

Promotion of 3R as an economic industry

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3Rs in the context of Green Economy

3Rs in a broader context - not just about municipal waste management, but is intrinsically linked with resource efficiency in a wide range of sectors with an objective to reduce or eliminate the waste load for final disposal towards transitioning to a resource efficient and green economy

Multilayer Partnerships and Coalition as the Basis for 3R's Promotion

3Rs in the context of Rio+20 outcome – The Future We Want

Pacific countries join 3R Forum



Tokyo 3R Statement

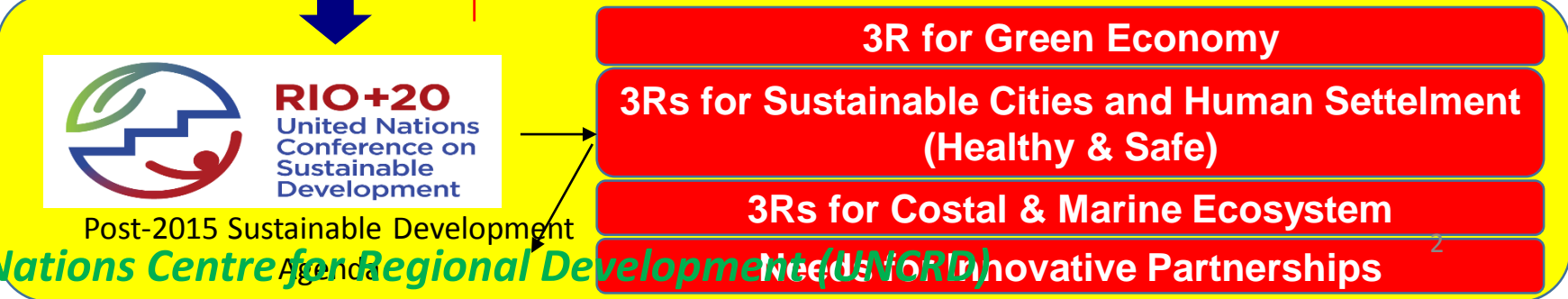
Singapore Recommendation

Surabaya 3R Declaration

Ha Noi 3R Declaration (2013-2033)
33 Goals for Urban/Industrial areas, Rural areas/Biomass, New and Emerging Wastes, Cross-cutting issues

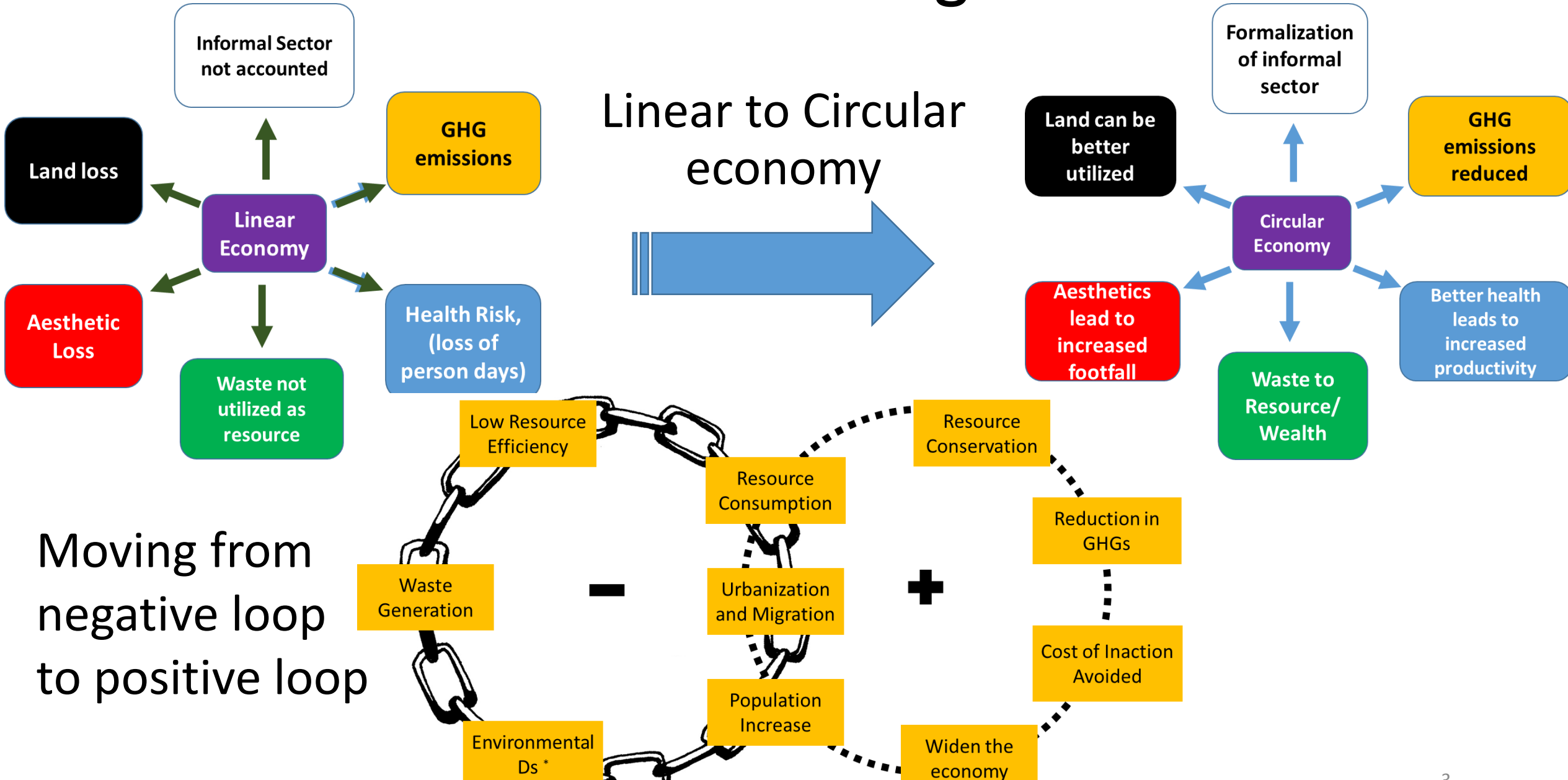
2nd East Asia Summit - Environment Ministers Meeting (EAS EMM), Brunei, 2010

Endorsed Regional 3R Forum in Asia



United Nations Centre for Regional Development (UNCRD)

