

Lecture 1

Towards a Waste Recycling Industry in Egypt: Building Blocks and Proposed Categorization

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v4

Outline

- WRI Building Blocks
- Proposed WRI Categorization
- Concluding Remarks

WRI Sector Building Blocks

Sector Organization

WRI Sector Categorization

Codes, Standards, Guidelines
HSE

Occupational Standards

Supporting Organizations
(Business associations
VET
BGA)

WRI-Industry Analysis

Subsectors Structure

Subsectors Attractiveness

Subsectors Performance

Subsectors Practices

Subsector Critical Success
Factors

WRI Sector Building Blocks

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Proposed Waste Recycling Industry (WRI) Categorization

Proposed Waste Recycling Industry Categorization

Category	Sub-sector
1	Collection and Transportation of All Types of Waste
2	Sorting and Densification of All Types of Waste
3	MSW Treatment and Disposal
4	Waste Glass Recycling
5	Metals Scrap Recycling
6	Paper Recycling
7	Textile Waste Recycling

Category	Sub-sector
8	Plastics Recycling
9	Rubber Waste Recycling
10	WEEE Recycling
11	Construction/Demolition Waste Recycling
12	Biomass Recycling
13	Reuse and Remanufacturing Industry
14	Support Businesses

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Feedstocks	Products
Category 1: Collection and Transportation of All Types of Waste	R1.1	Collection and Transportation of MSW	Mixed and/or source-separated MSW	Collected MSW delivered to transfer stations, MRF facilities, treatment facilities or disposal sites
	R1.2	Transportation of C/D Waste	Construction/demolition waste material	Mixed and sorted C/D waste
	R1.3	Collection and Transportation of Industrial Wastes	All types of industrial wastes	Collected industrial wastes delivered to recycling facilities or disposal sites
	R1.4	Collection and Transportation of Agricultural Waste	All types of agricultural waste	Collected agriculture waste delivered to intermediate storage, processing facilities or W2E facilities

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Feedstocks	Products
Category 2: Sorting and Densification of Types of Waste	R2.1	MSW Transfer Stations and MRF Facilities	Mixed and/or sorted MSW	Baled recyclables Baled energy rich fraction OFMSW
	R2.2	Industrial Waste Transfer Stations	All types of industrial wastes	Sorted industrial waste
	R2.3	Agriculture Waste Collection Sites	All types of agriculture wastes	Agriculture waste in the form of: Bales, Pellets, Cubes, Briquettes, Torrefied agriculture waste.

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Feedstocks	Products
Category 3: MSW Treatment and Disposal	R3.1	Mechanical/Biological Treatment (MBT)	Mixed and/or pre-sorted OFMSW	<ul style="list-style-type: none"> • Compost • Power • RDF • Recyclables
	R3.2	Alternative Fuels-MSW	Sorted fractions from MSW	RDF SRF
	R3.3	Sanitary Landfills	Mixed MSW, sorted MSW, reject fraction of MSW	Electricity (Bioreactor LF: LFG to electricity) No product from reject fraction landfilling

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Feedstocks	Products
Category 4: Waste Glass Recycling	R4.1	Glass Containers (closed-loop glass recycling)	Waste soda lime-silicate glass (cullet)	Finished glass containers
	R4.2	Glass Products (open-loop glass recycling)	Scrap glass	Glass products, examples include: <ul style="list-style-type: none"> • Ballontini (high reflective glass spheres) • Glass wool • Foamed glass • Ingredient in ceramic industry • Ingredient in abrasives • Ingredient in bituminous highway pavement • Aggregate mix in special concrete

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code		Industry	Feedstocks	Products
Category 5: Metals Scrap Recycling	R5.1 Non-Ferrous Metals	R5.1.1	Nonferrous Secondary Smelting and Refining Mills	Nonferrous scrap	Recycled and alloyed nonferrous metals in the form of billets, ingots and other shapes
		R5.1.2	Nonferrous Product Producers	Nonferrous scrap	Nonferrous products produced through extrusion, rolling or drawing processes
		R5.1.3	Nonferrous Foundries	Nonferrous scrap	Casted nonferrous metals
	R5.2 Ferrous Metals	R5.2.1	Iron and Steel Mills	Ferrous scrap and/or raw materials	Iron and steel slabs, billets, bars, plates
		R5.2.2	Iron and Steel Foundries		Cast iron or steel products

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Feedstocks	Products
Category 6: Paper Recycling	R6.1	Paper, Paperboard and Deinked Market Pulp Mills	Recovered paper or market pulp and/or de-ink recovered paper and sell pulp	Paper and paperboard products
	R6.2	Paper-Based Product Manufacturers	Recovered paper or paper – board	Cellulose-based products

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Feedstocks	Products
Category 7: Textile Waste Recycling	R7.1	Mechanical Processing of Textile Waste	Textile waste	Material reuse: <ul style="list-style-type: none"> • Wipes • Rags • Insulation material • Wallets • Bags
	R7.2	Chemical Processing of Textile Waste	Textile waste	<ul style="list-style-type: none"> • Cellulosic fibers • Synthetic fibers • Fiber blends

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Feedstocks	Products
Category 8: Plastics Recycling	R8.1	Plastics Reclaiming Industry	Recovered Plastics	Plastic products (e.g plastic lumber) or raw material ready for remanufacturing
	R8.2	Plastics Conversion Industry	Recycled plastic clean flake or pellets	Intermediate or end plastic products

