

Environmental Preservation

1. Introduction

Environmental preservation is the strict setting aside of natural resources to prevent the use or contact by humans or by human intervention. In terms of policy making this often means setting aside areas as nature reserves, parks, or other conservation areas. These areas are usually restricted or prohibit activities that may cause damage to habitat or wildlife. Such activities may include: logging, hunting, fishing, mining and so on. Just as often legal devices such as laws and regulations may be employed, such as the endangered species Act in the United States, which is not dependent on designating a specific geographic area aside for conservation. A government's environmental policy will determine which areas or species, etc are protected and how. Environmental preservation is different from conservation. Conservation allows for sustainable development, whereas preservation is complete restriction. Preservation of environment means to maintain the present condition areas of the nature or earth which are not yet touched by humans. This is because of the fact that mankind is encroaching on to the environment at such a rate that various wild landscapes are being given over to farming, industry, housing, tourism and other human developments. And we lose much of the natural areas. Preservationists also strongly support the protection of nature for purely human - centered reasons. However, some adopts less human - centered approach to environmental protection, placing a value on nature that does not relate to the needs and interests of human beings. But is a fact that by preserving and conserving environment we can make a healthy atmosphere to live in.

2. Alternative solutions to the excessive use of natural resources

1. Introduction of new materials

Improving efficiency has always been a major concern for industries, in order to combine economic objectives with the reduction of environmental impacts by steering technological innovation in new directions.

The choice of materials used requires significant product performance, particularly regarding energy consumption. Consequently, new constraints arise in the design of production processes, especially concerning the ease of recycling, with the aim of reducing the product's end-of-life impact and decreasing the amount of solid waste generated by human activities.

2. Reserving petroleum for essential uses

Today, the energy transition toward sustainable development (beyond petroleum) represents one of the greatest challenges of our time. This concept is the only approach that can best ensure the energy and economic security of countries that rely almost entirely on petroleum, which is gradually being depleted. For this reason, it is important to make better use of petroleum by reducing consumption through energy efficiency and using it for essential purposes such as fertilizers, solvents, plastics, nylon, resins, and lubricants. Furthermore, the use of petroleum should be replaced by other renewable energy sources.

2.3. Improving energy efficiency

This involves, on the one hand, reducing energy consumption within manufacturing processes, increasing the energy efficiency of the product during its use phase, and minimizing the energy required at the end of the product's life for operations such as disassembly, sorting, and material recovery.

This direction of technological progress is fully compatible with the economic objectives of both industries and consumers, and many advancements have already been made in this regard:

- Reduction of fuel consumption in vehicles
- Increase in the energy efficiency of heating systems
- Energy audits of industrial facilities and the use of industrial equipment that requires less fuel

3. Waste treatment and recovery

Human activities generate solid, liquid, and gaseous waste that disrupts natural environments such as water, air, and soil. In recent years, this waste has gained significant importance, particularly solid waste, which remains one of the main sources of renewable energy. Numerous projects are being developed in many industrialized countries to recover energy from such waste.

4. Definition and typology of waste

According to European regulations, waste is defined as “any substance or object which the holder discards or intends or is required to discard.”

In other words, waste is defined as any material or object whose economic value is zero or negative for its holder.

The principles of waste management are based mainly on maximizing waste recovery and reuse, particularly for materials, in order to generate the smallest possible amount of residual waste.

Several methods are used, including source reduction to decrease toxic waste and other residues. Another method of source reduction is to increase incentives for recycling.

Several cities in the United States have implemented taxes based on the quantity of waste deposited (“Pay As You Throw – PAYT”), which have proven effective in reducing the volume of urban waste. In some developing countries, waste recovery is carried out through manual sorting to retrieve materials that can be sold on the recycling market.

The simplest classification of waste is based on its level of hazard (explosive, toxic, flammable, capable of releasing harmful substances, etc.) and its impact on health and the environment. In contrast to hazardous waste, there are inert wastes, which are mineral solids that do not undergo significant physical, chemical, or biological transformations when landfilled and are not contaminated by hazardous substances or other nuisance-producing elements that could harm health or the environment.

Thus, inert waste mainly consists of construction and demolition residues generated from building sites and public works, as well as from mining and quarrying activities.

In addition, there are other types of waste of diverse origins, with compositions whose evolution may cause nuisances or multiple types of environmental pollution—for example: waste similar to household waste, infectious waste, solid hospital waste, hazardous or special industrial waste (HIW), and non-hazardous waste or ordinary industrial waste (OIW), ultimate waste, and anatomical waste.

5. Waste management

Waste management (rudology) involves the collection, transportation, treatment, reuse, or disposal of waste while aiming to reduce its environmental impact. Waste management applies to all types of waste—solid, liquid, or gaseous.

Some waste-management experts have added a fourth “R” to the hierarchy of strategies that is

traditionally based on the 3Rs (Reduce, Reuse, and Recycle). This fourth “R” (Rethink) is based on preliminary optimization studies aimed at producing the least possible amount of waste.