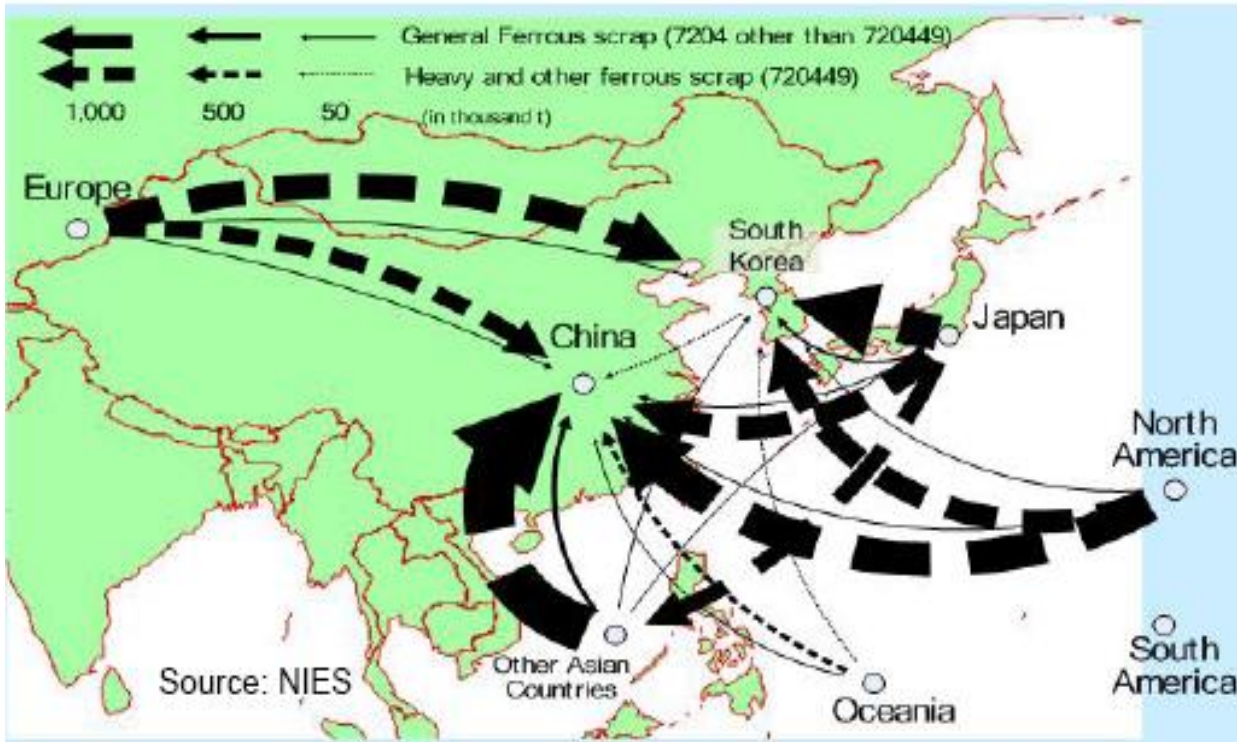
Acts and achievements: Regional 3R Forum



Recycling as the one way forward & Importance of Resource Efficiency

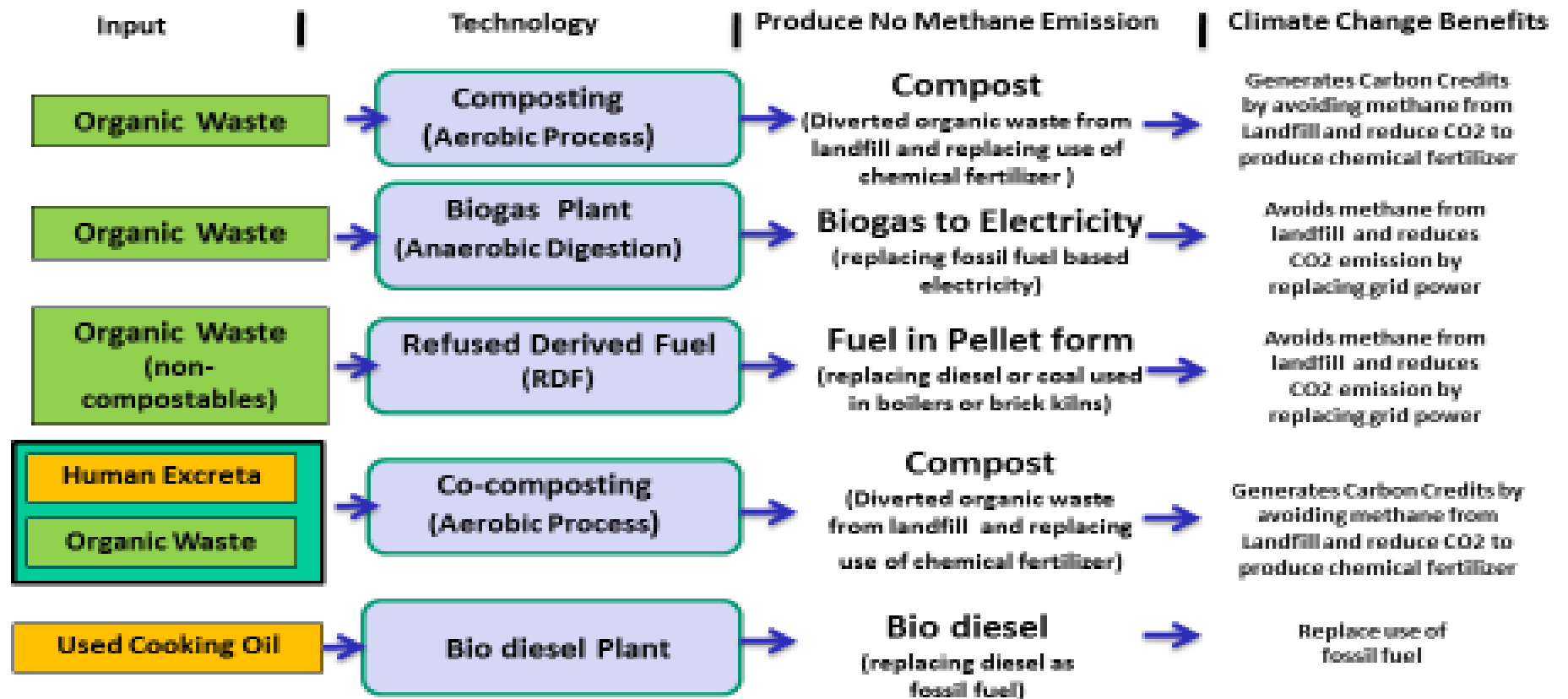
- To tackle the waste challenge
- To increase resource efficiency
- To reduce GHG emissions

- ❖ Reducing the environmental impact of consumption and production of goods and services over their full life cycles
- ❖ Efficiency at economic level + Environmental dimension = Resource Efficiency (RE) (materials, energy, water, land & emissions)
- ❖ Continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment



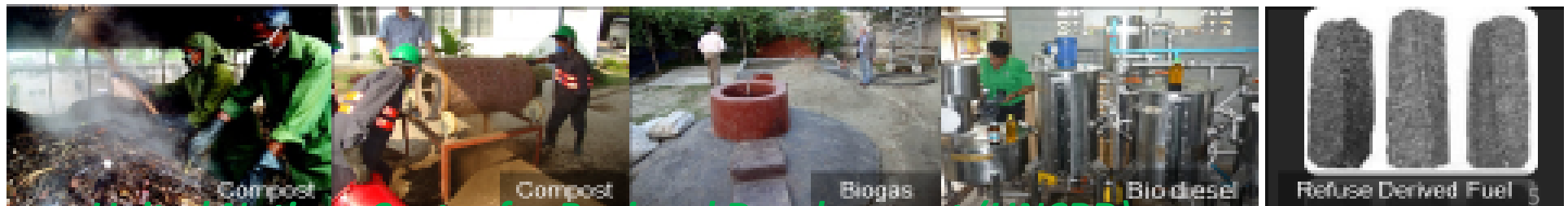
3R approach: Waste to Resource

Waste to Resource Approach with **Integrated Resource Recovery Center (IRRC)**



Best Example of Replicate model in Asia-Pacific countries

In Partnership with UNESCAP, Waste Concern is Replicating the Model in Asia Pacific Countries

