expedite the changeover to renewable energy

on a worldwide scale.

Due to the natural circumstances in NRW, the use of biomass plays an important role in our state. Today, on a global scale, biomass comes second only to hydro-electric power in terms of regenerative power production. Biomass represents a whole range of fuels and organic residues. This includes wood and unpolluted timber waste of any kind, farm waste such as straw or manure, energy-intensive plant or residues from food processing, and palm husk and coconut oils.

On a worldwide scale, biomass has the largest development potential for the future as it is a "universal energy" that is suitable for decentralised use and available everywhere. It offers itself for base load power generation, for cooking and heating purposes, and for use in the fuel sector. The Government of Nordrhein-Westfalen is going to increase the role of renewable energy in the next few years, and rely on the bio-energy sector to an even greater extent in the future.

Biogas plants are a very good example of the practical use of bio-energy. They work around the clock, and are extremely well suited for base load supply. Approximately 140 biogas plants are in operation in Nordrhein-Westfalen to date, and another 100 are currently being planned or under construction so that a total of approximately 240 plants will be in operation by early next year.

Due to improved emission technologies for private households as well, the use of wood for heating purposes has seen a real boom in the last few years, and is becoming even more attractive due to the rising oil prices. Indigenous wood is of particular importance for the heating market because of its technical usability, its sustainable availability and efficiency.

In the field of biofuels, Germany will very likely be one of the few EU member states that will meet the standard set by the EU of a 2% share in overall fuel consumption by the end of 2005. The EU Commission' target is to increase this share to 5.75% by the year 2010.

Considering the current trends in the global energy market and the increasingly noticeable effects of climate change, Nordrhein-Westfalen is supporting an admixture obligation of 5% by 2010. With renewable energy, we are acquiring new sources of income for the agricultural and forestry industries and providing alternatives for oil and other finite resources.

6 Dialogue of business and environment

The government of Nordrhein-Westfalen is introducing a new initiative entitled "Dialogue of Business and Environment". The aim of this dialogue is to achieve agreements within industry concerning "the improvement of resource efficiency", "the strengthening of product- and production-integrated environmental protection (Cleaner Production)" and "the increase in energy efficiency".

Nordrhein-Westfalen is committed to securing the quality of life for its citizens and to making a significant contribution to global climate, resource and environmental protection. As an export-oriented industrial state, NRW is backing the use of environmental technology in order to achieve these goals. In this context, we aim at continuously developing the available know-how through international exchange.

The opportunities presented to our societies to adapt to the global challenges of our time are plenty - as are possible solutions. The government of NRW is convinced that, on a basis of international cooperation, we will be able to meet these challenges.

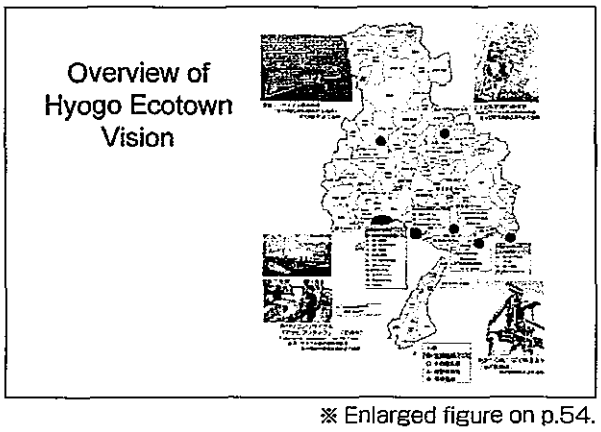
Session II: Promoting Local Industry

Promoting Local Industry
An Undertaking of the Hyogo Ecotown Promotion Conference

Ryota Hidaka
Hyogo Ecotown Promotion Conference Secretariat
Hyogo Prefecture Environmental Create Center Public Corporation

The Hyogo Ecotown Project is being managed to promote local industry. I will be reporting on that undertaking. I will start with an "overview of the Hyogo Ecotown Vision" and follow that with the "functions and activities of the Hyogo Ecotown Promotion Conference", which is the parent organization promoting the project's realization, and thirdly introduce some "research activities" in biomass, hydrogen and other activities.

1 Overview of Hyogo Ecotown Vision



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This is a map of Hyogo Prefecture, which you can see is comparatively large. It is the 7th largest prefecture in terms of industry and ships 4.7% of all products made in Japan. Along the shores of the Seto Inland Sea concentrate secondary industries for steel and chemicals, although changes in industrial structure have created some idle properties. The "Hyogo Ecotown Vision" was initially undertaken so as to use these potentials effectively.

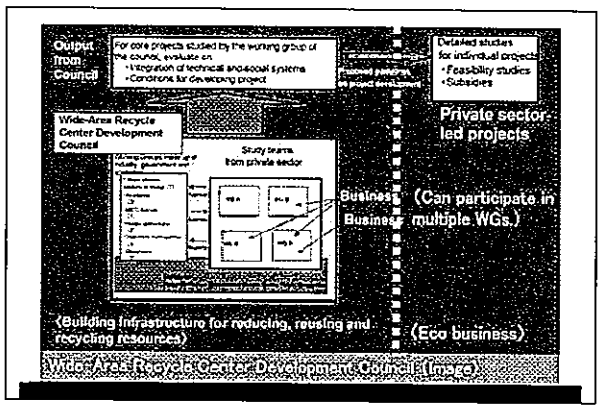
October 2000
Launched the Wide-Area Recycle Center Development Council.

(Objectives)
Industry, government and the academic world came together to explore the possibilities of building a recycle center in the coastal area as indispensable infrastructure for a recycle-oriented society in Hyogo, as recycling leads to the reduction and reuse of resources.

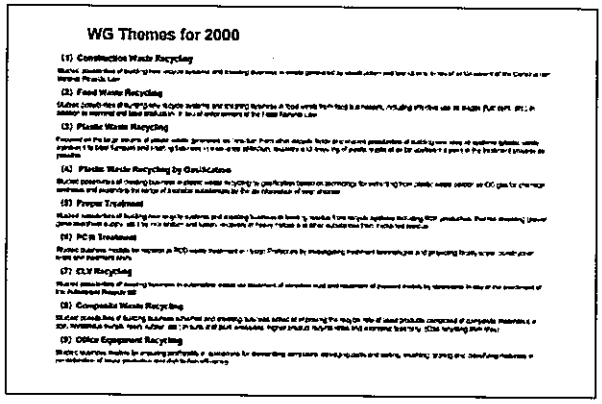
→April 2003 Formulated the "Hyogo Ecotown Vision".

The origin of the Ecotown Vision was the Wide-Area Recycle Center Development Council launched in October 2000. This period in and around the year 2000 saw the enactment of several recycle laws in Japan. The Wide-Area Recycle Center Development Council was created through a "cooperative effort of industry, government and academia to explore the possibilities of building a recycle center as essential infrastructure for a recycle-oriented society in Hyogo, as recycling leads to the reduction and reuse of resources."

This is a conceptual image of the Wide-Area Recycle Center Development Council. Study teams were formed from the private sector to explore business models, while a working group of persons from indus-



try, government and academia was created to approve projects. The Hyogo Prefecture Environment Create Center Public Corporation serves as the secretariat. Private sector groups head up individual projects.



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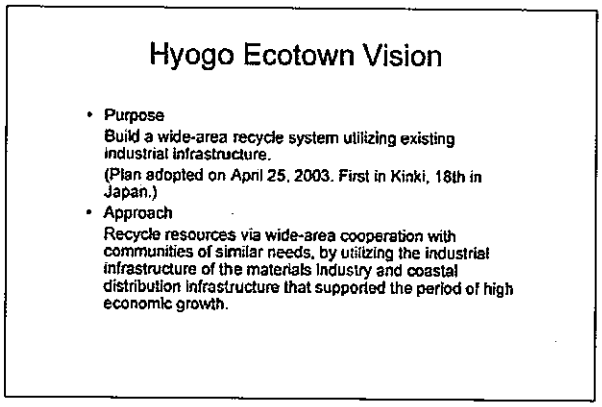
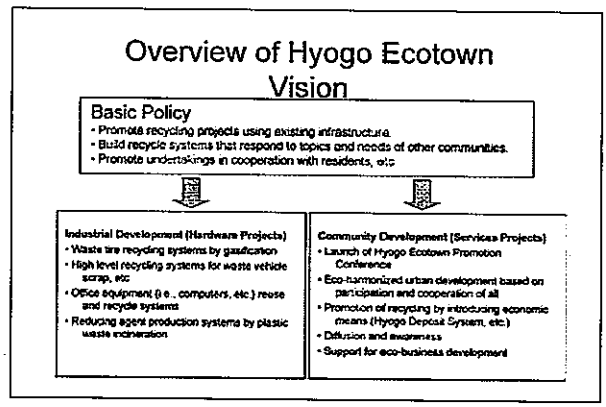
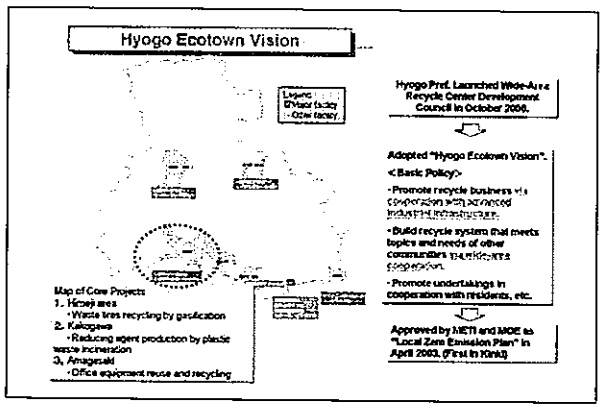
There are 9 research themes at present, those being Construction Waste Recycling, Food Waste Recycling, Plastic Waste Recycling, Plastic Waste Recycling by Gasification, Proper Treatment, PCB Treatment, ELV Recycling, Composite Waste Recycling and Office Equipment Recycling. Each is looking to promote recycling in its own way.



The "Hyogo Ecotown Vision" was crafted from within these studies, with the objective of "building a wide-area recycle system using existing industrial infrastructure." It aims to "recycle resources via wide-area cooperation amongst communities with similar needs, by utilizing the industrial infrastructure of the materials industry and the coastal distribution infrastructure that supported the period of strong economic growth."



In addition to the basic policy, the Hyogo Ecotown Vision has two primary pillars of hardware projects and services projects. The former addresses industrial development through the building of recycle-specific hardware and the promotion of the recycle business. The latter is about community development and led to the launch of the Hyogo Ecotown Promotion Conference to develop awareness activities across a broad swath of society and promote urban development through cooperation with residents.



