Chapter 3
Sustainable Materials Managment

Vision for the Future

The vision for this update of the *Clark County Solid Waste Management Plan* is to continue moving toward a more sustainable future. In that future, citizens will be generating less waste and handling the wastes they do generate differently. This will happen through tried and true methods such as waste reduction, increased recycling, and composting, as well as through new alternative and even innovative approaches such as product stewardship, life cycle analysis, design for recycling, packaging regulation, and recycling market development programs; in short, as a society and community we need to rethink how we think about "waste". This movement or shift will not happen overnight or replace the current solid waste system. New approaches to waste management and new technologies must respect and build upon the previous work and programs that have been put in place and that have served the county and its citizens well for decades. Ultimately, it is up to the individual to decide what and how to consume, and through our programs we will strive to provide a variety of environmentally and socially-responsible waste prevention, diversion and disposal options that further this plan's goals.

Background

All materials come from the Earth. The foundation that underlies the world economy, prosperity and a healthy environment rests largely on how people extract and use the full range of materials that come from and return to the Earth such as wood, minerals, fuels, chemicals, agricultural plants and animals, soil, and rock. How our society uses materials is fundamental to many aspects of our economic and environmental future. From the solid waste perspective, which is the focus of this plan, much of this activity happens "upstream" from where all of these materials end up as components of the "waste stream". If we want the U.S. to be competitive in the world economy, the sustainable use of materials throughout their life cycle must be addressed within our goal to plan for managing waste.

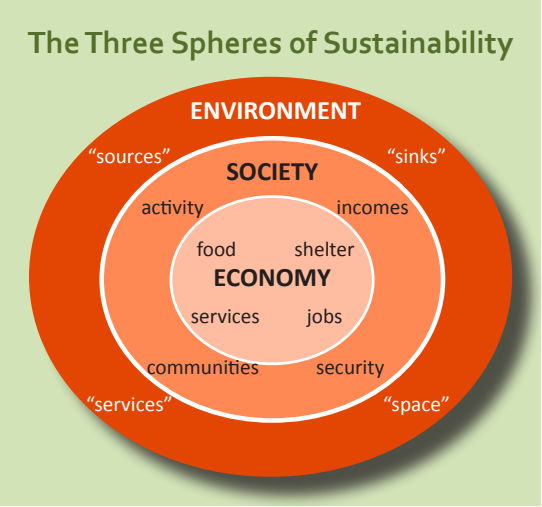


Figure 3-1

Considerations

Our increasing population places a higher demand on resources and ecosystem services. Our use of materials challenges the capacity of the Earth – air, water and land – and is the cause of many resulting environmental problems. This situation fundamentally affects many other aspects of our future, such as the economy, energy and climate. How do we fulfill our human needs and prosperity while using less material, reducing toxics and increasing recycling? This suggests that "business as usual" cannot continue, as depicted in Figure 3.2.

"The world at large and the United States in particular use vast amounts of materials and those amounts are rapidly increasing .[1]

- In the past 50 years, humans have consumed more resources than in all previous history.
- With less than 5% of the world's population, the U.S. was responsible for about one-third of the world's total material consumption.
- In 1900, 41% of the materials used in the U.S. were renewable (e.g., agricultural, fishery, and forestry products); by 1995, only 6% of materials consumed were renewable. The majority of materials now consumed in the U.S. are nonrenewable, including metals, minerals, and fossil-fuel derived products.
- Our reliance on minerals as fundamental ingredients in the manufactured products used in the U.S.—including cell phones, flat-screen monitors, paint, and toothpaste—requires the extraction of more than 25,000

pounds of new non-fuel minerals per capita each year.

- This rapid rise in material use has led to serious environmental effects such as habitat destruction, biodiversity loss, stressed fisheries, and desertification.
- The rate of deforestation in the tropics is approximately one acre per second.
- Half the world's tropical and temperate forests are now gone.
- 75% of marine fisheries are now overfished or fished to capacity.
- Freshwater withdrawals have doubled between 1960 and 2000; rivers including the Colorado, Yellow, Ganges, and Nile do not reach the ocean in dry seasons.