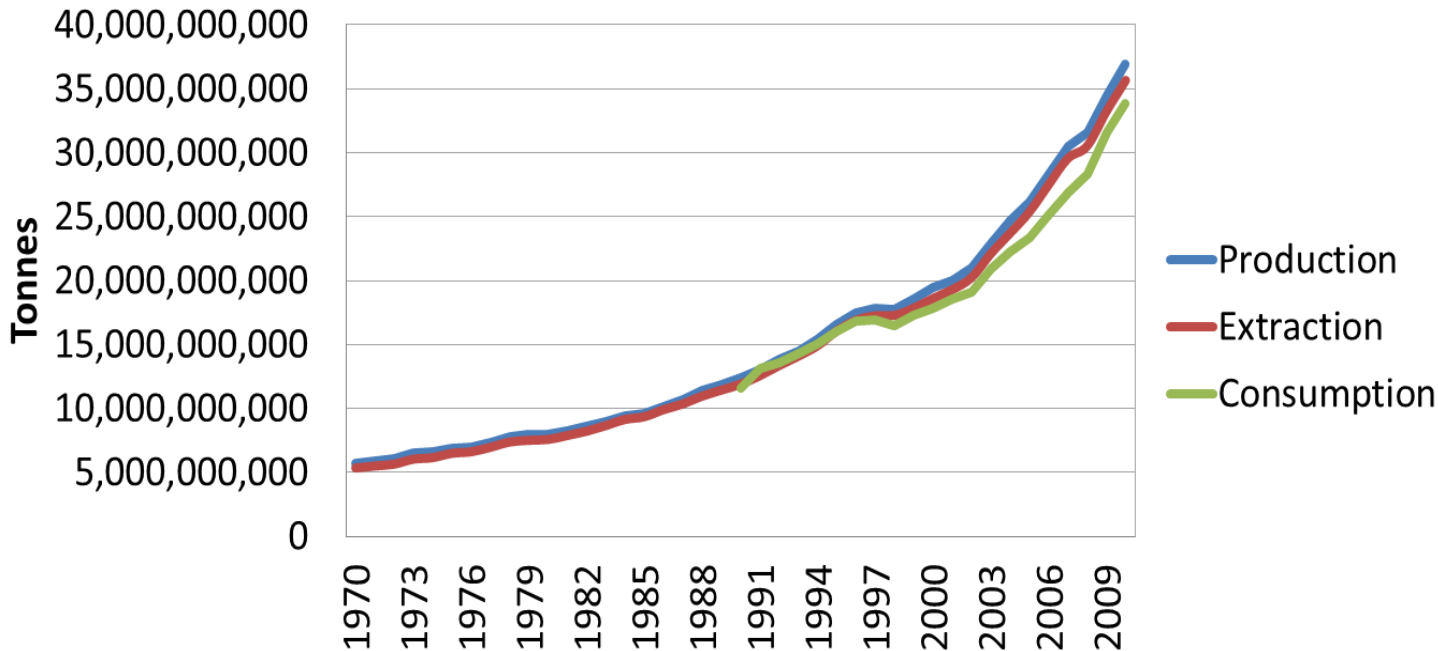


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Adapted from Mr. Sinha, Waste concern presentation, Presented at Sixth Regional 3R Forum in Asia and the Pacific 2015

Trend of resource use and Global and regional policy initiatives

Material use in the Asia Pacific region



Production: Domestic Material Consumption (imports + extraction – exports)

Consumption: Material Footprint

Extraction: Mining, Agriculture

- Post-2015 development agenda and new Sustainable Development Goals
- Agreement of ministers and environmental authorities of their first forum in Bangkok on priorities for Asia and the Pacific
- Group of 7 initiative for resource efficiency based on the Kobe 3R declaration
- Process of economic integration and technical cooperation in Asia and the Pacific
- Japan: Sound Material Cycle Society high-level policy goal
- China: Circular Economy Promotion Law

3R approach ~ Concept of Eco-town (Contd.)

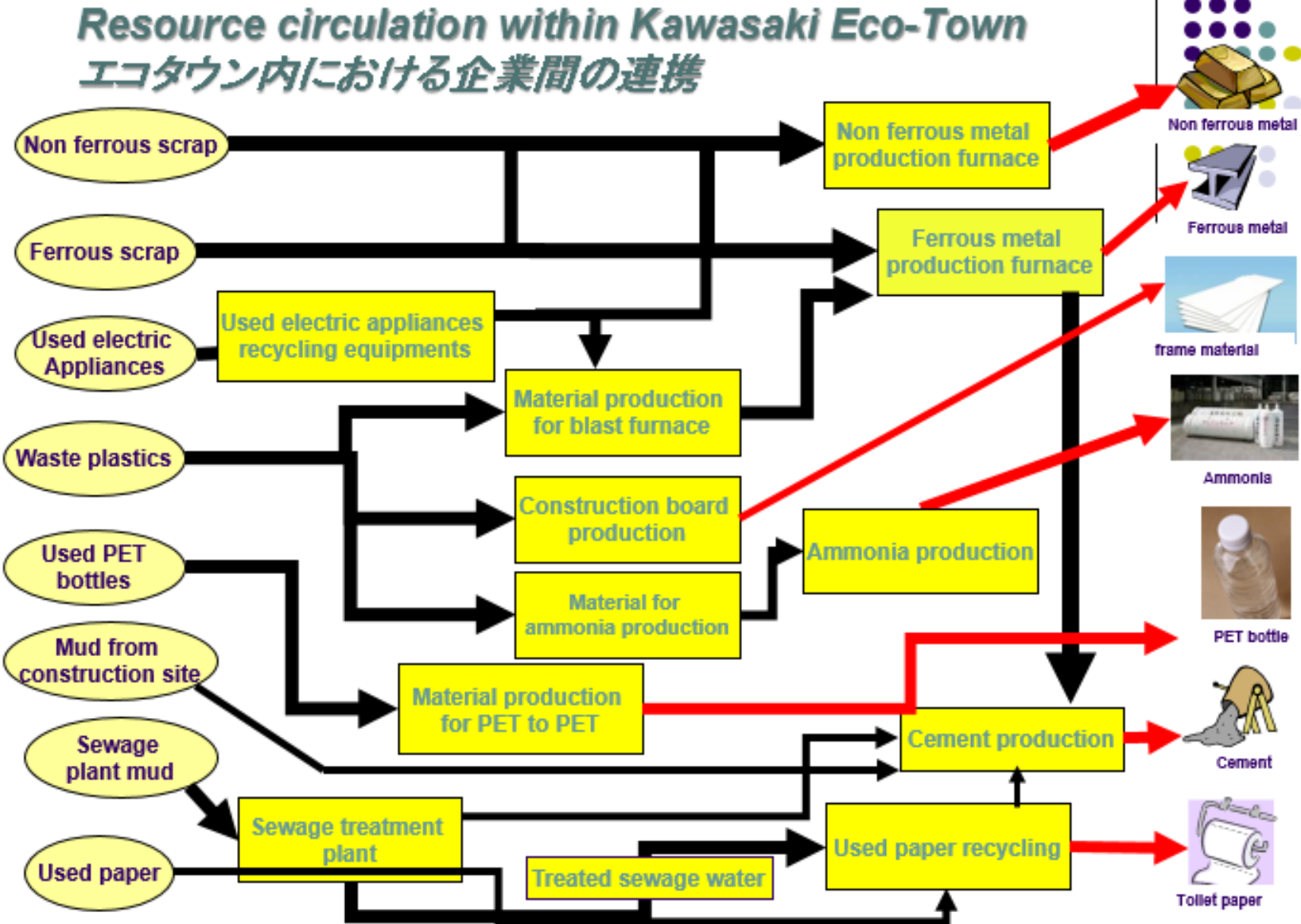
- ❖ Critical role of cities, which are concentration points for economic activity – 75% of Asia-Pacific GDP is generated in cities – and offer large potential for investment into sustainable urban infrastructure for housing and transport. Cities are also centres of waste accumulation.
- ❖ Urban level implementation of the 3Rs in Kitakyushu and Kawasaki cities of Japan



3R approach ~ Concept of Eco-town

Aiming at realizing a sustainable & recyclable city for global environment

❖ Unique efforts on 3R through diverse awareness-raising activities and eco-town projects aiming at *resource circulation in industrial areas* have significantly contributed to *environmentally sustainable growth* and the reputation of Kawasaki City as an *ecologically-sound and resource efficient city*.