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	feedstocks	Products
Category 9: Rubber Waste Recycling	R9.1	Pyrolysis of waste tires	Waste tires	<ul style="list-style-type: none"> • Pyrolytic oil (to be fractionated to Tire-derived fuel and Heavy fuel oil) • Carbon black
	R9.2	Shredded Tire Production and processing	Shredded tire	<ul style="list-style-type: none"> • Tire alternative fuel (cement industry) • Interior flooring (playground surfaces, parking lots)
	R9.3	Crumb Rubber Production and Processing	Crumb rubber	<ul style="list-style-type: none"> • Rubber modified asphalt • Tire-reinforced concrete blocks • Rubber railroad crossings • Devulcanized/surface modified rubber • Heavy crash barriers • Tire reefs • Waste tire powder for recovery of oil spills

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Feedstocks	Products
Category 10: Recycling of Waste Electrical and Electronic Equipment (WEEE)	R10.1	WEEE First Level Processing	WEEE	First level processing output
	R10.2	WEEE Second Level Processing	First level processing outputs	Second level processing output
	R10.3	WEEE Third Level Processing	Second level processing output	<ul style="list-style-type: none"> • Plastics • Glass and other recycables • Precious metals • Base metals

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	feedstocks	Products
Category 11: Construction/ Demolition Waste Recycling	R11.1	Road Work Waste Processing	Road work waste	Asphalt; Concrete; Soil; Reinforcing Metal
	R11.2	Site Work Waste Processing	Site work waste	Soil; wood, including trees and brush; organic matter; sand; stone; concrete; pipe.
	R11.3	Demolition Waste Processing	Demolition waste	Mixed rubble, including wood, concrete, masonry, and steel; fixtures; etc
	R11.4	Construction Waste Processing	Construction waste	Scrap wood; roofing; wall board; insulation; flooring; ducts; pipe; packaging; fasteners; concrete; steel.
	R11.5	Renovation Waste Processing	Renovation waste	Scrap wood; roofing; wall board; insulation; flooring; ducts; pipe; fixtures; mechanical equipment; packaging; fasteners; concrete; steel.

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code		Industry	Feedstocks	Products
Category 12: Biomass Recycling	R12.1 Bio-Power Production Facilities	12.1.1	Anaerobic Digestion	WWTP sludge, OFMSW, animal manure	<ul style="list-style-type: none"> Onsite power and/or heat Utility power
		12.1.2	Direct Combustion	MSW, LFG, agriculture waste	
		12.1.3	Gasification	MSW, Agriculture waste	
		12.1.4	Pyrolysis	MSW, Agriculture waste	
	R12.2 Biofuels Production Facilities	R12.2.1	Biochemical (Bio refining)	OFMSW, agriculture waste	<ul style="list-style-type: none"> Biodiesel Bioethanol
		R12.2.2	Thermochemical (Chemical Refining)		
		R12.2.3	Fermentation	Bagasse,	
		R12.2.4	Transesterification	Animal fat, vegetable oil	

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code		Industry	Feedstocks	Bio-Products
(Cont'd) Category 12: Biomass Recycling	R12.3 Bio- Products	12.3.1	Bio-chemical (fermentation/plant extraction)	Food processing waste Sugarcane waste Other agriculture wastes	<ul style="list-style-type: none"> • Coatings • Adhesives • Solvents • Textiles
		12.3.2	Thermochemical (conversion of sugars)		<ul style="list-style-type: none"> • Solvents • Coatings • Pharmaceuticals
		12.3.3	Thermochemical (gasification/pyrolysis)	Agriculture waste, OFMSW	<ul style="list-style-type: none"> • Chemicals • Biochar
		12.3.4	Densification		<ul style="list-style-type: none"> • Pellets/Briquettes • Construction materials
		12.3.5	Transesterification (alcohol processing)	Vegetable oils Jetropa oil	<ul style="list-style-type: none"> • Lubricants • Solvents • Resins • Plasticizers • Inks • Adhesives

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Description
Category 13: Reuse and Remanufacturing Industry	R13.1	Computer and Electronic Appliance De- Manufacturers	Establishments which sort, grade and remanufacture used electronic appliances (e.g computers).
	R13.2	Motor Vehicle Parts (used)	Establishments which clean, sort, inspect and remanufacture used motor vehicle parts
	R13.3	Tire Retreaders	Establishments which sort, clean and remanufacture used tires by adding tread. These establishments produce crumb rubber as byproduct
	R13.4	Wood Reuse	Establishments which produce finished goods by cleaning and reprocessing used wood
	R13.5	Textiles Reuse	Establishments which clean, sort and grade used textile products
	R13.6	Material Exchange Services	Establishments which which manage waste exchange programs

Proposed Waste Recycling Industry Categorization (Cont'd)

Category	Code	Industry	Description
Category 14: Support Businesses	R14.1	Recycling Equipment Manufacturers	Establishments which produce the primary equipment used by recycling businesses
	R14.2	Recycling Equipment Dealers	Establishments which trade recycling equipment and supplies
	R14.3	Consulting/ Engineering	Establishments which provide engineering design work and technical studies for the WRI
	R14.4	Vocational Education and Training (VET)	Establishments which provide VET to all WRI subsectors
	R14.5	Laboratories for Analysis and Quality Control	Establishments which provide laboratory analysis services to all WRI subsectors, including raw materials and product analysis and quality control

Concluding Remarks

- 1 A proposal for the building blocks of the emerging WRI in Egypt is presented. It is a call to conduct in-depth studies for each block.
- 2 A proposal for the Egyptian WRI categorization is presented. It is a call for stakeholders review before endorsement by the responsible authorities..