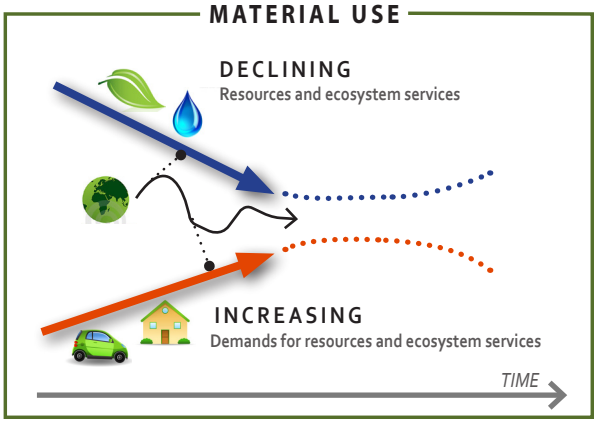


Figure 3-2

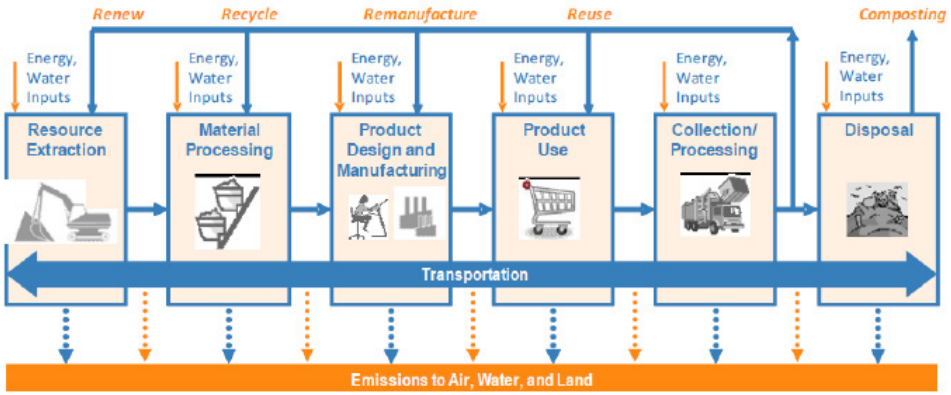
- Over half the agricultural land in drier regions suffers from some degree of deterioration and desertification.
- As available ore grades for some minerals decrease, the amounts of materials that have to be mined and processed to produce equivalent product increases, along with the environmental impacts.
- Persistent, bioaccumulative and toxic chemicals can now be found throughout the food chain."

Sustainable Materials Management

The magnitude of these environmental impacts is causing people to begin to look at all aspects of the material lifecycle that comprise our industrial practices and consumer habits. The material lifecycle begins with the extraction or harvesting of raw materials. Materials are then transported and processed to create the products and services that drive our society. They are distributed, consumed, reused or recycled, and ultimately disposed.

As Figure 3-3 depicts, each stage of this cycle requires energy and water as inputs and creates impacts on the environment. Because the stages are interrelated, it is important to rethink how we manage materials. If an item or product is disposed or even recycled without making the fullest and best use of it, all of the upstream inputs are also lost and the impacts multiplied. It is critical that both our consumption and waste generation choices are made with the best possible understanding and appreciation for what is upstream of the product being considered.

"If we want the U.S. to be competitive in the world economy, the sustainable use of materials must be our goal."
- United States Environmental Protection Agency



The Flow of Materials
Source: State/EPA 2020 Vision Workgroup

Figure 3-3

Why Use A Sustainable Materials Management Approach?

"The sustainable materials management approach focuses on waste prevention as a way to reduce environmental and health impacts of materials while strengthening the economy. This approach emphasizes the importance of looking at the full life cycle of materials: the design and manufacturing phase, the use phase, and the end-of-life phase when the material becomes waste. We need to identify more sustainable ways to design products that use less energy, water and toxics. The adverse environmental impacts of extraction, production and use can be far greater than those associated with disposal when the product becomes a waste.