Economic Opportunities through 3Rs – A Win-Win Strategy

- ❖ Cities and industries need to move from a linear or “one way” economy to a resource-efficient and even *closed-loop or “circular” economy*.
- ❖ Economic opportunities may exist, among others, in *green chemistry* and *nanotechnology*, *sustainable transportation*, *energy and water efficiency*, *sustainable farming*, *bio-economy*, *green buildings* and *wastewater reuse* for *urban green spaces* and *urban agriculture*.
- ❖ Public private partnerships were identified as critical for realizing business opportunities, and critically depend on *macroeconomic and development policy* settings such as, for instance, a *circular economy policy*.

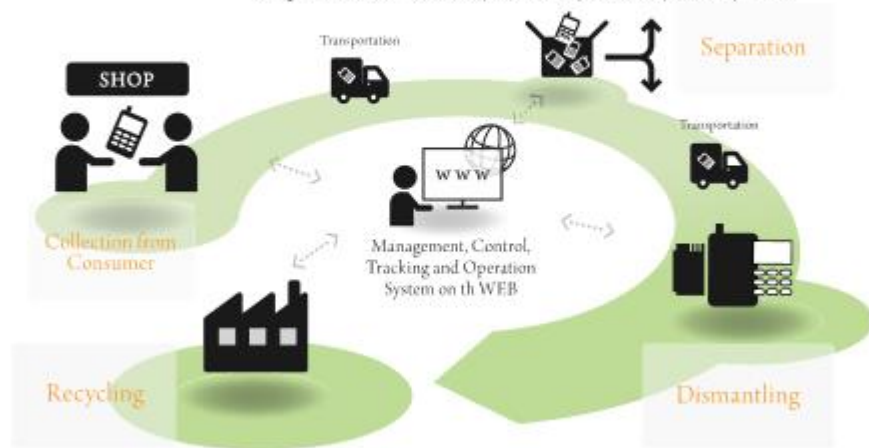
Economic opportunities in

waste electrical and electronic equipment (WEEE)

- ❖ E-waste is estimated to reach 50 Mt by 2018, with a growth rate of up to 5 per cent per year.
- ❖ The top three Asia-Pacific countries with the highest e-waste generation in absolute quantities are PR China (6 Mt), Japan (2.2 Mt) and India (1.7 Mt).
- ❖ E-waste can provide an alternative source of raw materials for the manufacturing industry, thus reducing the need for extraction of natural resources and at the same time reducing associated environmental impacts.

Domestic Mobile Phones Recycling Business in Japan

A Japanese mobile phones carrier has a program to recycle used mobile phones, which are collected directly from end users with the following system. Recycling technology and logistics management from 2,400 collection points in this system are all provided by JEPLAN.



A. Community Public

1. To promote household waste sorting
2. To encourage community organizations to promote recycling activities

D. Recycling Fund

1. To be paid by responsible enterprises
2. To subsidize the recycling and disposal system



B. Recycling Enterprises

1. To encourage the development of private sector
2. To purchase waste resources from the public, communities and cleaning teams

C. Local Authority (Cleaning Teams)

1. To collect, clear and transport resource waste, food waste and general waste separately
2. Creating a feedback system to encourage people and communities joining the recycling work

Best approach -Waste Hierarchy



Reuse waste

Reuse boxes, bubble wrap and other packaging

Suppliers to deliver in reusable packaging (plastic crates, returnable boxes, drums)

Re-use paper from misprints e.g. as note pads

Refill toner cartridges

Donate old PCs, furniture, textiles & equipment

Eliminate & reduce waste

Work with supply chain partners to supply goods in minimal packaging (plastic crates, returnable boxes)

Avoid disposable items e.g. plastic vending cups - use mugs

Optimise processes to reduce wastage

Design your own products with minimal packaging

Recycle

Segregate card, plastic, cans, bottles at source

Use labelled containers at convenient locations

Compost fruit & veg waste if possible

Buy recycled goods (packaging, paper)

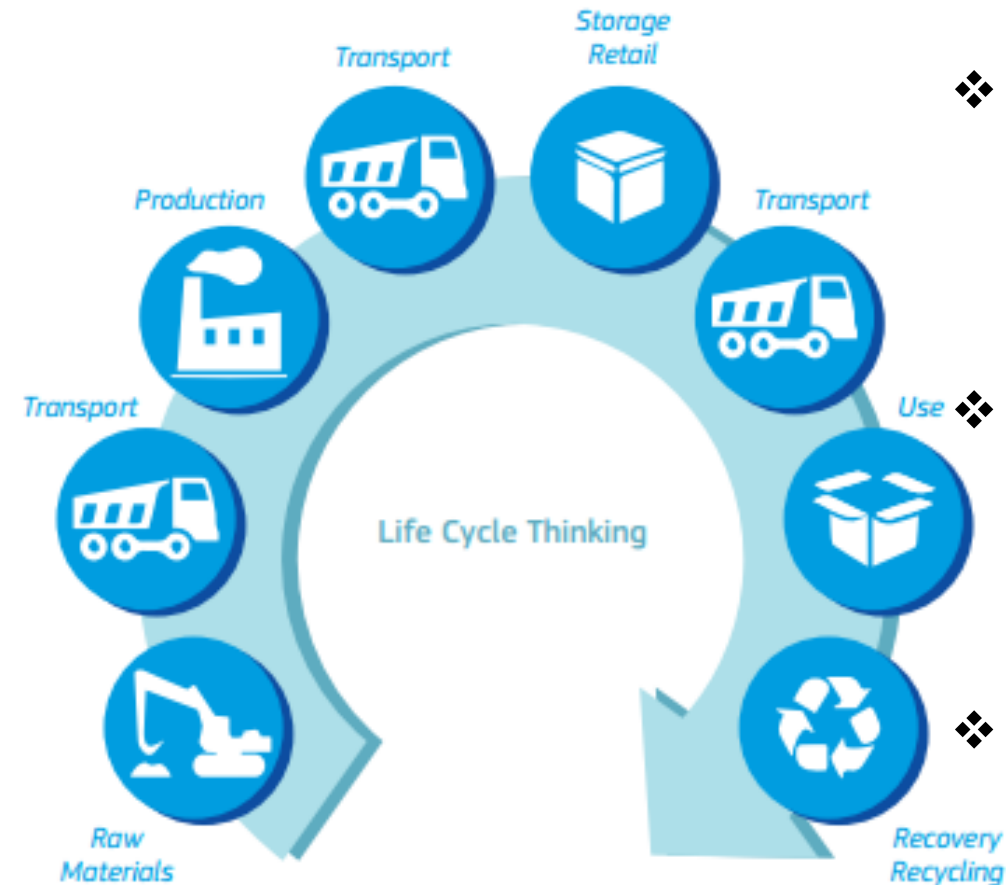
Facts from Circular Economy

❖ In a circular economy, resources - including energy and materials - are used in circles;

❖ Material-efficient products- An increasing number of products (TV sets, washing machines, mobile phones, cars, etc.) containing a large variety of electronic material and hazardous substances reach their end-of-life in Europe;

❖ Best available techniques for sustainable production- Based on sound techno-economic information and relevant stakeholders, best available technology be technically and economically available to an industry in order to improve their environmental performance; and

❖ End of waste criteria- The long-term strategy to recycle, avoid waste and re-use any unavoidable waste as a resource. Building on the Waste methodology under certain valuable waste streams can obtain 'end-of-waste status' and become products again, subject to the same market rules as their primary raw material counterparts.