6. Waste Recovery

Depending on their chemical nature and their mechanical, physicochemical, or thermal properties, almost all waste can potentially be recovered. This strategy is applied across all recovery sectors, where waste can completely or partially replace conventional fuels (wood, coal, oil, gas), and the heat produced is recovered in various forms (steam, hot water, electricity).

7. Waste Treatment Processes

7.1. Landfilling and Technical Burial Centers

Waste is generally stored in landfills. This method is considered the most traditional form of waste storage and remains the most common practice in most countries, although it has been replaced in some areas by controlled landfills called Technical Burial Centers (CET), which minimize environmental impacts.

7.2. Incineration

Incineration is the process of destroying a material by burning it and is often referred to as “energy from waste.” In energy terms, it is estimated that incinerating one ton of household waste produces an amount of energy equivalent to that provided by 150 liters of fuel.

The energy produced can be thermal and used, for example, to supply district heating systems or nearby industries. Therefore, the location of the facility must be carefully chosen to balance environmental considerations with the economic benefits associated with proximity.

Incineration helps save more valuable energy sources and reduces waste treatment costs for the community. In France, the energy sold from the incineration of household waste, in the form of heat or electricity, was estimated in 2004 at nearly 13 million megawatt-hours (about 1,350,000 tonnes of oil equivalent), an amount equivalent to the total annual energy needs of a city of 400,000 inhabitants. Some facilities also use cogeneration (combined production of electrical and thermal energy).

7.3. Thermolysis

Thermolysis is a heat-treatment process (450 to 2,000 °C) carried out in the absence of air. It can be applied to organic materials, which it decomposes into three components: a solid residue (composed of ash, minerals, and carbon), an oily liquid residue, and a hot gas.

7.4. Pyrolysis and Gasification

These are thermal-treatment methods in which materials are heated to very high temperatures with little oxygen. This process takes place in sealed, high-pressure chambers. These two methods are more efficient than direct incineration in terms of the amount of energy recovered.

Pyrolysis transforms materials into solid, liquid, or gaseous products. Pyrolytic oil and gases can be disposed of by burning them to produce energy, or they can be refined into other products. Solid residues, on the other hand, can be transformed into other products such as activated carbon.

Gasification (for example, using plasma torches) is used to directly convert organic materials into a

synthesis gas called syngas, composed of carbon monoxide and hydrogen. This gas is then burned to produce electricity and steam. This type of process is used in renewable energy plants that generate power from biomass.

7.5. Composting and Fermentation

Organic waste—such as plant matter, food scraps, or paper—is increasingly being recycled. These wastes are placed in a composter or digester to control the biological decomposition process of organic matter and eliminate pathogens. The resulting stable organic products are recycled as mulch or soil amendment for agriculture and gardening.

In wastewater treatment plants, biological waste management favors returning fermentable fractions to the soil, either through the spreading of sludge from treatment plants (a method increasingly challenged and with an uncertain future), or after treatment by direct composting or by methanization followed by composting of the digestate.

As an example: household waste contains about 29% fermentable material, representing approximately 9.5 million tonnes annually in France. The agri-food industries produce 40 million tonnes, and French agriculture recycles each year around 30 million tonnes of urban and industrial organic waste and 280 million tonnes of agricultural effluents and residues.

7.6. Biological and Mechanical Treatment (BMT or MBT)

This process is a technique that combines mechanical sorting and biological treatment of the organic fraction of municipal waste.

The mechanical part consists of bulk sorting to remove all recyclable elements such as metals, plastics, and glass, which are then treated to produce a fuel with high calorific value.

The biological part consists of anaerobic fermentation or composting.

7.7. Recycling

This treatment method mainly concerns glass, paper–cardboard, packaging materials, and metals. These wastes are collected separately—a system that has long been well established—and are then subjected to specific recovery processes in the form of recycling. This consists of recovering raw materials without significant transformation.

In most cases, the material obtained from recycling is less expensive than the natural raw material and possesses the same properties. This simple observation suggests, with little risk of error, that recycling has a promising future wherever it can be applied.

7.8. Waste Collection Center (Recycling Center)

A waste collection center is a facility that ensures the collection and recovery of waste, which is then directed toward the appropriate treatment method depending on its nature—recycling, incineration, storage in a Technical Burial Center (CET), etc.

8. Ecological Taxation

Ecological taxation, also called environmental taxation or eco-taxation, is a new form of financial taxation aimed at environmental protection. It is considered an instrument for guiding taxpayer behavior regarding environmental matters.

The use of taxation in environmental policies aims to reduce pollution and the environmental impacts linked to economic activities and consumption patterns. It initiates a shift toward integrating various market-based tools (pricing instruments, emission permit trading systems, tax

credits) and breaks away from the traditional view of taxation.