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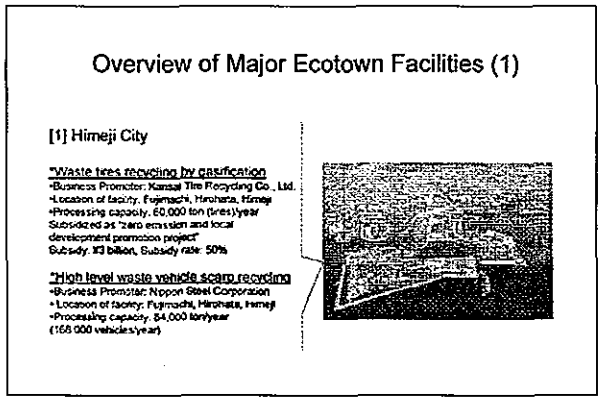
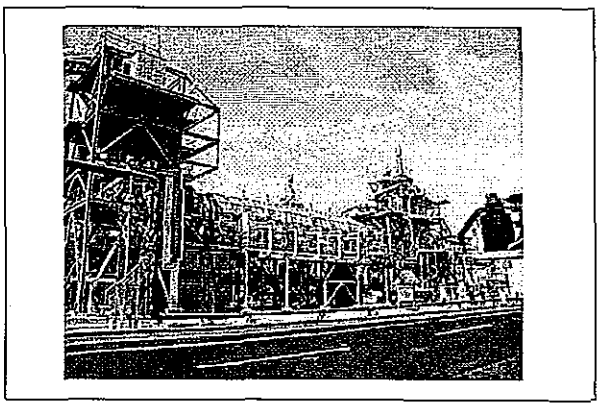
The Ecotown Vision originated out of these two pillars. Based on the "Hyogo Ecotown Vision" put forth by the Wide-Area Recycle Center Development Council, Japan's Ministry of Economy, Industry and Trade and the Ministry of the Environment approved the project on April 24, 2003 as the 18th "Local Zero Emission Plan" in Japan. The basic policy was to promote the recycle business via cooperation with advanced industrial infrastructure, build recycle systems that meet the issues and needs of other communities via wide-area cooperation, and promote undertakings in cooperation with residents and others.

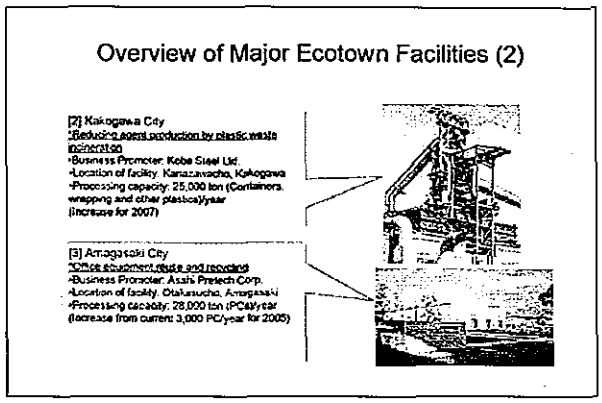


At this point, I would like to introduce the main facilities of the Ecotown Vision. With an Ecotown Grant of ¥1.5 billion, a "waste tire recycling by gasification" plant was built in Himeji last July. It is located on the grounds of the Hirohata Works of the Nippon Steel Corporation where their high temperature furnace used to be. Waste tires are brought to the plant and decomposed by deoxygenation. When decomposed, a waste tire is 13% steel wire and about 30% carbon residue, which are recycled as materials for making steel. The rubber does not burn because it is heated by deoxygenation, which leaves about 50% as gas or cracked oil, which are used as energy by the steel mills.

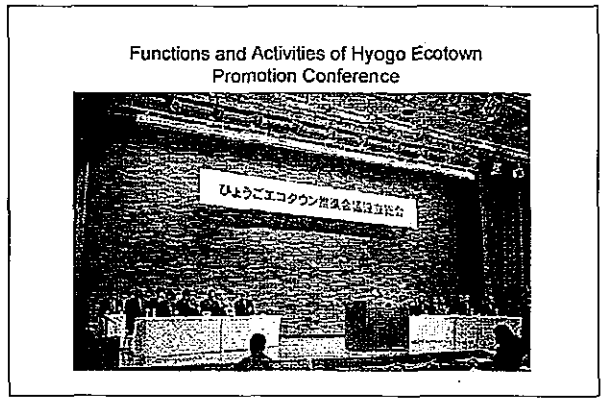
This photo is an external shot of the "waste tire recycling by gasification" plant. This long cylinder here is a rotary kiln. Processing flows from left to right.

Two other facilities are a plant in Kakogawa for producing "reducing agent by incinerating waste plastic" and an office equipment reuse and recycling center in Amagasaki. These are the kind of core facilities of the Ecotown Project.



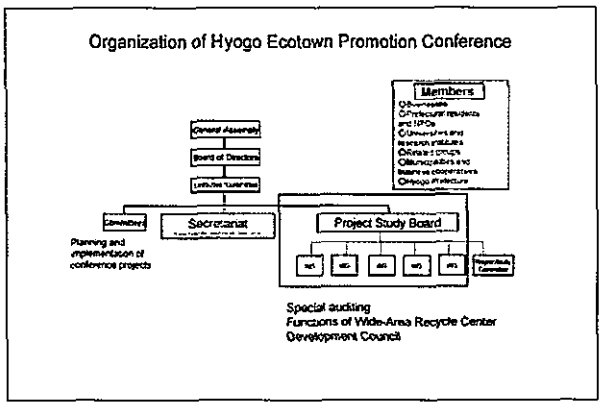


2 Functions and Activities of the Hyogo Ecotown Promotion Conference

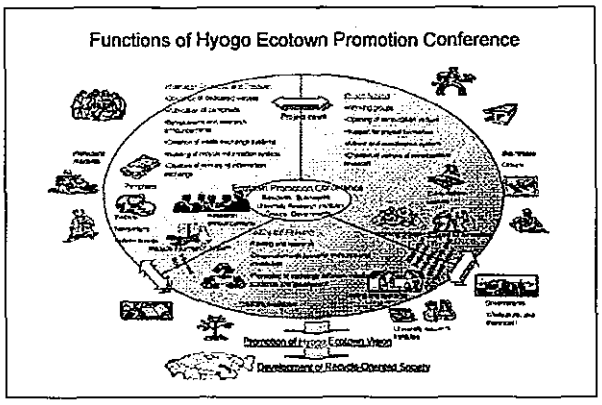


In December 2003, the "Hyogo Ecotown Promotion Conference" was launched the implementation of the Ecotown Vision. I would now like to introduce what goes on there.

This figure shows the organizational structure of



the Hyogo Ecotown Promotion Conference. Major policies are decided by the General Assembly, Board of Directors and Executive Committee. Also, underneath the Project Study Board, there are several Working Groups. These Working Groups are carrying on the functions of the Wide-Area Recycle Center Development Council I talked about earlier. Other than this, there is Project Study Committee, which operates as a closed meeting of only concerned members.



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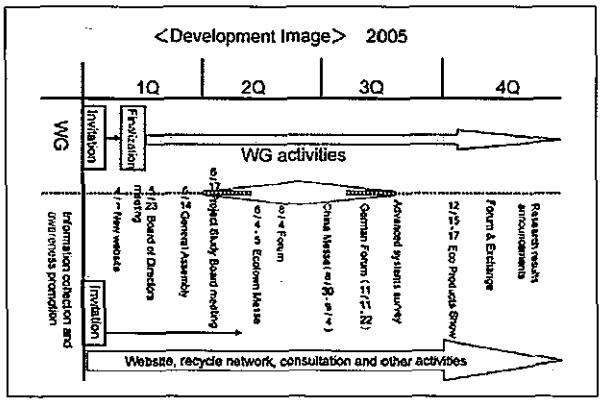
This slide conceptualizes the functions of the Hyogo Ecotown Promotion Conference. There are three main functions.

The first is "testing and research", which involves the implementation of testing and research for the development of a recycle-oriented society, promoting cooperation with universities and institutes, and interaction amongst industry, government and academia.

This here focuses on business support by opening venues for consultation on launching working groups and promoting concrete projects based on collected information, providing support for project formalities including permits, and creating a system for providing advice and coordination and venues for collaborative research. This is the second function, "project support".

Another function is "information collection and provision". Since these services are directed at the general public, they include activities for operating a dedicated website, publishing pamphlets, staging symposia, announcing research results, creating waste exchange systems and building a recycle information system.

The Hyogo Ecotown Promotion Conference is promoting the Ecotown Vision via these three functions in order to contribute to the development of a recycle-oriented society.

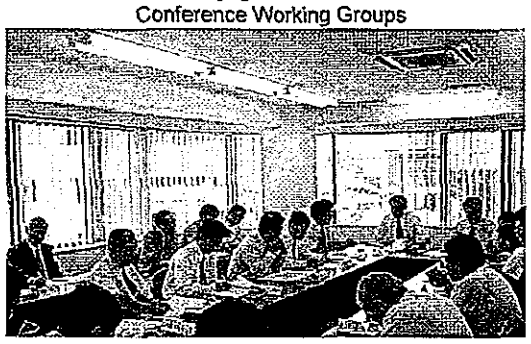


This is a schedule of major developments of the Hyogo Ecotown Promotion Conference. It gives activities for FY2005. Working Groups are solicited in April, then decisions are made by the Project Study Committee as to which will be promoted. Then, the projects themselves are managed throughout the rest of the fiscal year. Also, as a part of information collection and awareness activities, there are various types of forums and tradeshows, opportunities to announce research results and conduct surveys on advanced systems.

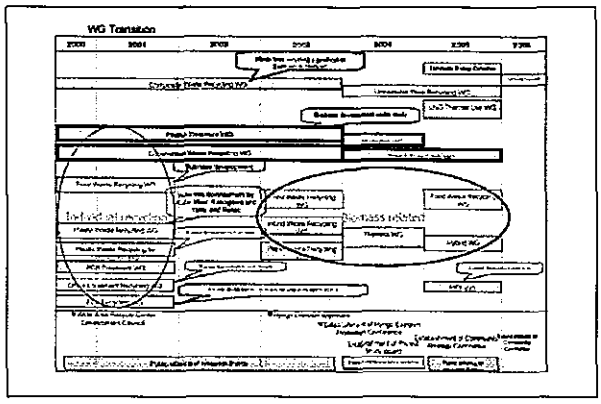
3 Activities of Hyogo Ecotown Promotion Conference Working Groups

From this point forward, I would like to introduce

Activities of Hyogo Ecotown Promotion Conference Working Groups



some actual activities of a few Working Groups of the Hyogo Ecotown Promotion Conference. This is a snapshot of a meeting of one Working Group. University professors, officials from prefectural and municipal governments, and persons from the business world take part in the Working Groups. They all gather to share opinions on how to build business models.



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This chart shows the transition of past Working Groups, but you can see that research became quite diversified following the launch of the Wide-Area Recycle Center Development Council in 2000. The recycle Working Groups that existed at that time have led to business projects in each their own way. In launching these Working Groups, many businesses had done preliminary studies in line with the host of recycle laws that were enacted in and around 2000. This is where the Wide-Area Recycle Center Development Council emerged with the dynamics of business and eventually turned into an actual business project.

Until 2003, studies looked into business models for capitalizing on the initial recycle laws that came out, after which the Ecotown Promotion Conference was established. In 2004, Working Groups were formed to do research into the new mid-to-long-term themes of "Hydrogen", "Slag and Fused Ash" and "Biomass".

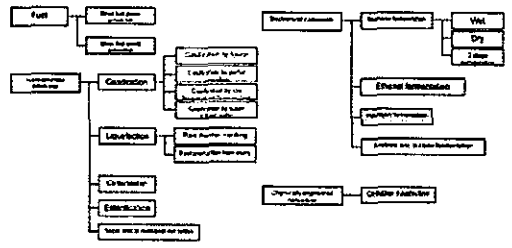
One project I will mention today has to do with biomass. Working Groups were formed after 2003 to research "Food Waste Recycling", "Waste Wood Recycling" and "Waste Paper Recycling", while in 2004 came a Working Group for "Biomass" and, in 2005, Working Groups for "Food Waste Recycling" again and "Hybrids". All of these come together as one big cluster of biomass research.