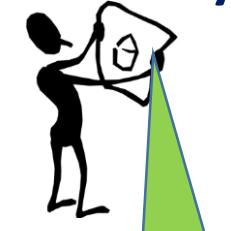


Business Opportunities in Sustainable Urban Development Practices ~ Connecting P-E-T-B

R & D/Engineering



Energy Efficiency



Energy service companies (energy audit, energy efficient system design /equipment manufacturing, specialty engg. services, etc.)

Nano tech market: more than US\$1 trillion



Green Chemistry & Nano Technology

- cosmetics, baby lotion, computer chips, paints, medical equipments, etc.

Water Efficiency

- Water saving devices
- distribution efficiency
- Zero leakage,
- Waste water treatment,
- Rain water harvesting, etc.



Waste-Water-reuse for urban agriculture practices

- Water purification technologies, waste water treatment (ecological engineering: constructed wetlands for pre-treatment of urban run off water & river water)
- Distributed sewage treatment systems, etc.



Green Buildings

- Engineering, design & construction materials



Sustainable Transportation

- ITS, IFS, BRT, Railways, walkways & bicycle ways
- Fuel efficiency measures
- Vehicle I/M
- Alternative fuels, PPP for urban transport. etc.



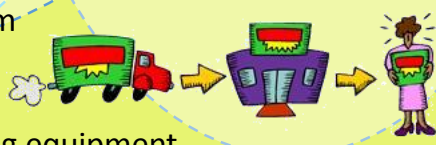
Bio-economy (high value processing/conversion of biomass)

- Bio-products
- Bio-energy
- Bio-Engineering
- Landscape trimming, etc.



Sustainable Farming Support Companies

- Efficient water & nutrient management system
- Water & nutrient delivery system
- Biomass energy company
- Energy efficient cultivating, harvesting, hauling equipment
- Compost industry (e.g. Dhaka Community-based Composting System)
- Roof top agriculture (urban greening) for food security



Synthetic fibers/oil, bioplastics, materials from fiber by-products, composts, animal feeds, bio-chemical

Resource Recovery/3R



CH4 & fertilizer from animal manure /sewage sludge with anaerobic or aerobic digesters, refused-derived fuel (RDF), etc.

Urban Services and Supplies

Major Recommendations & Outcomes of Maldives 3R Forum

Economic Opportunities through 3Rs – A Win-Win Strategy

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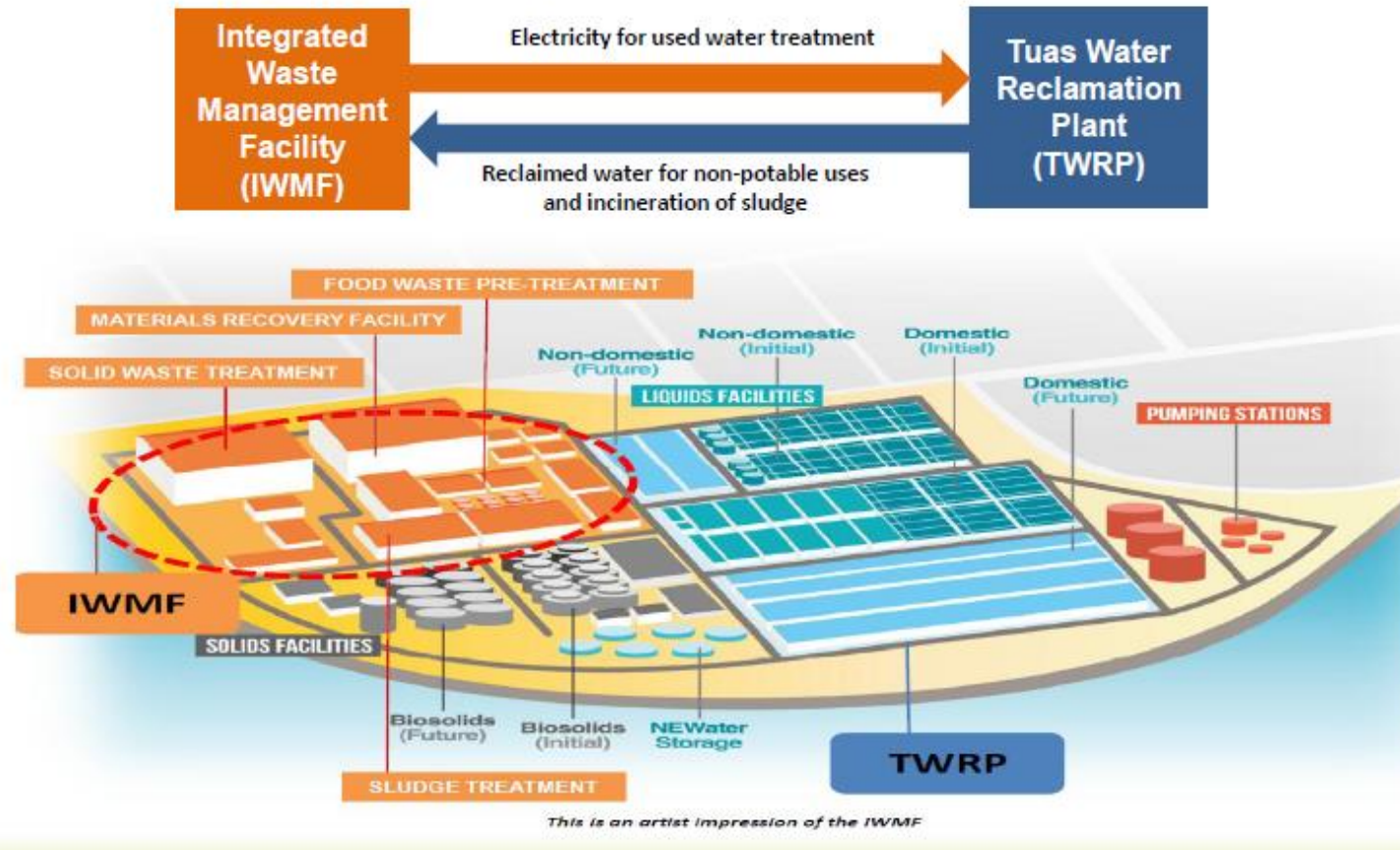
Proliferation of sustainable urban business opportunities in 3R areas

- ❑ 3R as an economic industry offers competitive solutions to many urban environmental issues, provided 3Rs and resource efficiency are integrated into *macroeconomic development policies* (e.g. the circular economic policy of China);
- ❑ *Eco-towns, eco-industrial parks and industrial symbiosis* could significantly contribute to regional development as has been demonstrated by Japanese cities such as Kawasaki, Kitakyushu;
- ❑ City governments and urban local bodies should recognize and publicize the excellent performance of private companies that *carry out environmentally-sound operations*;
- ❑ R&D oriented industrial structure and environmental efforts by companies are critical to fostering sustainable urban businesses; and
- ❑ Consumers' awareness (green consumerism) is a critical driver of sustainable urban practices and related green business opportunities

Enabling framework for 3R Science-Policy-Business interface is key to realize Smart, Resilient, Inclusive, Low Carbon and Sustainable Cities

At the macro level, the *Singapore Sustainable Blueprint 2015* provides a road map to realize the vision of a liveable and endearing home, a vibrant and sustainable city, and an active and gracious community.