On average, ecological taxation represents 2.6% of the GDP of European Union countries; this rate is 2.3% in France and reaches 6% in Denmark.

Ecological taxation is today a major issue—at least in public debate—in the fight against climate change. “Carbon” or “carbon-energy” taxation is considered a fundamental instrument for reducing carbon emissions and controlling energy consumption.

The aim of ecological taxation is to correct market imperfections rather than to collect revenue in the most neutral way possible. Taxation therefore replaces regulatory standards to reduce pollution by bringing the private cost of production up to the level of the social cost (the latter includes the damage caused to other economic agents—this is the principle of “polluter pays”).

Assessing the social cost of damage, which includes evaluating the appropriate level of pollution reduction as well as estimating how responsive behaviors are to costs, is difficult. Nevertheless, the tax is, in most cases, considered more effective (more effective because less costly than an emission standard). Indeed, unlike an emission standard, a tax (per unit of pollution) gives the regulated company a choice.

The company faces two options:

- **Maintain its current level of emissions.**

In this case, it avoids the costs of improving its environmental performance but ends up paying a high total tax. The money collected can then be used to finance environmental protection measures.

- **Choose to reduce its polluting emissions.**

This involves spending on improving its environmental performance but reduces its tax burden.

The eco-tax is a way to encourage polluters to reduce pollution until the cost of depollution equals the amount of the tax. This implies more modern and therefore less costly production technologies within the company. Pollution reduction through taxation is less expensive than implementing a uniform quantitative standard.

This is all the more true in situations of imperfect information. The government decision-maker’s depollution objective can be carried out in several stages, by adjusting the tax level each time. If the emission level is too high, the tax level is increased. The process of reaching the set objective is achieved through a trial-and-error approach. Eco-taxes make it possible to go beyond pre-existing standards.

Here are some examples of developed countries that have opted for eco-taxes:

- **In Denmark:** An energy tax was introduced after the oil shocks and today applies to all forms of energy. In 1991, a tax on carbon dioxide emissions was established to help combat the greenhouse effect, initially set at 13 euros per ton of CO₂, but with partial exemptions for energy-intensive companies. In 1995, the CO₂ tax increased to 80 euros per ton, but companies received reductions in return on social contributions. Eco-taxes generated 320 million euros for the State in 2000, and 233 million euros of this revenue was allocated to reducing social charges.
- **In Norway:** The CO₂ taxes introduced in 1991 made it possible to reduce emissions from stationary combustion facilities by 21% per year. Studies have shown that a tax on CO₂

emissions, combined with reductions in labor-related contributions, would produce a modest net gain in employment.

- **In France:** The project proposed in 1999 to extend the General Tax on Polluting Activities (TGAP) to intermediate energy consumption aimed to encourage companies to reduce their pollutant emissions. It quickly encountered the problem that any levy represented an additional cost...

9. Economic, Legal, and Regulatory Mechanisms for Environmental Protection

The depletion of natural resources and raw materials, as well as the issue of climate change, highlight the need for the concept of sustainable development.

Faced with this new phase of awareness regarding environmental issues, public authorities intervene by using, without prior restriction, all available instruments to preserve the natural environment. These actions are supported by economic analysis, which can help policymakers in their decision-making by proposing new instruments classified into two major categories:

- **Regulatory instruments** (which set standards relating to technical processes or to the volumes of pollutant emissions)
- **So-called economic instruments** (mainly eco-taxes and emissions trading markets, but also tax credits and subsidies)

10. The Role of Public Authorities in Solving Environmental Problems

Public authorities must take into account the interests of individuals when making decisions that have an impact on environmental issues. In this context, it is important that the public be able to submit comments and observations to public authorities.

When public authorities must address complex environmental and economic policy issues, the decision-making process must include the completion of appropriate investigations and studies, in order to anticipate and assess in advance the environmental impacts, thus allowing for the establishment of a fair balance between the different interests at stake. The court emphasized the importance of public access to the findings of these studies, as well as to information enabling individuals to assess the risks to which they are exposed. However, this does not mean that every decision must be based solely on exhaustive and verifiable data covering all aspects of the issue to be resolved.

11. Current Environmental Policies

Based on economic instruments, current environmental policies rely less on regulatory instruments such as standards (which prescribe the behaviors that agents must follow). Indeed, the use of standards presents what Boemare and Hourcade describe as “perverse effects”:

Standards generate additional costs due to the difficulty of accounting for the diversity of possible solutions, which would allow for differentiated pollution-reduction efforts.

- In some cases, standards may fail to guarantee a reduction in total emissions.

12. The Market for Tradable Emission Permits

The federal policy of emission standards set and monitored by the Environmental Protection Agency in the United States failed, leading to the emergence of a new regulatory mechanism: tradable emission permits. Indeed, in many regions, the prescribed emission standards were not met. As a result, the construction of new plants was prohibited. An exception was made for new

industrial operators who could obtain licenses transferred by historical polluters.