I would also like to briefly report on studies into hydrogen as a promising energy source of the future.

I would also like to talk about the Working Groups that are researching "Slag and Fused Ash", "Construction Material Waste Recycling" and "Proper Treatment".

3.1 Biomass projects

Overview of Biomass Utilization Technologies



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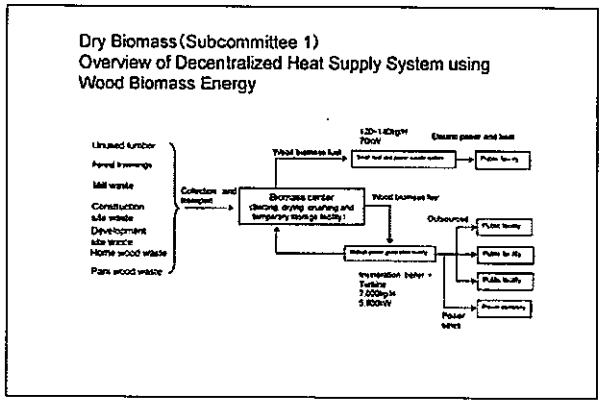
Biomass utilization technologies are very diverse in nature. There are its use as fuel, and its thermochemical conversion, biochemical conversion and chemically engineered conversion. With fuel, the Ecotown Development Conference is looking at "mixed fuel power generation", with thermochemical conversion, "gasification by partial oxygenation", with biochemical conversion, "dry methane fermentation",

and with chemically engineers conversion, "cellulose liquefaction". Later, I talk briefly about "hydrogen fermentation".



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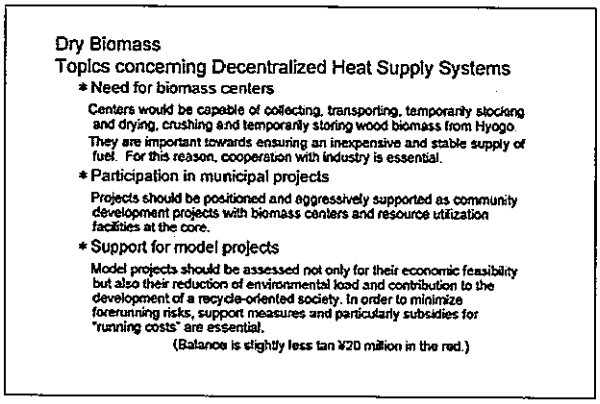
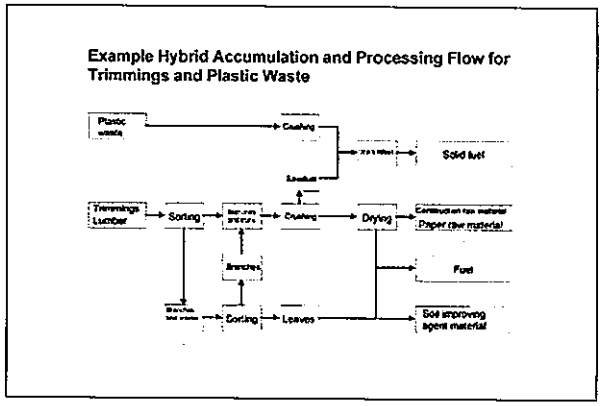
Biomass has dry and wet systems. Dry systems enable shipping to some degree, while wet systems require on-site processing. In this field, studies are looking at a decentralized heat supply system using dry wood biomass energy.



As you know, biomass is extremely light, widely available and requires a moderate cost to transport. Therefore, studies are exploring the possibilities of building a biomass center for sorting, drying, crushing and storing diverse types of biomass and using it as needed to generate power and heat. However, the cost balance is not good because of running costs, etc.

Though there is demand for biomass use, it is still far from being a business, therefore studies are looking at simultaneously collecting waste plastic and biomass. Research is moving forward with a hybrid accumulation of waste plastic and tree trimmings, and



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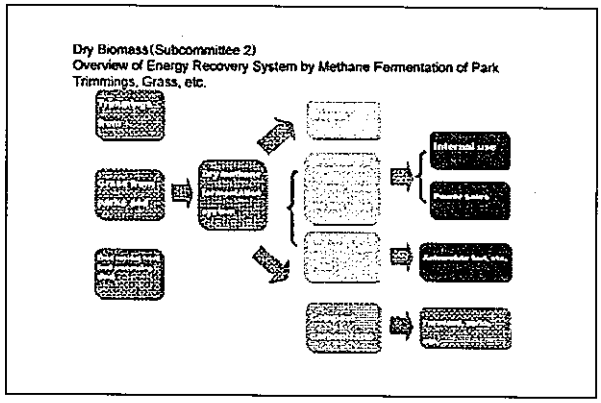
there are prospects of high economic return.



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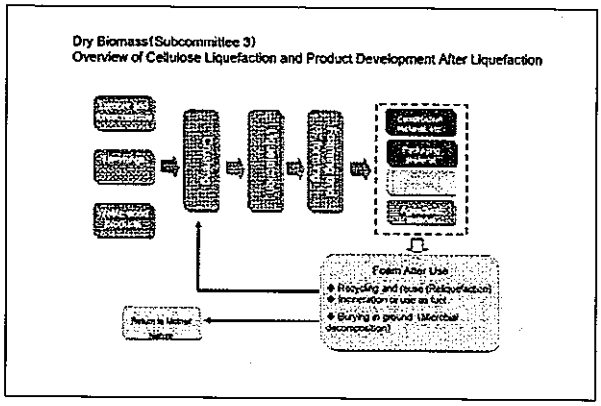
The second is dry methane fermentation. It collects trimmings, grasses and food waste and produces biomass gas with a dry methane fermen-tation system. In addition to gas production, it offers co-generation via power generation. Studies are looking also into carbonizing the residue to make compost. However, even with 80% funding, it still does not look feasible.



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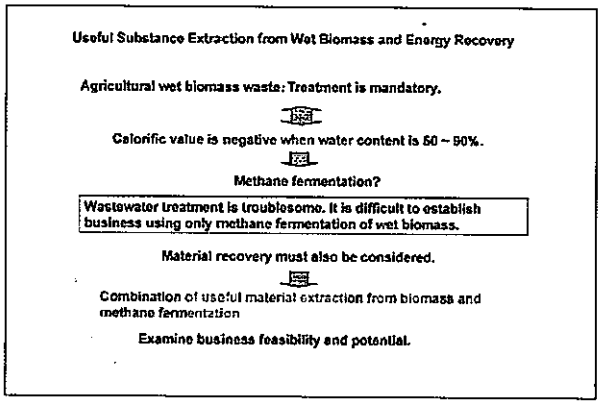
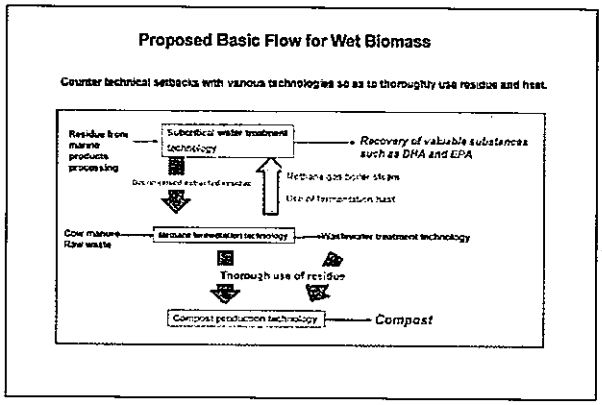
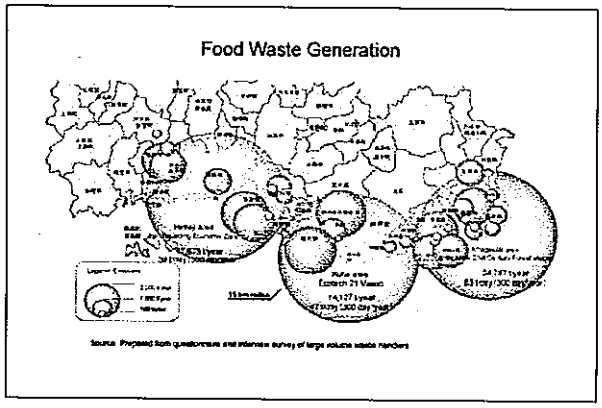
The third is cellulose liquefaction whereby cellulose is crushed, liquefied, formed into chips, changed to liquid by chemical processing and then foamed. Example uses are construction materials and greening materials. After that, it is recycled, reused or buried in the ground to return it to the natural environment. Studies of it's potential are underway on this.



Like dry systems, wet ones, too, are not at a feasible stage just yet. Moreover, because the biomass contains anywhere from 50 to 90% water, evaporation rate is very low. If this is to be used effectively, it will be necessary to improve business feasibility not just by thinking about energy but by also recovering materials.

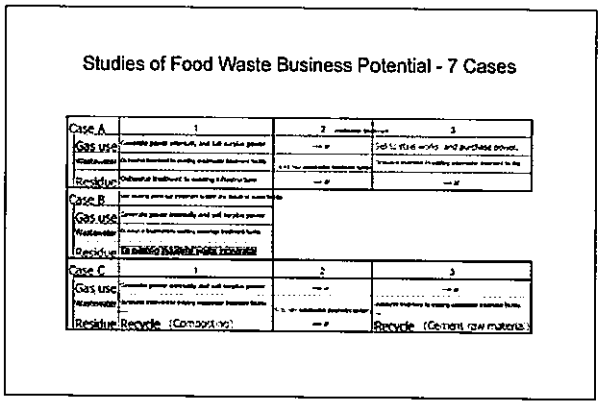


Using various technologies, wet biomass systems should be able to extract DHA (docosahexaenoic acid), EPA (eicosapentaenoic acid) and other valuable materials from processed seafood. To enhance the business potential, the system that the residue would be used to generate electricity by methane fermentation has been proposed.



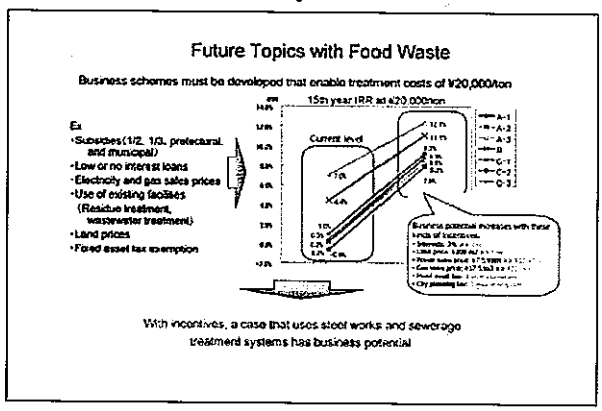
※ Enlarged figure on p.59.

This map gives food waste generation figures. Just in cities along coastal areas, a considerable amount of waste is generated.



※ Enlarged figure on p.59.