An Integrated Waste Management Facility will help to realize the **waste-water-energy nexus** for maximum efficiency and potential of economic and business opportunities



Potential of Economic and Business opportunity

Economics of Biomass Utilization/ Business opportunity (Contd.)

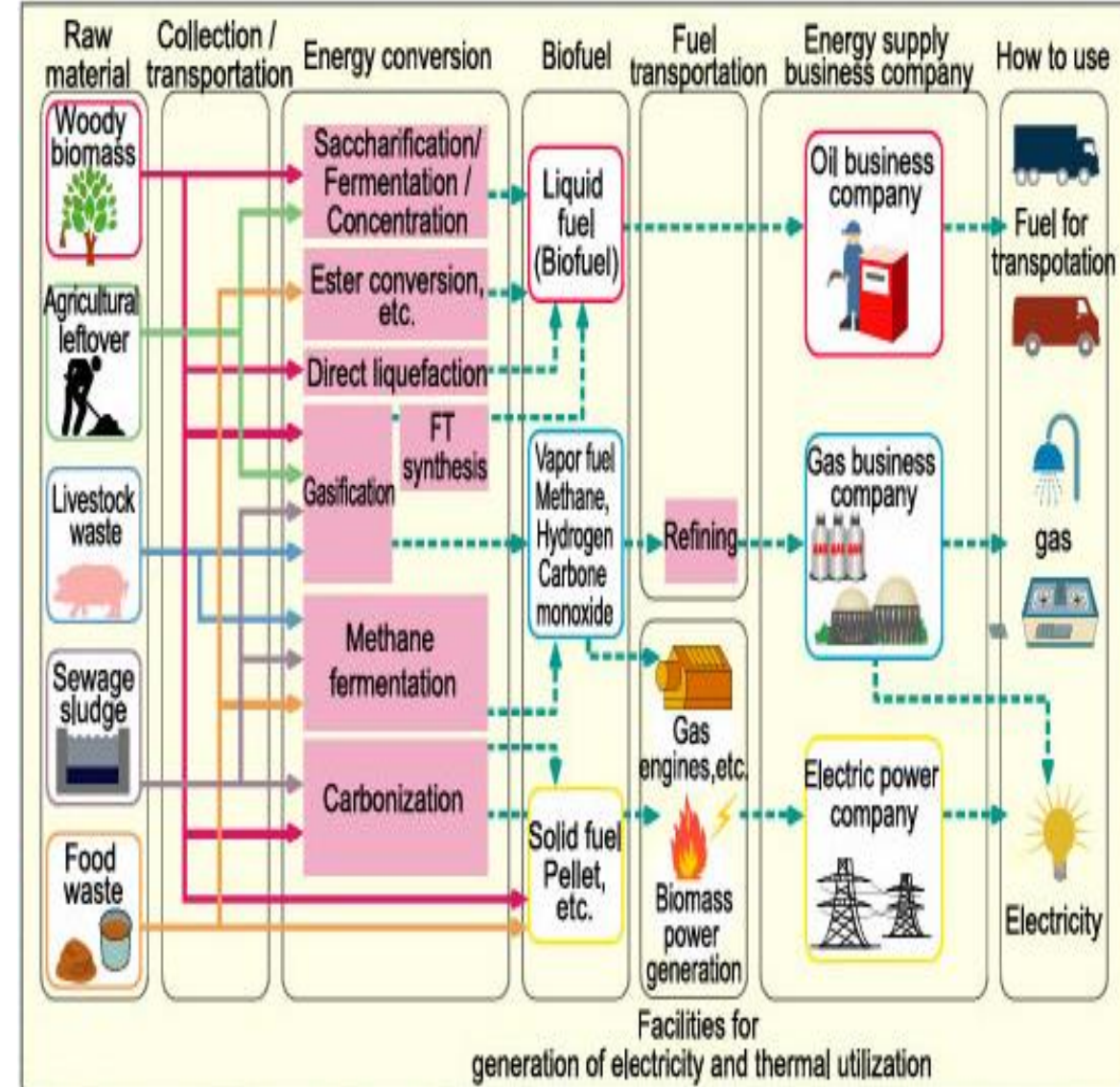
- ❑ The agriculture sector contributes *between 0.7% and 30% of total GDP* for Asia-Pacific countries
- ❑ Economic potential of the *biomass economy* → 17 trillion US dollars globally
- ❑ Based on a 2013 estimate, Asia-Pacific countries generated 673,694,540 tonnes of agriculture biomass waste only from the one major agriculture commodity. Some studies say that there was an estimated potential of 153 million tonnes of briquettes (worth USD 23,000 million) from the Asia-Pacific region in 2013.

❖ Increase interest of utilizing of biomass for power generation as an **alternative to fossil fuels**. Generally, there are two types of biomass utilization:

- energy utilization
- material utilization

In Asia Pacific region biomass is often left unused.

❖ It is estimated the Southeast Asian biomass and **waste-to-power market** produced nearly 230 million tonnes of feedstock annually.



Economics of Biomass Utilization/ Business opportunity

❖ Thailand

- Formulated policies to encourage biomass projects
- Very Small Power Producers (VSPPs) scheme (2001)

❖ Malaysia

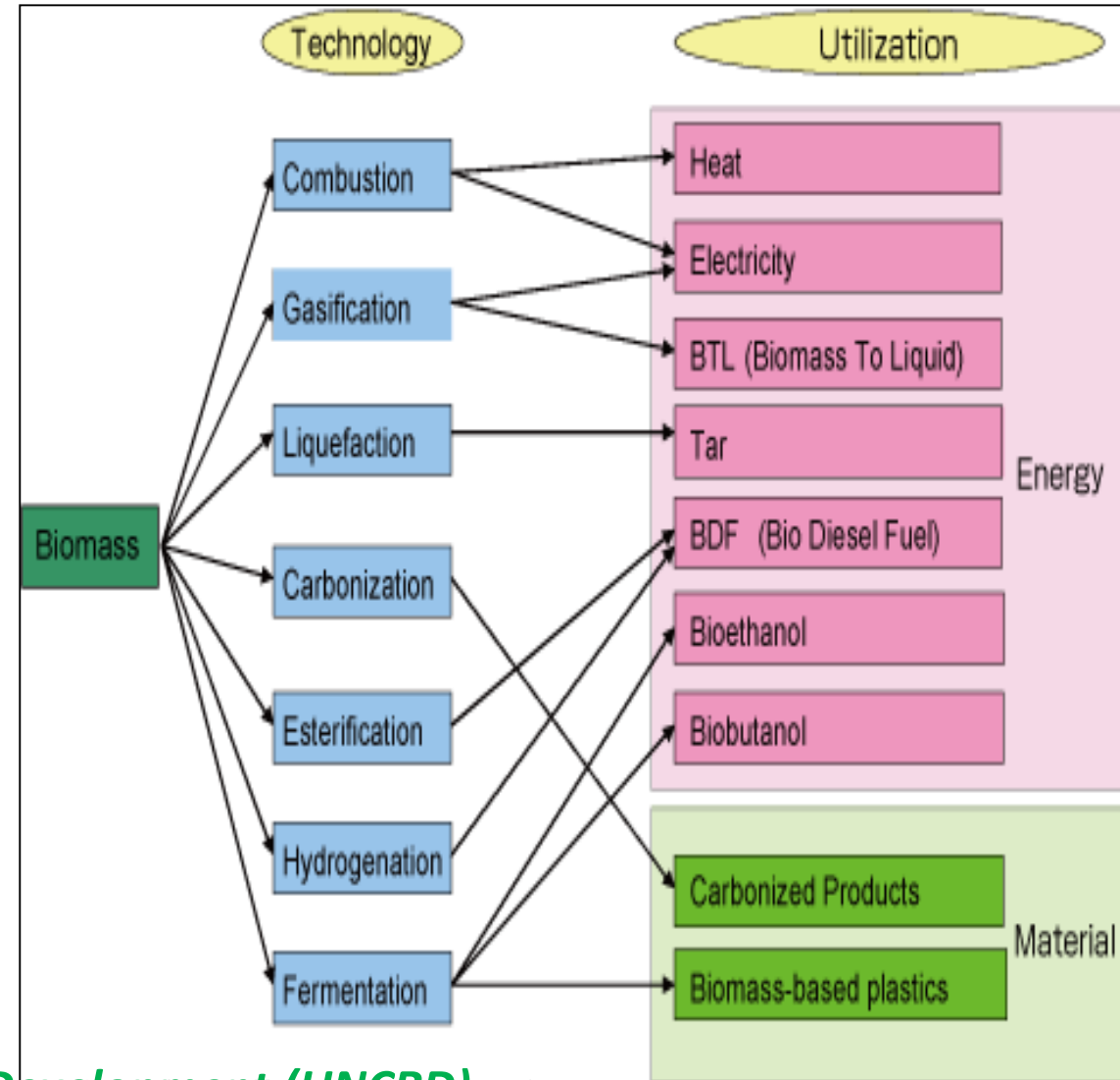
- Palm oil industry contributed to RM 90 billion GNI
- 83 million dry tonnes of biomass (2012)

