



Resource efficiency: progress and challenges of 3Rs technologies and policies

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Abstract

Resource efficiency and waste management lacks a holistic approach which cover the whole chain of product life cycle and its management. The quantities of waste generation increases in close relation to economic growth, however, the Reduce-Reuse-Recycle (3Rs) technologies and policies are introduced through the strategic planning and management. The effective waste management is an efficient method which include both to increase resource efficiency and to replace fossil fuels with renewable energy sources. Sustainable production and consumption from the extraction-material use-disposal, could be directly linked with waste management. Addressing the problems and solutions of waste management system from 'waste' to 'resource', 'waste and resource management' and 'circular economy' all reflect the significant impact of decoupling between economy and waste management. Resource recovery and recycling activities generate revenue from the recovered and recyclable materials, compost and energy. The main objective of this study is to analyse the waste treatment strategies with the combination of progress and challenges of 3Rs technologies and policies towards resource efficiency. This paper also identifies the positive contribution of waste and resource management through financing and provide better and improved environmentally sound waste management system.

Keywords: resource efficiency, sustainable, waste, resource, resource recovery, circular economy.

1 Introduction

The waste hierarchy can be seen as a 'historical' first step towards a current move away from the 'end of pipe' concept of 'waste management' towards the most integrated concept of 'resource management' [1]. By improving resource



efficiency, countries could easily tackle and understood the environmental problems, address pollution, climate change, and also helps to improve economic and social benefits, which ultimately contribute towards the promotion of green economy. Many developing countries have undergone a various and different kinds of environmental problems according to their economic growth. However, the waste management is one of the single largest budget item for many cities (World Bank, 2012). The waste handling significance the stage of consumption related problems and create serious infectious diseases in many developing countries, with both direct and indirect effects. Green economy impact significance as an importance of zero waste which is a long-term vision that ultimately envisages a thriving society that exists within natural resource use, constraints and its ability to assimilate waste, pathway moving towards a resource-efficient. The article analyses the importance and challenges of 3Rs technologies and policies towards resource efficiency.

2 Reduce, Reuse and Recycle technologies and policies

An approach to minimise resource consumption sufficient to reduce; reuse goods and materials until it can't be repaired or fixed to perform; and recycle and reprocess the materials that being discarded into new products. 3Rs fosters cooperation among waste generators, waste collectors, processors and manufacturers. Reducing the amount of waste plays a most significant role to manage waste. Recycling allows for production and consumption with reduced depletion of natural resources and energy, and can reduce the negative impact on the environmental system (air, water and soil). Developing countries are progressively working towards the application of an integrated waste management through reduce, reuse and recycle technologies and policies. Both public and private activities in waste management plays a significance role in reuse and recycling activities. 3Rs targets and indicators can be useful tool for monitoring the progress of 3Rs efforts. Recycling is market driven and must be run like an industry. The central and state governments may consider introducing the concept of Extended Producers Responsibility (EPR). Industry needs to realize the problems their packaging material creates once they are discarded by the purchaser of their products. EPR can act as a pressure tool for making big corporate houses, which generate large quantities of waste, to invest in recycling and take back their product waste. Extended Producer Responsibility (EPR) based recycling policies can be used for monitoring the recycling status of particular electronic waste. E-waste is one of the rising issues in the sub-region due to the rapid integration of the global market. The principal issues including: a) the need for national regulations, b) transboundary movement of E-wastes, c) improper processes for E-waste dismantling and recycling, and d) technological and financial consideration in the recycling and reuse of E-waste. However, there is a variety of challenges associated with indicator selection and target setting in Asia, be it diverse definitions and approaches to measuring the waste recovery rate or lack of baseline data or different approaches and interval of data, this article also analysed this based on case of recycling rate [3]. 3Rs effort to promote better waste



management needs to be done in an effective manner. Social/institutional dimension—Community involvement in recycling, informal sector in waste management and voluntary programs for reusing/recycling programs; Financial/economic dimension—Incubation of recycling and reuse market, waste taxation and subsidies, and the Clean Development Mechanism (CDM); and Technological/engineering dimension—Development of new technology to reduce or recycle wastes, adaptation of existing technology to local conditions, safe and environmentally sound waste treatment technology, networking, and application of information technology.

3 Resource recovery towards resource efficiency

An approach that increasing resource efficiency, and contributing to sustainable consumption and production, millennium development goals and sustainable development goals. Sustainable waste management encourages various activities as substituting services for products, increasing material efficiency in the supply chain, redesigning products and packaging, and a range of other actions. Local governments benefit from these activities by reducing the amount of waste and need to manage and making better use of reuse materials and promote resource recovery. By implementing resource conservation and recovery practices, which involve avoiding, delaying, or decreasing the raw materials required to produce new products. Resource conservation and recovery strategies can produce significant environmental, economic, and quality of life benefits by helping local governments, public and private sector. Resource recovery involves four main approaches: (a) Reduce the quantity of waste generated through practices such as source reduction and reuse; (b) Promote initiatives that encourage reuse and waste reduction; (c) Manage waste effectively through practices such as recycling and composting to recover materials and minimize environmental impacts; and (d) Promote programs that provide financial incentives for waste reduction.

4 Path of circular economy: resource decoupling to achieve sustainable and sound environment

Transition to a circular economy, focus on 3Rs technologies and policies, requires changes throughout value chains, from product design to new business and market models, from new ways of turning waste into a resource. Turning waste into a resource is part of ‘closing the loop’ in circular economy systems. Circular economy approaches ‘design out’ waste and typically involve innovation throughout the value chain, rather than relying solely on solutions at the end of life of a product. Resource and resource use are most important link between social, economic and environmental constraints and activities. The sustainable global economy depends on the decoupling of growth rate of resource consumption and environmental degradation. Resource decoupling means reducing the rate of use of resources per unit of economic activity. Resource decoupling leads to an increase in the efficiency with which resources are used, it can be expressed for a national economy- an economic sector or production chain, by dividing added



value by resource use [4]. Circular economy integrates with the resource decoupling which helps to makes the resource and energy intensive pathway for the development strategies of environmental issues. To make the transition with more circular economy, the resource management strategies will be required that promote resource recovery and emphasis the resource use reduction in developed countries and relative decouple with the developing countries.

References

- [1] UNEP 2005. 10 Year Framework on SCP www.unep.org/pc/sustain/10year/home/htm
- [2] World Bank 2012. What a Waste: A Global Review of Solid Waste Management. Urban Development Series Knowledge. Papers <http://documents.worldbank.org/curated/en/2012/03/16537275/waste-globalreview-solid-waste-management> (accessed 09.10.13).
- [3] Hotta, Y., Visvanathan, C., and Kojima, M 2015. Recycling rate and target setting: challenges for standardized measurement. *J Mater Cycles Waste*. Doi:10.1007/s10163-015-0361-3
- [4] UNEP 2011. Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel. Fischer-Kowalski, M., Swilling, M., von Weizsäcker, E.U., Ren, Y., Moriguchi, Y., Crane, W., Krausmann, F., Eisenmenger, N., Giljum, S., Hennicke, P., Romero Lankao, P., Siriban Manalang, A., Sewerin, S. (accessed on 14.01.15).