This table examines seven cases of food waste business potential. Using gas produced from food waste, internal power generation would be possible with any surplus power being sold and perhaps sold to steel mills. Wastewater treatment would be outsourced to existing facilities or new systems would be built.



The business potential of food waste has been studied closely, but in terms of IRR (internal revenue rate), the prospects of business are not good. Accordingly, incentives, such as to reduce current interest rates from 3% to 1% or charging nothing for land, are being considered to make business possible. These are the studies going on now.

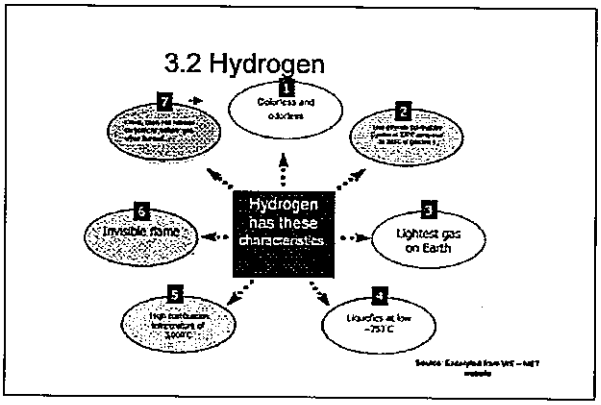
Future Outlook on Biomass Projects

- Current State and Topics
  ① Hyogo has high potential for hydrogen technology, but there is no long-term strategy.
- ② Collection costs are high for dispersed sources of biomass and, with currently available technology, profits do not cover costs as a private sector project. Innovative technology must be developed to support diversified ways of use.

- Future Undertakings
  ① Prepare a long-term road map for a hydrogen-driven society that uses biomass, and promote R&D from a mid to long-term perspective.
  ② In the short-term, promote the development of business models and the startup of projects that match the peculiarities of the local area and the diversified ways of use.

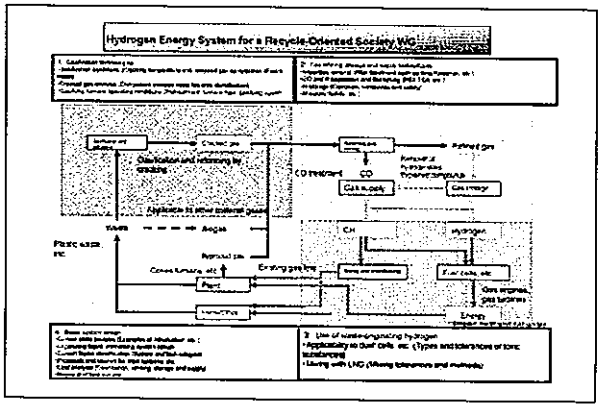
Whatever the situation, biomass is rather costly and, as a business, the profits do not balance the expenses. A technical approach, including technological innovation for various ways of use, seems necessary.

3.2 Hydrogen projects



Next, I would like to talk about hydrogen. Its characteristics are laid out here. Hydrogen has various qualities to note that it does not release carbon gas or sulfur oxides when burned, hence offering future expectations as an energy source.

Within the Ecotown Promotion Conference was launched a Working Group to research "Hydrogen Energy Systems for a Recycle-Oriented Society", which



Proposal and Topics for Hydrogen Use System Model Project
Study Approach to Hydrogen Production and Use System
Objectives and Method of Study

- Study Objectives
  Conduct preliminary studies into proposing a model project for using recyclable resources such as waste to make and use hydrogen.
  Set multiple scenarios, and organize a project overview, technical development topics and business topics.
- Study Method
  ① Set hydrogen production and use scenarios.
  ② Separate and design basic processes (gasification, gas separation and thickening, and gas use).
  ③ Identify features and topics of each scenario.
- Study Items
  Energy balance, cost balance, technology level and development topics

is examining hydrogen utilization. One possibility is gasification technology. In the conventional process of breaking down natural gas to produce hydrogen, CO_2 is generated, but research is trying to produce hydrogen from waste using gasification technology.

However, hydrogen production from waste could conceivably generate impurities that never existed before, therefore technology is being thought of to reform and refine the product by removing such impurities. There is also the question of how to use hydrogen that has been reformed from waste. One idea is on the hydrocarbon level, whereby it would be mixed in existing gas lines or the hydrocarbon would be used in fuel cells to generate power. Then, there is the question of what kind of social service could collect waste from factories and homes, and gaseous by-products exhausted from factories. Studies are probing the prospects of a hydrogen-driven society by creating a single circulatory cycle like that shown here.

We are asking whether a hydrogen production and utilization system that uses waste and other recycled

Prerequisites and Target Technologies

- Source Substances
  Waste ties and plastic (potential source of hydrogen) from the prefecture
  Processing capacity: 200 ton/day × 300 day/year = 60,000 ton/year
  (Waste tires: 50%, Plastic waste: 50%)
- Target Technologies
  ① Gasification process: Externally heater kiln type gasifying furnace
  2 types: "Gasifying" only and "Gasifying + Reforming (Hydrogenation)
  Recovered gas is refined (dust removal, desulfurization, etc.). Imagine a site where materials can be accumulated, heat supply is available, and demand and delivery of recovered resources and byproducts can be expected (i.e., coastal steel works, etc.).
  ② Separation and thickening process: PSA, CO-PSA
  ③ Use process: GE (gas engine), MCFC (molten carbonate fuel cell) SOFC (solid oxide fuel cell), PEFC (polymer electrolyte fuel cell), CH_4 supply to city gas line, methanol synthesis, DME synthesis (dimethyl ether)

resources as raw materials is actually possible or not. Studies are looking at a processing rate of 200 t/day, "gasification" and "gasification plus reforming (hydrogenation)" as target technologies, gas engines that run on methane, MCFC (Molten Carbon Fuel Cell) and SOFC (Solid Oxide Fuel Cell), and supplying CH4 to city gas lines.

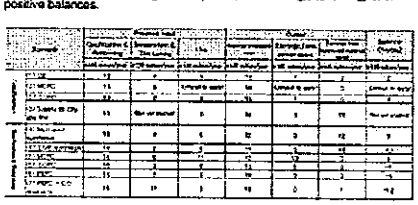
This table gives numerical figures for each case of hydrogen production and utilization flow as part of a study into cost balance. For example, with scenario 6, separation and recovery of hydrogen, the hydrogen

Studied Scenarios (Hydrogen Production and Use Flow)

Scenario	Gasification & Reforming	Main gas components	Separation & Thickening	Use	Output
①	Gasification	CH_4, etc. H_2	–	GE	Power
②			–	MCFC	Power
②'			–	SOFC	Power
③			CH_4 thickening	Supply to city gas line	CH_4
④	Gasification & Reforming (hydrogenation)	H_2, CO	–	Methanol synthesis	Methanol
④'			–	Methanol synthesis + Methanol dewatering	DME
⑤			–	MCFC	Power
⑤'			–	SOFC	Power
⑥			H_2 PSA	PEFC	Power (H_2)
⑦			CO-PSA+H_2 PSA	PEFC	Power (H_2), CO

Cost Balance - Power Sales Price of ¥15/kWh

- A positive cost balance (revenues - expenses) results for methanol synthesis (scenario ④) and DME synthesis (④').
- If it costs ¥50/kW or less to generate power, scenarios ①, ②' and ⑤ offer positive balances.



Remark: Data is given for a generator output price of ¥300,000/kW.

Balance - Hydrogen Production Cost

- Hydrogen production cost is a low ¥2 ~ 20/m³N.
- Recuperated materials (waste tires and plastic) greatly affect hydrogen production costs.

Scenario	Investment cost: Gasification & Reforming	Investment cost: Separation & Thickening	Recovery cost: Material treatment cost	Recovery cost: Earnings from recovered material sales	Cost balance (Investment - Recovery)	H production rate	H production cost	(Material treatment cost excluded)
	¥100 million/year	¥100 million/year	¥100 million/year	¥100 million/year	¥100 million/year	m³N/year	¥/m³N	¥/m³N
④	16.0	2.8	18.0	0	0.8	43.00 mil	2	43
⑦	16.0	11.3	18.0	0.6	8.7	44.00 mil	20	61

Scenario Features

Scenario		Output		Cost		Technology level	
Gasification	① GE	○	Surplus energy available (?: Not yet studied)	△	Power generation system cost: Low. Power sales price: Profitable if high	∨	Stable operation of gasification process is difficult. GE and FC must be developed
	②, ②' MCFC, SOFC	? ○		? △		∧ ∧	
	③ Line supply	○	CH_4 can be used as fuel, etc.	?	(Not yet studied)	△	Gas must be refined as per supply agreement
Gasification + Reforming	④ Methanol synthesis	○	Methanol and DME can be used as fuel etc.	○	Methanol and DME production cost is low (Sales should be profitable)	○	Similar projects already exist (DME synthesis uses existing technology) Gasification and reforming process must be validated
	④' DME synthesis	○		○		○	
	⑤, ⑤' MCFC, SOFC	○ ○	Surplus energy available	△ △	FC cost: Low Power sales price: Profitable if high	△ △	Gasification and reforming process must be validated. FC must be developed
	⑥ PEFC	×	Power must be purchased to produce H_2	○	H_2 production cost is low (Sales should be profitable)	○	PSA must be scaled up
	⑦ PEFC+CO PSA	×		○		○	

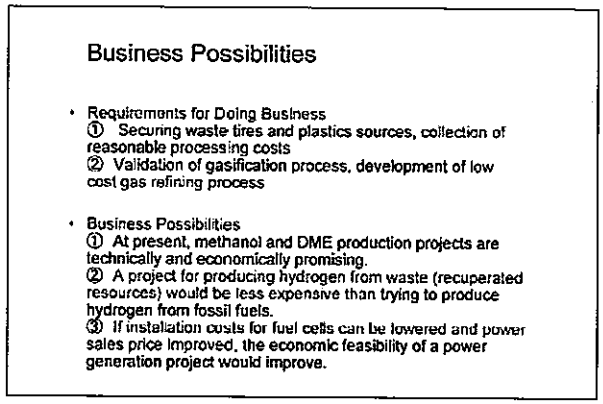
production cost is a considerably low \2. However, the effect of recuperated materials (waste tires and plastic) is large. Recuperation means that money must be borrowed to obtain recyclable materials. Based on these scenarios, the outlook is good on producing hydrogen from waste whether via methanol synthesis or DME (dimethyl ether) synthesis, but recuperation is the pretext, therefore individual studies need to be scrupulous.