❖ Singapore

- Woody biomass and steam cogeneration plant on Jurong Island (60 tonnes of process steam per hour).

Effective utilization of agriculture and biomass waste---> global mitigation potential of 5,500-6,000 megatons CO₂e/yr by 2030

Agriculture waste is of high value with respect to material and energy recovery



Extended Producer Responsibility (EPR) is an important mechanism for management of waste electrical and electronic equipment (WEEE)

- ❑ EPR is considered globally as one of the *most powerful policy mechanisms* in dealing with the e-waste problem;
- ❑ Asia-Pacific countries need to develop *national e-waste management strategies* based on 3R concepts. Such strategies should address not only the environmental and health impacts of e-waste (end-of-pipe) but also look at the reduction of e-waste through green design (up-the-pipe);
- ❑ Should create enabling conditions for *relevant stakeholders to develop business and economic opportunities* to recover materials from e-waste; and
- ❑ Strategies should take into account *the financial, institutional, political and social aspects* of e-waste management, including due consideration to the activities of the vast informal sector in the region.

EPR as an Innovative Policy Option for 3R promotion ~ Some experiences

- EPR paves the way for resource recycling towards **closing the material loop**;
- The EPR approach is expanding, especially targeting products with high recyclability and high environmental impacts, e.g. electronics and packaging;
- Recycling policies have played an important role in reducing waste generation at source and promoting the **circulation of recyclable resources in the Republic of Korea**;
- In Japan, **Sound Material-Cycle Society** initiative → progress towards three major indicators – (1) resource productivity, (2) recycling rates and (3) final waste disposal volume.
- EPR on home appliances, small appliances and batteries, were gradually introduced. The recycling rate has been increasing for all home appliances except CRT TVs. **To date, approximately 60% of all municipalities in Japan already take measures or are preparing to implement EPR for small appliances.**
- ❖ A successful EPR requires multi-stakeholder involvement, the inclusion of the informal sector, the presence of a sustainable financial mechanism, and sound legal and institutional frameworks.

Reduce, reuse, recycle and recover (the 4Rs) best option in order to minimize waste.

United Nations Centre for Regional Development (UNCRD)

SIDS and Coastal Region: Important nexus between Environment-Tourism- Economy

□ for Small Island Developing States (SIDS) and coastal cities of the region:

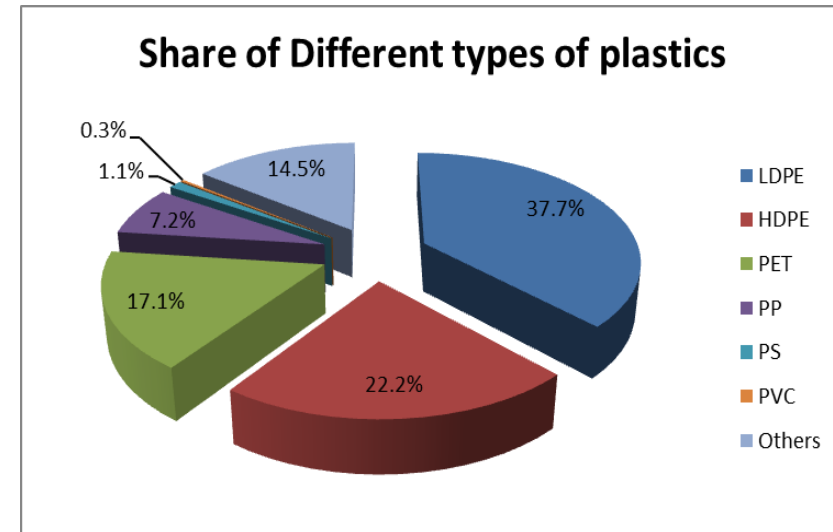
- ✓ The state of their environment, ocean ecosystems, tourism potential and business opportunities are closely tied to each other in mutually beneficial ways.
- ✓ Limited availability of land, resources and technology combined have become major drivers for waste management problems and related health and environmental degradation.

3R and Resource Efficiency are key towards Sustainable Tourism Developments in SIDS

- ❑ Important *nexus between the environment, marine ecosystem protection and the tourism industry*;
- ❑ Sustainable tourism development contributes *significant inputs to economies*, especially in SIDS, and application of 3R concepts in reducing plastic pollution and promoting sustainable tourism development is crucial;
- ❑ Environment, tourism and the economy are *intricately linked* with each other; Tourism generates tax revenue, jobs and trade; and
- ❑ *Decoupling of economic gain and environmental degradation* could result in enormous economic opportunities in sustainable tourism development.

Sustainable Tourism Developments in SIDS- Case study ~ Management of plastic wastes, Mauritius

- Mauritius initiated a PET bottle recycling programme in 2001, which is running successfully;
- About 416,000 tons of MSW was landfilled in 2014 and this figure is expected to reduce as composting and other 3R initiatives take shape;
- Regulatory policies, such as clean-up campaigns prior to cyclonic and summer seasons, have added strength to the implementation of various 3R programmes;
- Mauritius will introduce new legislation banning certain plastics in 2016 and is expected also to convert existing transfer stations into Material Recovery Facilities



- ❖ To promote the recycling sector in Mauritius
- ❖ Reduction on reliance on landfill or on other ultimate disposal facilities Savings on waste transportation and disposal of waste
- ❖ New economic activities and hence green jobs are created



Waste and Freshwater Nexus ~ 3R is key for Water Security

❖ 3Rs (reduce, reuse and recycle) strategies and principles provide a holistic solutions to ensure water security:-