A sustainable materials management approach is vital because available resources are declining worldwide, while demand for resources continues to grow. As people consume more resources in the form of products and materials, it causes more pollution, including greenhouse gases and other toxic releases, and limits the ability of all people to meet their basic needs, now and in the future. We are using resources faster than the planet can renew them.

The demand for finite resources will continue to increase, putting increased pressure on our environment. Since the industrial revolution, our society has been operating on the assumptions that resources are abundant, readily available and cheaply disposed. This is no longer the case. A linear use of resources where we extract materials, use them once, and then throw them away is unsustainable. Not only will we run out of key materials, but the throw-away economy continues to pollute our environment with waste and toxics. Instead, we can use our resources in a circular model, as illustrated by the sustainable materials management cycle., as depicted in Figure 3-5 (*WA State Solid and Hazardous Waste Plan (Beyond Waste) 2014 Update) .**

Table 3-1 How WA State Department of Ecology's Work Fits Into the Sustainable Materials Management Cycle *

Design and Production	Use and Reuse	End-of-Life Management
Compliance with Toxics in Packaging, Children's Safe Products Act, Better Brakes and other product laws	Pollution Prevention planning	Pollution Prevention planning
Food waste prevention	Environmentally preferred (green) purchasing	1-800-Recycle Hotline
Green chemistry	Technical assistance and information on safe use of chemicals and toxic products	E-Cycle and LightRecycle Stewardship Programs
Alternatives Assessment Guide	Support of re-use networks	Solid waste facility assistance
Comprehensive lean and engineering assistance to businesses	Local source control partnership	Hazardous waste compliance
		Permitting hazardous waste facilities
		Local source control partnership
		Most recycling (including organics) and moderate risk waste assistance
Currently, most of Ecology's work is on end-of-life management activities.		

**See Figure 3-4 for an illustration of the Sustainable Materials Management Cycle.*

Figure 3-4

From: US EPA Source Material Management. Adapted from "Design Guidelines for Sustainable Packaging," Sustainable Packaging Coalition, Green Blue, 2006.

Life Cycle

In order to minimize the amount of materials involved and all the associated environmental impacts, a new way of thinking is needed. Life cycle materials management is an approach to serving human needs by using/reusing resources most productively and sustainably throughout their life cycles and is dependent on the price system, regulatory framework, technical information and human mindsets all working together. The EPA's *Road Ahead* document provides additional information.

By considering system-wide impacts, life-cycle materials management casts a far broader net than traditional waste and chemicals management approaches and represents a change in how we think about sustainable choices.

Life Cycle Assessment (LCA) is a method used to track a product and its interactions with the environment from cradle to grave. *Life Cycle Assessment* provides a clearer understanding of a product's full cost, including costs to the environment, and benefit to the economy, and can identify ways to improve the sustainability of a product. There are many means by which life cycle materials management can be accomplished. For instance, careful industrial and product design that reduces virgin material use and reuses materials can reduce what is taken from the Earth and put back into the environment.