Technology Level and Development Topics

Scenario		Technology level and process matching, development topics, etc.
Gasification	①' GE	◆To prevent misfiring with GE running on hydrogen mixed gas, output must be adjusted. Cost is higher than GE that run on city gas. (Product development needed)
	② MCFC	◆Cracked gas has high tar content and contains fuel cell catalyst poisons (HCl, H_2S, etc.). Therefore gas must be thoroughly cleaned
	②' SOFC	◆Current SOFC are low output high cost. Power generation efficiency is barely 40%
	③ Line supply	◆To supply hydrogen to a city gas line, the composition of the supply agreement (H_2 ≤4% vol) must be ensured
Gasification + Reforming	④ Methanol synthesis	◆Gasification systems that convert plastic waste into chemical industry raw materials are operating in Japan ◆How to use the recovered methanol as a fuel (CVCC, etc.)
	④' DME synthesis	◆Plants that synthesizes DME by methanol dewatering are operating in Japan ◆DME demand and use development are topics (Producing 20 000 ton of DME a year would be excessive.)
	⑤ MCFC	◆There is at present no example of an MCFC with cracked gas as fuel ◆Current MCFC installation costs are high at approx. ¥500,000/kW
	⑥ PEFC	◆PEFC are low output, high cost. To use recovered H_2, many installations are needed ◆Endurance, energy efficiency and electrical power consumption are topics with PSA
	⑦ PEFC+ CO recovery	◆Finding uses for the cracked recovered CO (acetic acid production, etc.) is a topic

This table matches actual technology levels and processes, and gives development topics, etc. As can

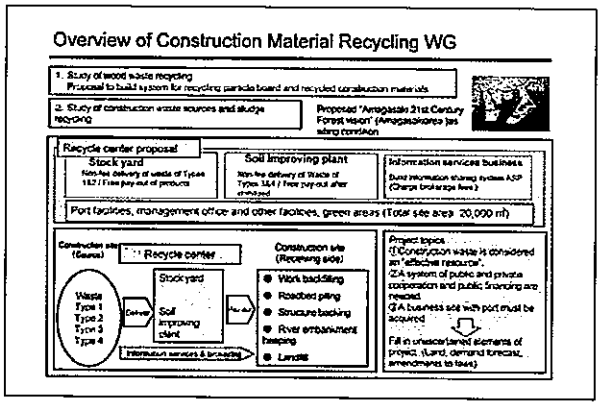
been seen here, there are still topics to deal with, therefore the technology issues must be individually cleared. For example, with gas engines (GE), output of hydrogen mixed gas must be adjusted to avoid knocking. And, with MCFCs (Molten Carbon Fuel Cells), since it is made from waste, the cracked gas contains a high level of tar and toxic substances (HCl, H2S, etc.), therefore it requires cleaning technology. So, there are various issues. Accordingly, hydrogen must be looked at with a long-term perspective.

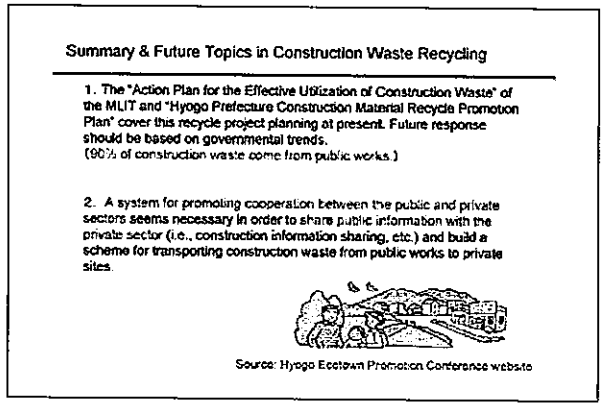


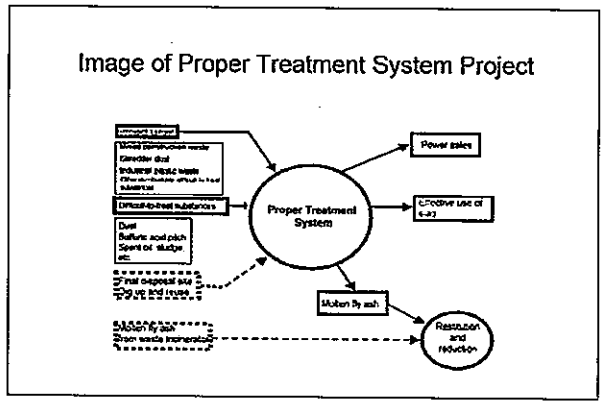
Some of the requirements for business development include securing the waste materials such as waste tires and plastic that act as raw materials, validation of gasification processes, and so forth.

3.3 Other projects (Construction material recycling, proper treatment, slag and ash)

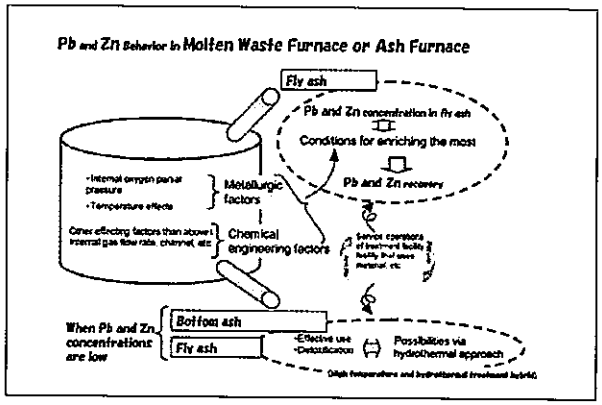
This slide outlines the Working Group for "Construction Material Recycling". Here, soil excavated from construction sites is transported to a stock yard/recycle center, where it is improved and delivered as necessary. Here, such a business model is being studied.





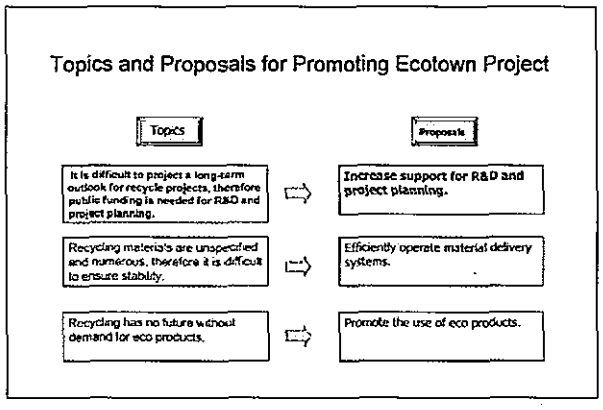


A proper treatment system is a place for properly treating difficult to treat waste such as shredder dust, industrial plastic waste, dust, sulfuric acid pitch, and so forth. After treating the waste, the byproduct energy is sold. Slag is put to effective use and the molten ash would also be used.



This figure illustrates studies into the effective use of molten ash and slag. The lead and zinc found in fly ash would be enriched for recovery. Moreover, stud-

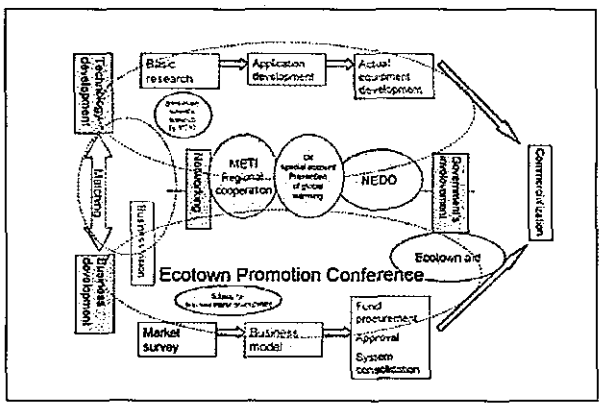
ies are looking at whether slag has some kind of higher value added than roadbed aggregate.



That was a brief explanation of what is going on in the Working Groups, but recycling has many topics. One is directly related to costs; how do we secure the needed raw materials? Depending on the circumstances of how the waste is generated, biomass requires a great deal of money. Efforts are needed just to collect materials.

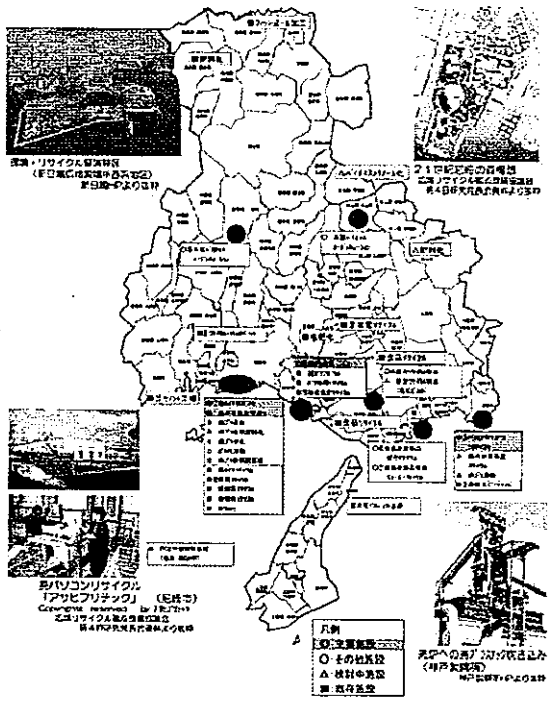
The second is the demanded innovation of recycling technology I mentioned earlier; the systems built specifically for a purpose will age with time. Greater public funding will be needed.

The third is that recycling does not have a future without demand for eco-friendly products. Therefore, promoting their use is a big issue.



This slide illustrates how project development and technology development can be commerciali-zed. Progress towards commercialization will come from studies by the Working Groups of the Ecotown Promotion Conference into market analyses, business modeling, capital procurement, authorization, system building, etc. With technology development, on the other hand, basic research, application development and actual equipment development must be somehow carried out with the idea of matching technology to business needs in mind. The Ecotown Promotion Conference will be injecting these functions as business development moves forward.

Overview of Hyogo Ecotown Vision



WG Themes for 2000

(1) Construction Waste Recycling

Studied possibilities of building new recycle systems and creating business in waste generated by construction and tear-downs in lieu of enforcement of the Construction Material Recycle Law.

(2) Food Waste Recycling

Studied possibilities of building new recycle systems and creating business in food waste from food businesses, including effective use as biogas (fuel cells, etc.) in addition to compost and feed production, in lieu of enforcement of the Food Recycle Law.

(3) Plastic Waste Recycling

Focused on the large volume of plastic waste generated as "residue" from other recycle fields and studied possibilities of building new recycle systems (plastic waste injection into blast furnace) and creating business in wide-area collection, recovery and recycling of plastic waste at as far upstream a point in the treatment process as possible.

(4) Plastic Waste Recycling by Gasification

Studied possibilities of creating business in plastic waste recycling by gasification based on technology for extracting from plastic waste carbon as CO gas for chemical synthesis and expanding the range of treatable substances by the dechlorination of vinyl chloride.

(5) Proper Treatment

Studied possibilities of building new recycle systems and creating business in treating residue from recycle systems including RDF production, thermal recycling (power generation/heat supply, etc.) by incineration and fusion, recovery of heavy metals and other substances from thickened residue.

(6) PCB Treatment

Studied business models for hazardous PCD waste treatment in Hyogo Prefecture by investigating treatment technologies and projecting facility scale, construction costs and treatment costs.

(7) ELV Recycling

Studied possibilities of creating business in automobile waste via treatment of shredder dust and treatment of pressed metals by steelworks in lieu of the enactment of the Automobile Recycle Bill.