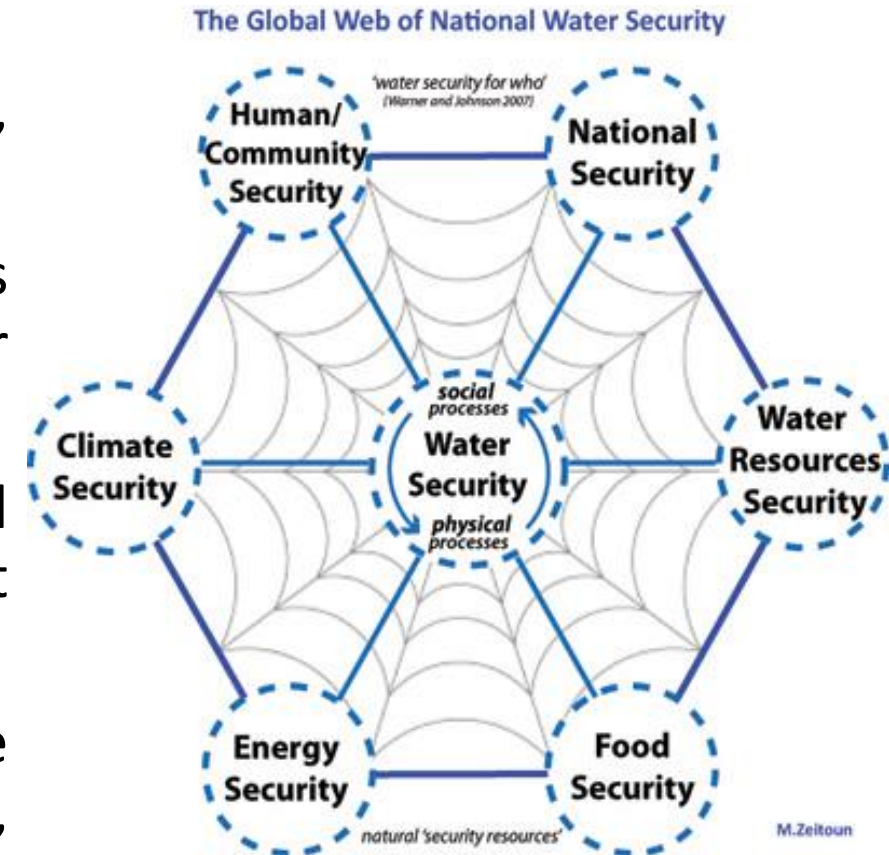
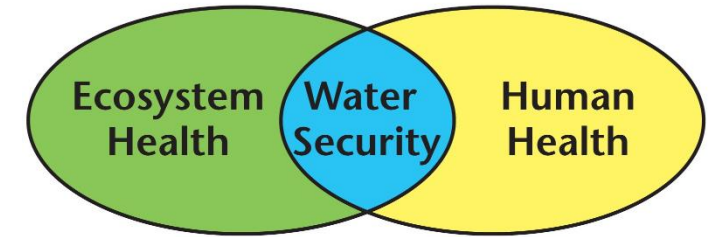
❑ First R-Reduce: efficiency of water usage/reducing water footprint;

❑ Second R-Reuse: reuse of treated wastewater in municipal, industry, and agricultural sector; and

❑ Third R- Recycling: Implementing recycling technologies for handling and treatment of wastewater for reuse and/or safe discharge to the environment

❖ Supply side management practices include recycling and reusing wastewater and improving wastewater treatment capacity by employing advanced treatment technologies.

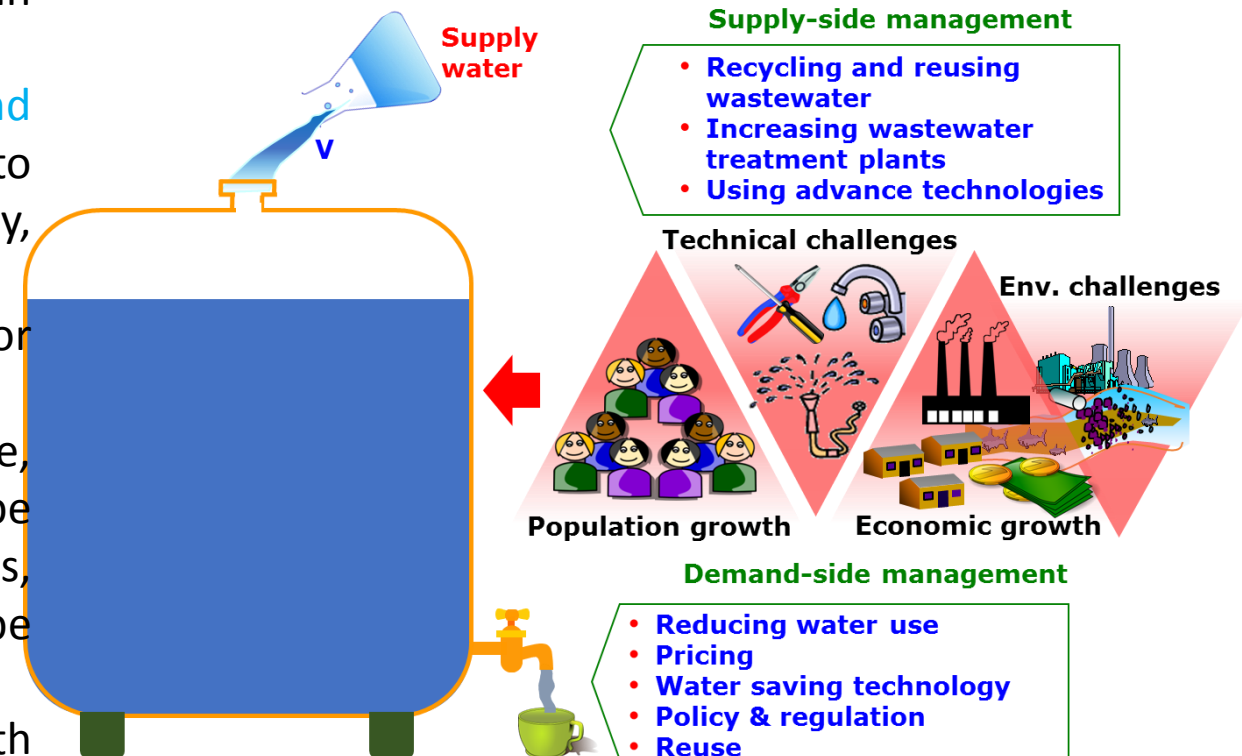
❖ For demand side management, 3R strategies include reducing water use, water pricing, water saving technology, policy and regulation.



Response for both Water-Demand and Supply Side Issues

- ❑ Water **drives the economy** (food-energy-transport-manufacturing/production-as well as service sector like tourism) is dependent on water;
- ❑ Water is the resource **used across all supply chains**, but wastewater is the largest untapped waste category in industries;
- ❑ Water security **policies should promote investing and incentivizing the “reduce, reuse, recycle”** systems, and has to cover the holistic urban water cycle inclusive of water supply, treatment, reuse application;
- ❑ Requires **closed-loop system technological innovations** for water saving and reclaiming and reuse of wastewater;
- ❑ **Installation of a recycling and reuse infrastructure** (for example, construction of new wastewater treatment plant, dual pipe system for distributing recycled wastewater in houses, retrofitting of water saving appliances etc.) may also be promoted via these institutions;
- ❑ Expanding a range of **financial services opportunities** -both public funding and private financing; and
- ❑ Solutions for **smart wastewater management** must be socially and culturally appropriate.

3Rs in the context of water, offer effective tools for both demand and supply side management



Evolving 3R Trends and Development in Asia and the Pacific and their relevance in the post-2015 development context

- ❑ Large *potential for resource efficiency and waste minimization* that exists in many economic sectors and the need for transformational policies;
- ❑ The policy initiative was implemented through a process of stakeholder participation, *sound government policy* and establishment of incentives, and underpinned by mature technology such as waste to energy; and
- ❑ *Economic opportunities* exist in all sectors of the economy across many systems of provision and in many regional contexts. *Creating wealth from waste will become a new business opportunity.*

Thank you!!