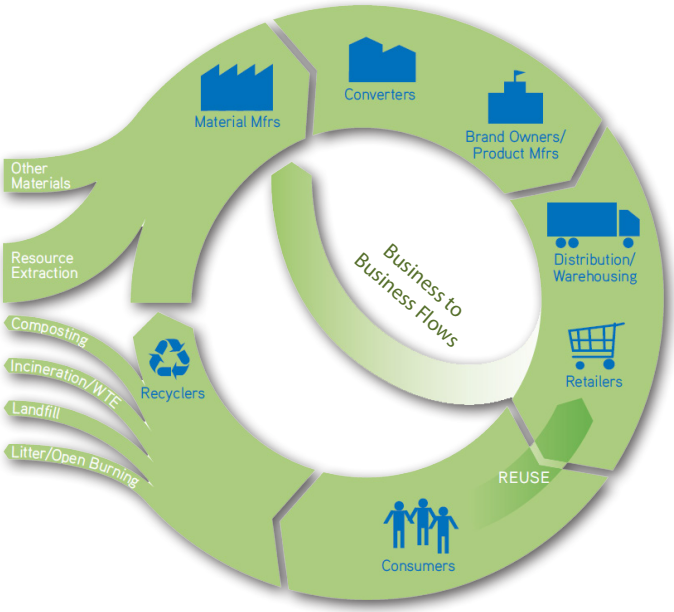


Figure 3-5

From: US EPA Source Material Management. Adapted from "Design Guidelines for Sustainable Packaging," Sustainable Packaging Coalition, Green Blue, 2006.

Product Stewardship

Product Stewardship (PS), as depicted in Figure 3-6 is an important tool to address environmental impacts from the perspectives of production, consumption and end-of-life management of products through design, development and product launch. In the late 1990s, a coalition of local and state government agencies in Washington and Oregon, in conjunction with EPA Region 10, formed the Northwest Product Stewardship Council (NWPSC) to research and promote product stewardship in the Northwest. By working together through the Council, the member agencies have been able to combine resources, expertise and efforts to maximize the effectiveness of each agency's efforts and to work cooperatively toward state, regional or national solutions. While the impacts of product and packaging waste are at the local level, the decisions and negotiations often happen at a national level. By working together through NWPSC, local governments have been able to work with national and multi-national corporations on pilot programs and policies, and participate in national dialogues on product stewardship approaches. This process helped establish producer responsibility legislation for electronic wastes (televisions, computers and monitors). The E-Cycle Washington program kept 238,366,228 pounds of electronic waste out of the landfill in its first 5 years.

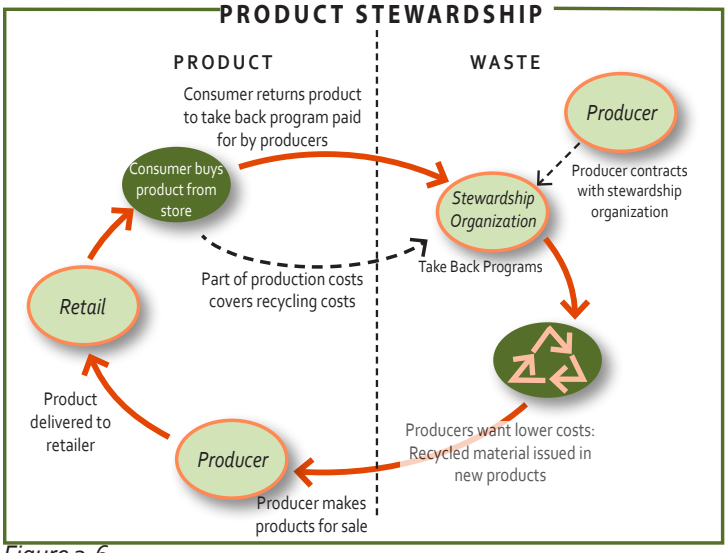


Figure 3-6

Conclusions

The path to a future of promise and prosperity provides many opportunities for shifting from the traditional waste management approach to a sustainable materials management approach to move beyond "end of pipe" controls by targeting interventions upstream. Opportunities include: sustainable use of materials/resources, management of chemical risks, and conservation of energy and water. The path requires a systems perspective that designs products with life cycle and environment in mind and uses more renewable and less toxic materials.

Recommendations

1. **Continue to pursue and develop product stewardship programs,** in coordination with other public and private entities.(3-5)

2. **Integrate the Solid Waste Program to include other environmental issus,** such as source control, that has an impact on, and is significantly affected by, solid waste. (3-3)

3. **Lobby state and federal governments to pass legislation** that requires waste prevention and product stewardship: including packaging reduction and improvements. (3-5)

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1 United States Environmental Protection Agency's Sustainable Materials Management: The Road Ahead, June 2009

End Chapter 3

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