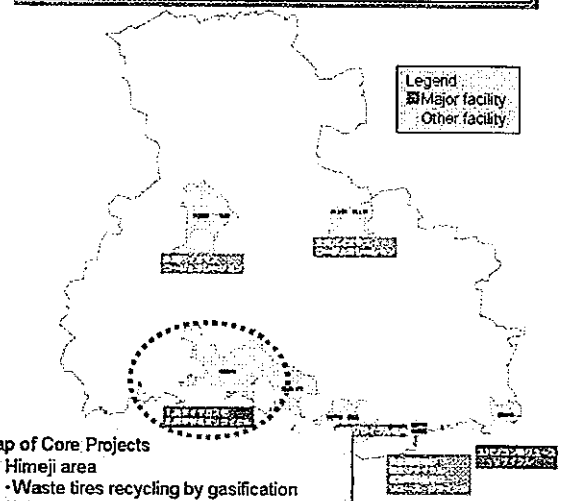
(8) Composite Waste Recycling

Studied possibilities of building business schemes and creating business aimed at improving the recycle rate of used products composed of composite materials (i.e., iron, nonferrous metals, resin, rubber, etc.) in pursuit of zero emissions, higher product recycle rates and economic feasibility. (Gas recycling from tires)

(9) Office Equipment Recycling

Studied business models for ensuring profitability in operations for dismantling computers, salvaging parts,and sorting, crushing, storing and classifying materials in consideration of reuse promotion and distribution efficiency.

Hyogo Ecotown Vision



Map of Core Projects
1. Himeji area
   - Waste tires recycling by gasification
2. Kakogawa
   - Reducing agent production by plastic waste incineration
3. Amagasaki
   - Office equipment reuse and recycling

Hyogo Pref. Launched Wide-Area Recycle Center Development Council in October 2000.

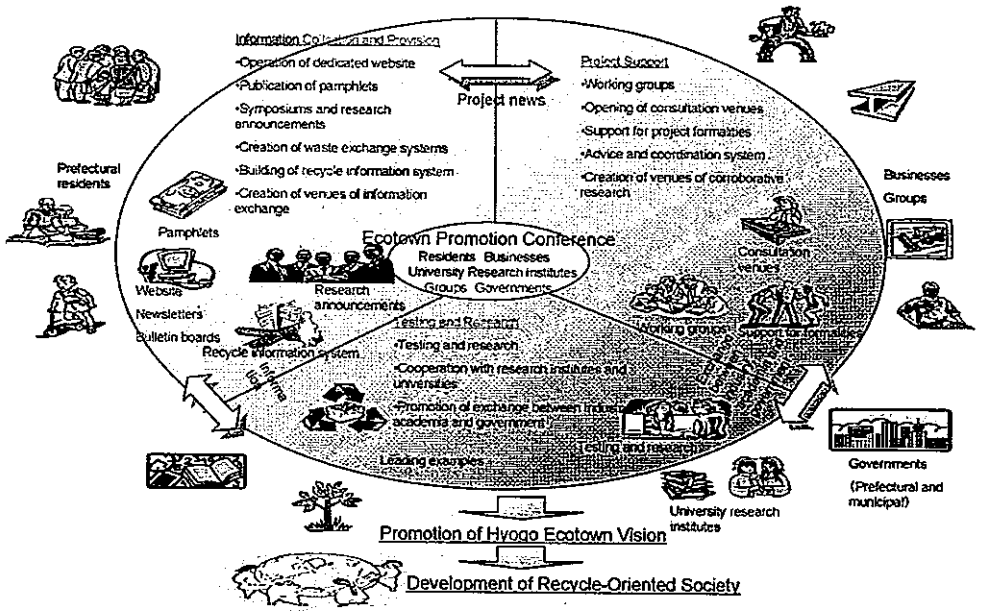
Adopted "Hyogo Ecotown Vision".

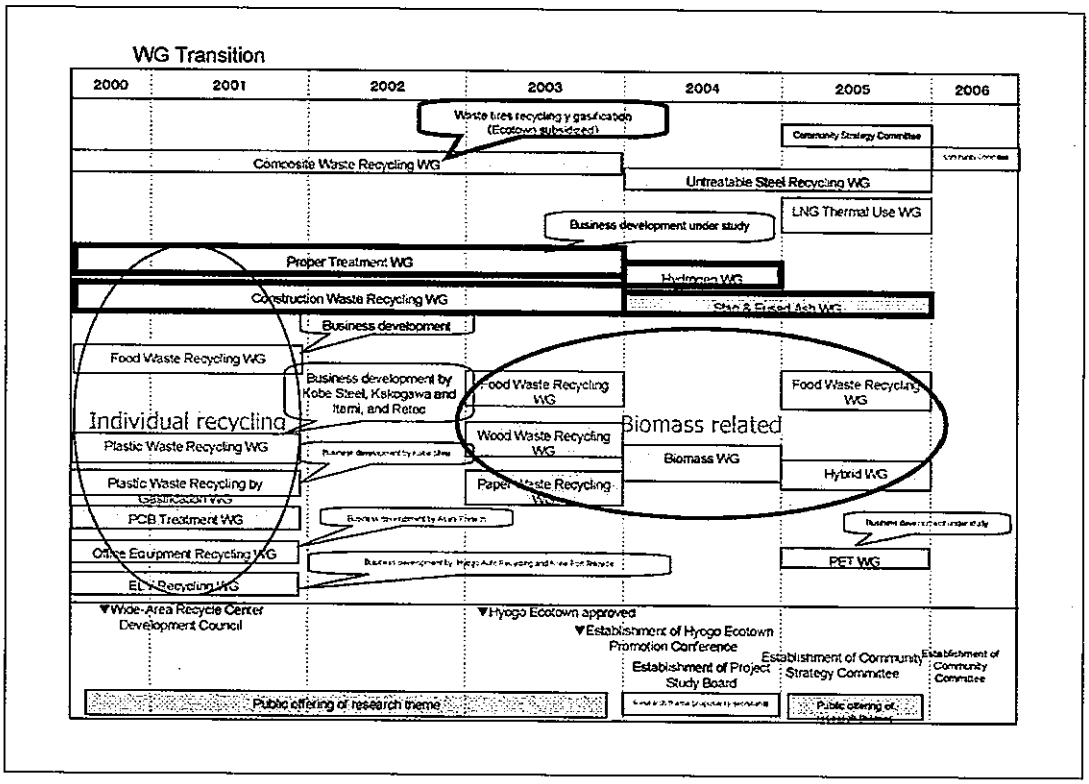
<Basic Policy>

- **Promote recycle business via cooperation with advanced industrial infrastructure.**
- **Build recycle system that meets topics and needs of other communities via wide-area cooperation.**
- **Promote undertakings in cooperation with residents, etc.**

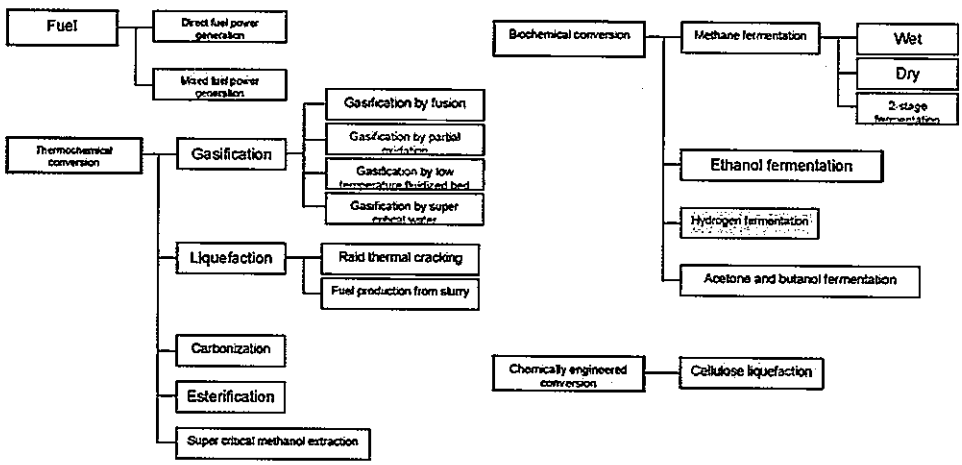
Approved by METI and MOE as "Local Zero Emission Plan" in April 2003. (First in Kinki)

Functions of Hyogo Ecotown Promotion Conference

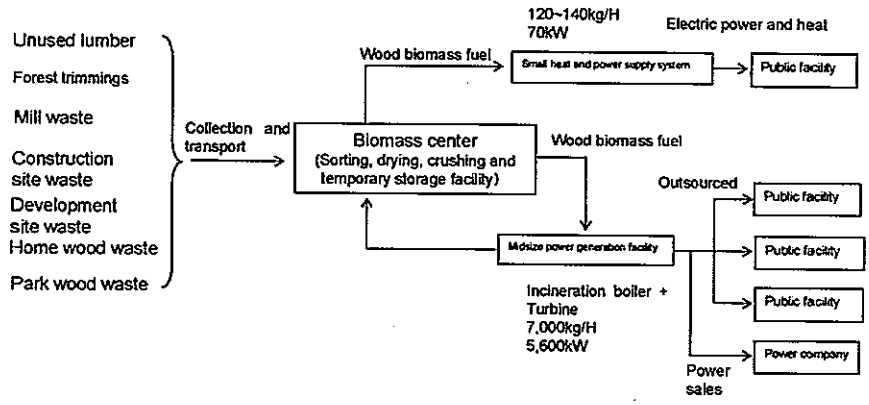




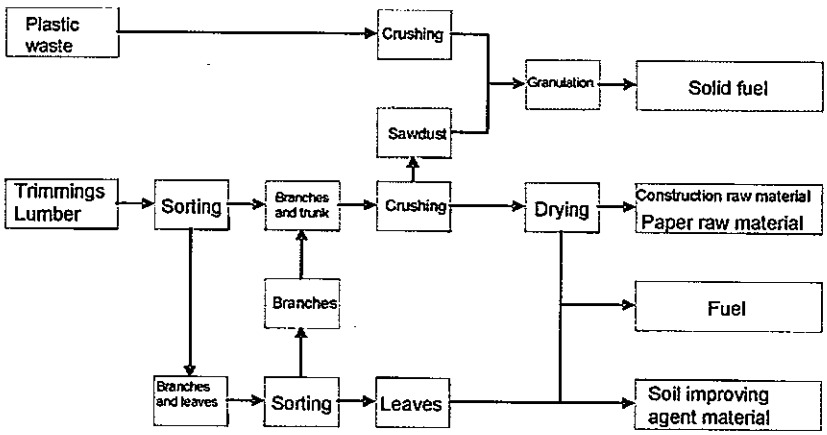
Overview of Biomass Utilization Technologies



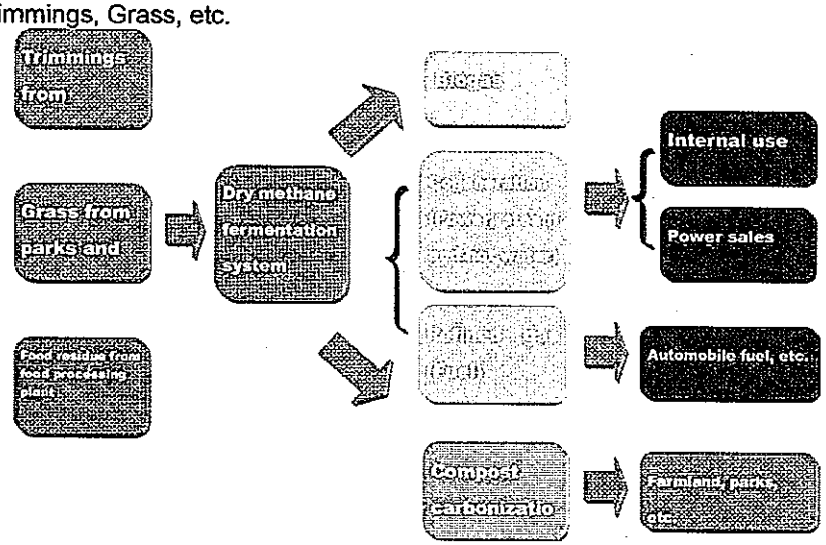
Dry Biomass (Subcommittee 1) Overview of Decentralized Heat Supply System using Wood Biomass Energy



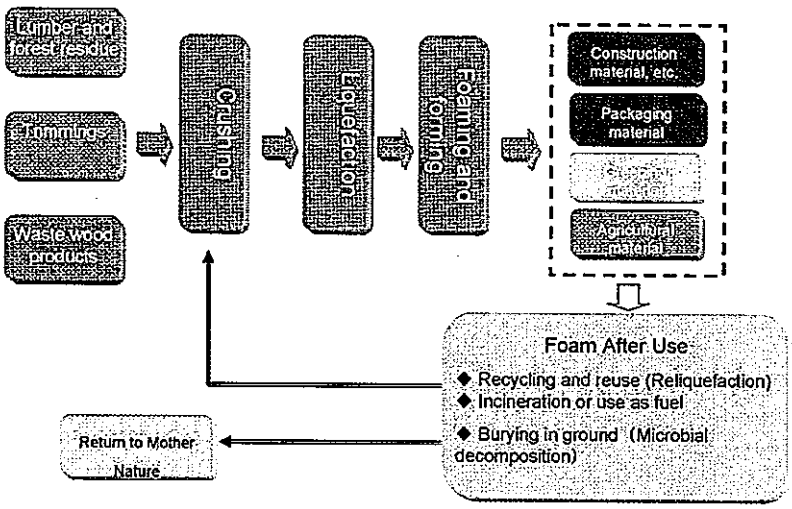
Example Hybrid Accumulation and Processing Flow for Trimmings and Plastic Waste



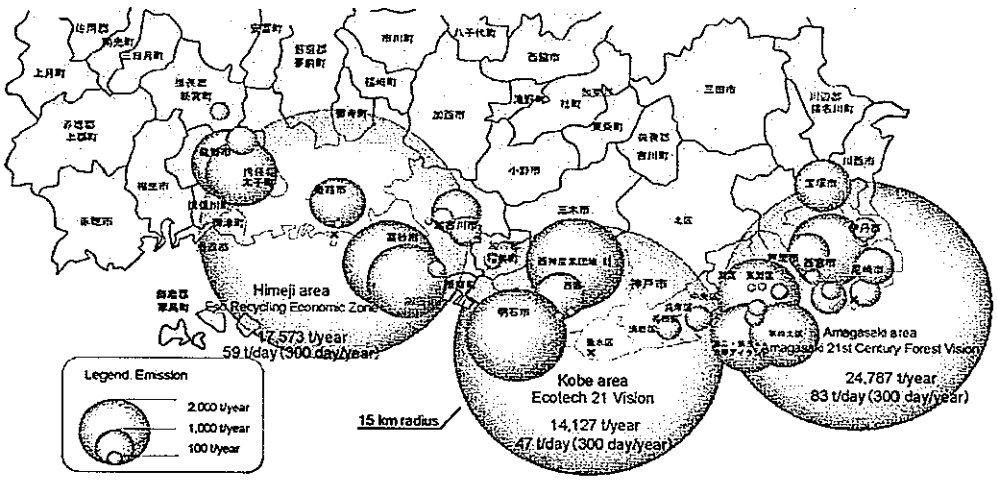
Dry Biomass (Subcommittee 2)
Overview of Energy Recovery System by Methane Fermentation of Park Trimmings, Grass, etc.



Dry Biomass (Subcommittee 3)
Overview of Cellulose Liquefaction and Product Development After Liquefaction



Food Waste Generation



Source: Prepared from questionnaire and interview survey of large volume waste handlers

Studies of Food Waste Business Potential - 7 Cases

Case A	1	2 Wastewater treatment	3
Gas use	Generate power internally and sell surplus power.	→ //	Sell to steel works and purchase power.
Wastewater	Outsource treatment to existing wastewater treatment facility.	Build new wastewater treatment system.	Outsource treatment to existing wastewater treatment facility.
Residue	Outsource treatment to existing infrastructure.	→ //	→ //
Case B	Use existing sewerage treatment system and industrial waste facility.		
Gas use	Generate power internally and sell surplus power.		
Wastewater	Outsource treatment to existing sewerage treatment facility.		
Residue	To existing industrial waste incinerator		
Case C	1	2	3
Gas use	Generate power internally and sell surplus power.	→ //	→ //
Wastewater	Outsource treatment to existing wastewater treatment facility.	Build new wastewater treatment system.	Outsource treatment to existing wastewater treatment facility.
Residue	Recycle (Composting)	→ //	Recycle (Cement raw material)

Concluding Session

Moderator:

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Director, Japan Office of the State of Nordrhein-Westfalen (NRW)(Germany)

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(All titles and honorifics omitted below)

Kanda

In this Concluding Session, I would like us to first answer the questions from the floor as best possible and then get into free discussion, where our presenters can share ideas amongst them-selves. Then, before ending, I would like to get a final comment from each of our presenters.

[Resource cost accounting]

Kanda

This is our first question from the floor. The Resource Cost Accounting done by the Efficiency Agency is a new technique, but is it different from Material Flow Cost Accounting?

Bleischwitz

The concepts of Resource Cost Accounting and Material Flow Cost Accounting are basically the same, but the practice is different. Right now, a demonstration project is underway to test the various techniques. The differences lie in whether all materials are covered, or just some or just basic materials. System boundaries are also different. Another difference is whether all hidden flows are included or not, or whether the system includes only hidden flows or not.

Then, there is the software; different applications are used. The Efficiency Agency is using a software tool. Also, software created by our institute is being offered to businesses. It is important for small and medium-size businesses to select an appropriate method by testing the available applications.

[Scope of applicability of WEEE Directive]

Kanda

Next, we have a question about the EU's WEEE

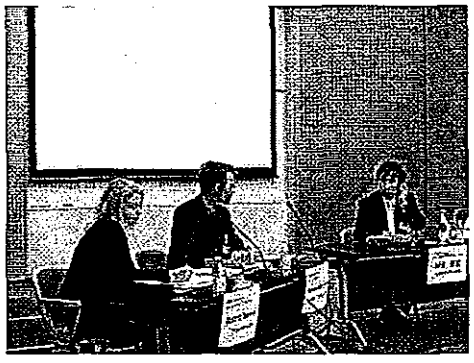
(Waste Electrical and Electric Equipment) Directive. I would like the person who actually posed the question to present it directly to our presenters.

Floor

I have understood it that this law applies to the all of the EU, but it is being applied differently by each individual country. I would like to hear about the prospects of the toner cartridges used in copiers and laser printers being subjected to the WEEE Directive.

Becker

Most of the parts of electric devices are subjected to the WEEE Directive, but toner cartridges are not covered by it. Toner comes under reusable substances; the toner manufacturer, not the hardware manufacturer, recycles it or takes it back. It does not fall under the WEEE Directive; toner is toner and there is another system for it. Disposal and recycling policies are specified there.



[Use of biomass in Germany]

Kanda

Our next question is: 'I have two questions. I have heard that Germany is advanced in the use of biomass. What kind of businesses are there for the use of biomass and what kind of incentives are the federal and state governments offering to establish these kinds of businesses?"

Bleischwitz

There are various types of biomass and many businesses engaged in it. There are even companies who have received assistance from the federal government and are making goods from biomass. For example, home insulation is being made from biomass. This, too, is recognized as a renewable energy program under the Renewable Energy Sources Act.

As for recyclable materials, as Prof. Gunjima mentioned, new recyclable materials are being made from biomass. Though this is under development, it is a field that requires further government funding.

Becker

A major objective of biomass is to make up for the shortage of energy. To deal with this energy shortage, one way is to make gas from biomass by gasification. It is burned to generate heat energy. One approach that is being promoted today is to make wood pallets and then burn them in an incinerator to generate electricity.

The use of heat energy from biomass will be further encouraged in the future, but the state provides assistance for power generation and there are incentives as well. Also, there is a provision that requires power companies to purchase electricity generated from biomass at an appropriate price. And, there are tax breaks for investing in biomass systems.

Bleischwitz

Also, biofuel can be made from biomass. With biofuels, there is assistance such as tax deductions.

[Environmental policy in Germany and international competitiveness]

Kanda

We have a question regarding the relationship between environmental policy and unemployment problems in Germany. Again, I would like the person who wrote this question to ask the presenters directly.

Floor

Various innovative activities are being done in Ger-

many, but also unemployment is increasing steadily. Of course, we need a win-win situation that is good for industry and good for the environment, but is not Germany losing their competitive strength in the marketplace? Unless the other EU member countries undertake similar action to fill in the gap, you cannot compete under the same conditions. I would like to ask how the relationship between environmental policy in Germany and international competitiveness plays out in all of this.

Becker

As I mentioned in my report, one of the objectives of promoting environmental protection and environmental technology is to resolve unemployment problems. The high unemployment rate is not because businesses are focused on environmental protection; it is high for other reasons. Also, by taking measures with environmental protection, jobs are inversely being created. If not for the new businesses, industrial promotion and assistance with regard to environmental protection, the unemployment rate in NRW might be even higher.

Also, as you said, there is competition with other countries in Europe. But, the entire EU has high environmental standards. Accordingly, competition across the EU is fair amongst industries with a new environmental consciousness. As of 2004, all EU member states must uphold new environmental standards. Therefore, industry cannot relocate to countries with low environmental standards. Germany wants to craft standards that are consistent and fair across the EU.

We cannot survive with a polluted environment. We cannot produce from within a polluted environment. So, I think we must invest in environmental protection and fulfill our respective obligations.

Bleischwitz

I feel the same as Ms. Becker. Let me also add that Germany launched reforms in the labor market just last year, so it is still too early to see the effects.

Environmental policies in the industrial world are showing concern. One item on everyone's agenda is the high cost of electric power and the high cost of introducing renewable energies. When it comes to policy, though we must observe regulations for reducing green house gases, it is also necessary to enhance competitiveness of the industrial world. Electric power costs, an emissions trading system, green energy taxes ... there are still many matters that need further coordinating in the EU.

Also, one way to think about it is that even good polices have bad effects in some cases. For example, with carpet recycling, waste laws are not well designed therefore bad consequences arise. Another example is that biomass producers are not observing their obligations under the subsidies program. In these cases, policy is incomplete, but, as policy, you can say that about 90% of it is good. The remaining 10% has room to be improved.

[Japan's Eco-town approach]

Kanda

The questions from the floor have been directly entirely to our German counterparts, so if our German friends have any questions or comments about the Japanese presentations, please speak up.

Becker

I would like to comment about Mr. Hidaka's presentation. With regard to the Ecotown model, compared to Europe and Germany, Japan is very centralist, that is to say, the central government has the

reigns of leadership. And, you are building clusters like think-tanks and trying to take a strategic approach. Germany does not take this approach; the role of policy is to take action and learn as you go. In Germany, strategies are developed while action is being taken, and eventually lead us to the future. I would like to ask what Japan does to implement undertakings in concrete terms.

Hidaka

The primary undertaking of the Ecotown Project is to develop business on the cooperation of industry, government and academia. With industry and academia, it's about various kinds of technology; with cooperation amongst industry, government and academia, for example, it's about problems with permits. Cooperation with third parties leads to business development. The project is being promoted in that direction. Accordingly, regarding the "waste tire recycling by gasification system" I spoke of earlier, technology was initially researched within the company, but to turn it into a business, public funding was put to use so as to improve business potential. This has been carefully applied to the Ecotown model to successfully develop business. It is hard to develop business quickly when a single company is doing all of the research.

Gunjima

I, too, would like to say something about the Ecotown Project. It has to do with whether the name of the "Ecotown Project" itself is befitting or not. I had the opportunity to speak about the eco-business with students in Kyushu after lecturing at Eco-techno in Kyushu together with Ms. Becker. When that happened, the students argued over the then-image of Ecotown Project. The name "Ecotown" was chosen because we thought that it was hard for just the industrial park to draw businesses to the site, so it was decided to make the industrial park green by adding the "environment". But, the students claimed that it was not an "ecotown". Because it contained the word "town", it could not be an "ecotown" without urban development. They felt that a true ecotown had to involve urban development and had to be done in cohort with the local community; it was not good enough to be gentle on the environment only inside the industrial park.

This argument came right at the time that the Industrial Restructuring Committee was to review the Ecotown Project, so it was proposed that "it would be good for local community revitalization to bring in urban development rather than have the Ecotown exist all by itself like a tiny remote island". Of course, prefectures are promoting the Ecotowns properly, but the proposal was put forth to have municipalities link it with their own basic environmental plans.

The Ecotowns I am involved with are in Mie Prefecture, the first of which to receive approval was in Suzuka city. Let me outline their undertakings as an example of urban development in an Ecotown Project. Honda Motors paints cars in Suzuka, but if they would switch to organic paint, organic waste would result. This would be made into compost together with the raw waste that households in Suzuka produce, which is similarly organic in nature. Also, Suzuka is famous for growing azaleas. The idea is to aid agriculture by making compost of the raw waste from the city and organic waste from industry and using it as fertilizer. Through undertakings such as this, the Ecotown is being developed in cohort with the community.

Another city in Mie Prefecture with an Ecotown Project is Yokkaichi city. Let me briefly describe that project as well. The project is being developed by Mitsubishi Chemical and Fuji Xerox. The plastic waste from Fuji Xerox's products is being recycled to a high degree as polyethylene and polypropylene. Another involvement of Mitsubishi Chemical's is biodegradable plastics called "bioplastics". These plastics are basically biodegradable, therefore if they are recovered and returned to the earth, they turn back into soil.

But, they contain succinic acid. In other words, these biodegradable plastics can be recycled again as biodegradable plastics. So, Mitsubishi Chemical is studying whether it might be better to recycle the plastics instead of returning them to the earth.

Also, Yokkaichi is the birthplace of the retailer AEON, so they are involved in replacing plastic bags that consumer receive in stores with biomass bags, recovering those bags and recycling the biodegradable plastic.

Ecotowns are changing to enable collaboration that links to environmental plans or waste plans of their municipalities.

Secondly, it is conceivable to transform recycle-based Ecotowns into reduce- and reuse-based Ecotowns. Presently, most Ecotowns, to note Kitakyushu and that in Hyogo Prefecture, are recycle-oriented, but what we are talking about today is the 3R business for promoting all of the 3Rs, including reduction and reuse. In that sense, Ecotowns, too, need to convert from a recycle-orientation to a reuse-orientation. There could be new Ecotowns oriented for reduction and reuse, which place a higher priority on upstream areas with maintenance or repair functions, by introducing servicizing and PSSs (Product Service Systems). By repairing a product, it lasts longer and, because residents would seek repairs, waste could be reduced, which would have the effect of urban development. Ecotowns of this nature could be developed.

Ecotowns have gone from the eco-parks that remake conventional industrial complexes to Ecotowns that coordinate with municipal environmental plans. This is just my opinion, but Japan's Ecotowns have changed slightly.

[Hydrogen use]

Bleischwitz

This is a question for Mr. Hidaka. In a hydrogen society, once the hydrogen is produced, how is it distributed? Distributed infrastructure is necessary on the community level to distribute hydrogen. It is necessary for local communities to accept hydrogen use. What are your thoughts about this?

Hidaka

Your question is about how to distribute hydrogen, how residents will use it. With hydrogen, I imagine model projects would be set up in select communities. Then, to spread the use of hydrogen, residents will have to actually use it, so efforts will be needed within that to gain the residents' understanding of its safety and other aspects.

As for hydrogen distribution, there were several thinkable applications mentioned in the presentations. I can see gas engines, fuel cells, mixing with city gas, etc. With gas engines, a discrete quantity could be consumed to generate electric power. Fuel cells are somewhat distributed in nature as is. This intertwines with the actual costs, so it will be necessary to decide how to use it, and how much will be generated and consumed. Whatever the case, the prime issue is to get people to use hydrogen to a minimal degree.

[Possibilities of material recycling in Japan]

Bleischwitz

The second question is for Prof. Gunjima. It would seem that the emphasis in Japan is placed on product recycling; compared to Germany, material recycling is low level. It is also predicted that material recycling will increase 20% in the next 50 years, but shouldn't more energy be directed at the possibilities of material recycling? For example, tell us what is be-

ing done with the recovery of metal from construction infrastructure.

Gunjima

I wanted to ask about the state of recycling in Europe. Currently, I understand it that, in Europe, thematic strategies are having a considerable impact. Recycling is not set up by products via home appliance recycling laws or vehicle recycling laws; material recycling is being looked at in terms of switching from product recycling to material recycling and is being given considerable attention. Plastic is plastic wherever it comes from, so not just plastic from containers should be recycled.

Presently, in Japan, the Containers and Packaging Recycling Law is being reviewed, but material recycling in Japan would be rather expensive.

One reason is that plastic recycling costs have not come down. Under the Containers and Packaging Recycling Law, recycling costs for glass and metal have decreased. And, for what regards PET bottles, excluding exports to China and elsewhere, progress is being made at present. Nevertheless, where the big trouble lies is in recycling plastics that are separated as "other plastics". Here, the cost has barely changed. One reason for this is that the demand-side businesses that recycle the material are clearly an oligopoly compared to the supply side, so even if the Japan Containers and Packaging Recycling Association bids for jobs, bidding stops at a high level.

Secondly, most of the recycling of "other plastics" is done by small and medium-size businesses, and they are not really capable of developing revolutionary technology.

Another problem is on the collection side. Because residents do not carefully separate "other plastics", a considerable amount of residue is mixed in. As a result, unless the plastic is sorted again, material recycling is not possible. To improve quality, it is necessary for municipalities to seek the cooperation of residents in better sorting their waste.

Moreover, unless the current industrial structure is addressed, material recycling costs will remain high. The same goes for construction waste. "Sorting" waste on the job site could seriously effect work efficiency. At present, they have just started separating concrete, reinforcing bars and cement, just three categories. There is wood, but it can only be used for particleboard. The problem is that there is no demand for waste construction material.

Material recycling will be difficult until efforts are made to develop technology, recycle in an efficient way and reduce costs. For this reason, within the review of the Containers and Packaging Recycling Law I mentioned earlier, studies into lowering the costs are looking into using energy recovery technologies - or thermal recycling - to create competition. In any case, it seems that high costs are impeding material recycling.

[Wind-up]

Kanda

Before closing, I would like each of our presenters to make a final comment.

Hidaka

It was a very worthwhile day today to hear various aspects about the situation in Germany. Though different from the Japan's Ecotown approach, I learned that Germany has created an Efficiency Agency to help developing a 3R society. Also, biomass is very advanced in Germany, while it was concluded that, in Japan, its use is cost-prohibitive. In any case, I would like us to look at Germany as reference in furthering our research.

Gunjima

A big recycling issue in Japan is the Food Recycling Law. And, though a strategy to encourage usage has been crafted under the title "Biomass Japan", the legal framework presents many difficulties. Not all biomass should be left to making compost of raw

waste. Accordingly, we need to develop other new applications. For example, by mixing raw waste with live excrements, energy efficiency could be improved. However, these wastes are handled by different departments in the Ministry of Agriculture, Forestry and Fisheries, so it is hard to mix them together. Moreover, deregulation needs to be taken further. Japan should learn from the strategies in Germany.

In other regards, exchange on policies and technologies is being promoted between Japan and Germany in order to enhance material productivity and 3R efficiency. I hope we can continue the exchange of information in the name of sustainable societies.

Becker

It was a very interesting exchange of views today. I also learned about Japan's 3R policies and your approach to new business opportunities. It was a fruitful discussion, but it does not end here. New problems to overcome will keep arising. And, because the world is round, what I do and what everyone does will have an effect somewhere on the planet. Moreover, countries like China and the new Eastern European member states of the EU want to achieve the economic development that we have enjoyed. We need to work so that these nations, too, can quickly adopt similar environmental standards. There are still many problems to be dealt with seriously by all of society and by the industrial world.

Bleischwitz

When I return home, I want to rethink two topics: Ecotowns and biomass. Biomass is found most anywhere, therefore it is important to use it efficiently so that is good for the environment and a plus for business. The same goes for Ecotowns. As cities grow, incentives for new technologies and policies will be necessary.

Lastly, I hope Japan and Germany can form a partnership in developing 3R societies of the future.

Kanda

As Ms. Becker just pointed out, all of our economic activities affect the other side of the world as well. In the state of NRW, there is a "One World Policy Unit". With the Ecotown Project as well, I would like Hyogo Prefecture to inject the lifecycle concept and develop it as an Ecotown of the world rather than focusing entirely on Hyogo Prefecture. Also, concerning information on Germany and Japan, there is still much left that we have to share. It is necessary for the two countries that lead the world in 3R to further promote research exchange between us. With that, I would like to close this Concluding Session.

Closing

Hiroshi Matsugi
Executive Director
Hyogo Prefecture Environmental Create Center Public Corporation

I am truly grateful to everyone for taking part in -- and doing so with fervent passion - this Japanese and German Dialogue on Businesses for a Reduce-Reuse-Recycle Economy that commemorates this Year of Germany in Japan.

As you well know, global warming and the world's depleting resources are very serious problems that seem to only worsen as time goes by. In order to develop sustainable societies in the 21st century, it is necessary that we will build 3R societies. Under these circumstances, we reported the status and have had discussions on programs and activities of the theme "3R business" in Germany and Japan.

Because of our position as the secretariat of the Hyogo Ecotown Promotion Conference, there have been many occasions to think about material recycling, but after hearing about the programs and activities in Germany and Prof. Gunjima's presentation today, I was able to reconfirm how diverse the 3R business is with its branches to repair and reduction. We have been involved in exchanges with Guangdong, China since last year, but we would like to expand these undertakings to all points of the globe to promote the 3R business activities discussed today.

I would like to salute today's speakers for their wonderful presentations. And, I would like to express my appreciation to the staffs who made this possible.

I hope that, through further cooperation between Japan and Germany, we can further promote each other's activities and expand those benefits to other parts of the planet. With that, I would like to conclude. Thank you for your attention.

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