GREEN DEAL

green future

European Youth Alliance for a Green Future

European Youth Alliance
For Green Future

BOĞAZİÇİ YAYINLARI

The Green Deal
"For A Greener Future"

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WORLD ACADEMY FOR LOCAL GOVERNMENT AND DEMOCRACY

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PREFACE

World while embracing the millions of living species on the earth, only asks us to respect the balance of nature in return for her generosity. Today, problems that can be grouped under the headings such as climate change, air pollution, water and food safety, and loss of biodiversity have reached dimensions that will drag the future of humanity into uncertainty. Disasters as a result of climate change affect all humanity deeply. In that regard, if we can carry out the fight we need against climate change, all humanity will benefit seriously from these gains.

The most important pillar of this struggle; the European Green Deal addresses environmental issues such as biodiversity, pollution and climate change through the transformation of food systems, agriculture, energy, industry, buildings and mobility. Young people under the age of 25 today are the largest generation of youth in human history. They represent half of the world's population, mostly living in developing countries. It is predicted that approximately 33,000 young people will enter the job market every day by 2050.The trainings on the green deal are essential to ensure that young people are fully involved in the transition to low carbon, climate change, resource efficiency and a circular economy. Many young people are aware of the green economy. However, they need more information to understand how to do this at the local, national and international level.

Building a green future must begin with education and training. We hope that this work will be a roadmap for all members of the society, especially the youth, in adopting conversations about green economy, green societies and green jobs with their life-styles, and we aim to provide young people with ideas, actions and starting points for a sustainable world.

I would like to express my sincere thanks to the valuable contributors to the preparation of this work that we have presented to you;

Nelu NEACSU – EAR-AER President,
Ionica ONCIOIU, Ph.D. – EAR-AER Vice President,
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and wish it to be a practical guide for minimizing the carbon footprint.

Dr. Mehmet DUMAN
WALD Chairman of the Executive Board

INTRODUCTION

Sustainability for the future of nature and humanity…

It is aimed to reduce greenhouse gas emissions until 2030 with the Green Deal, which extends from the political processes in the world to the **Paris Agreement** in 2015, **the United Nations Framework Convention on Climate Change** (UNFCCC) and the process of the UK and the European Commission. The processes we are going through today increase the momentum of sustainability. The complementary goals set by the United Nations Sustainable Development Goals (SDGs) and the European Green Deal (EGD) highlight green and digital technologies, which will become an export product. With these developments; the digital transformation process reveals that the European Union (EU), the Green Deal and the United Nations SDGs have a complementary effect on each other.

We all know that digital technologies will play a key role in achieving sustainability goals. Awareness and development of innovative, environmentally friendly, digital sustainable marketing strategies and integrating these strategies into their corporate strategies with a structured approach are of utmost importance.

Today, in practice, there is the climate crisis, and the basis of the climate crisis is the linear economy model based on fossil fuels, which has been maintained since the Industrial Period. The introduction of the concept of "sustainability" over the years has not been sufficient for the economic transformation of the linear economy model, which aims at more growth, more production and consumption by ignoring the economic success and the destruction it causes to nature and the living creatures in it.

Just like the pandemic, climatic disasters, which have a global impact and have increased their severity and frequency in recent years, need an urgent solution as the most important problem of the climate crisis. While this situation is the first consequences of both global problems as loss of life and economic losses, it also reveals many secondary and invisible effects from displaced people to food insecurity.

The more significant dimensions of all these effects can be seen in the United Nations Sustainable Development Goals. The whole world strives to overcome these climate-based disasters, to ensure fair welfare for all living creatures on the planet, and to achieve permanent and sustainable results for this purpose. One of the most important of these efforts is the **"European Green Deal"**, the climate action plan of the European Union. With the European Green Deal announced in 2019, the European Union basically aims to zero its greenhouse gas emissions by 2050 with the changes and regulations it will implement in many sectors. This target naturally also concerns countries that have commercial relations with the EU. In this context, Turkey is in an effort to make the necessary arrangements within its body in order not to disrupt its relations with the EU countries, which is one of its most important commercial partners.

In light of all these developments, the European Commission presented in December 2019 the European Green Deal, a set of policy initiatives to make the EU the first climate-neutral continent by 2050. This aims for a cleaner environment, more affordable energy, smarter transportation, new jobs and overall better quality of life. The EGD also increases the efficient

use of resources by moving to a clean, circular economy and halting climate change, and outlines the investments needed and available financing instruments, as well as explains how to ensure a just and inclusive transition.

A bottom-up approach is needed to ensure an inclusive and appropriate transition. Overcoming environmental challenges and fully complying with the main elements of the EGD can be done using democratic tools and informing local communities. There is a tough responsibility for Europe's next decision makers. Their duty is to understand and internalize the main elements of the EGD, to include the elements of local communities in the policy making process, to put forward environmental legislation in different societies and to offer new solutions at the same time.

This work aims to express the basic concepts of the European Green Deal, environmental issues, sustainability, environmental legislation, best available techniques, green entrepreneurship concepts and social objectives in terms of environment. As part of a summary of the European Green Deal, It also includes structural analysis and needs related to the Green Deal. This meticulously conducted study will serve as a guide for the production of innovative and environment-based solutions in the field of Green Deal, as well as for all studies related to environmental problems.

This book, in which we try to explain the basic environmental issues at the global level, covers how to ensure environmental sustainability, how to maintain a green economy, how to develop green entrepreneurship skills, what are the ways to manage environmental systems, and finally, environmental-based policy and legislation practices with European approach and directives. It also reveals what kind of solutions have been produced in different countries. For this reason, the whole world, triggered by pandemics and extreme weather conditions, had to make plans to reduce carbon emissions, both locally and internationally, to limit the global temperature rise to 1.5 degrees. This is why the European Green Deal aims to stop climate change, regulate the use of resources and switch to a circular economy approach all over the world.

With the European Green Deal, the EU offers a roadmap that includes extremely important steps on climate change and tries to create an economic growth model and infrastructure based on a circular economy, focused on clean energy, efficient usage of energy and materials. This work, which was written in order to mainstream the Green Deal Action Plan for a more livable, clean and fair future within the framework of the principle of **"Leaving no one and nowhere behind"** and to make it understandable and applicable to all, aims to guide the spread of change starting with the actions of individuals.

Dr. Mehmet DUMAN
WALD Chairman of the Executive Board

WHAT IS THE EUROPEAN GREEN DEAL?

Ana-Maria STANCU

We are witnessing the terrible news on TV about forest fires, floods, extreme weather. These extreme events are due to the climate change and intense pollution of the humans. If we want to prevent this type of events and even worse ones, we need to reduce pollution.

These are some of the worrying data we have (European Environment Agency):

- carbon dioxide levels are predicted to double by the year of 2030 with Europe's temperature expected to increase by 2-3 °C in the summer season,
- Europe is responsible for nearly one third of the world's gas emissions that deplete the ozone,
- more than 50% of all surface area where ecosystems are in Europe are presented with threats from management problems and stresses,
- on average, 700,000 hectares of woodland are burnt annually by fires "often caused by socioeconomic factors" within the European Union, leading to the degradation of forests.

These are the main problems that the European Commission wants to address through a policy called European Green Deal. The aim of this set of policies is to make Europe climate neutral by 2050 (European Commission, 2019; Figure 1).

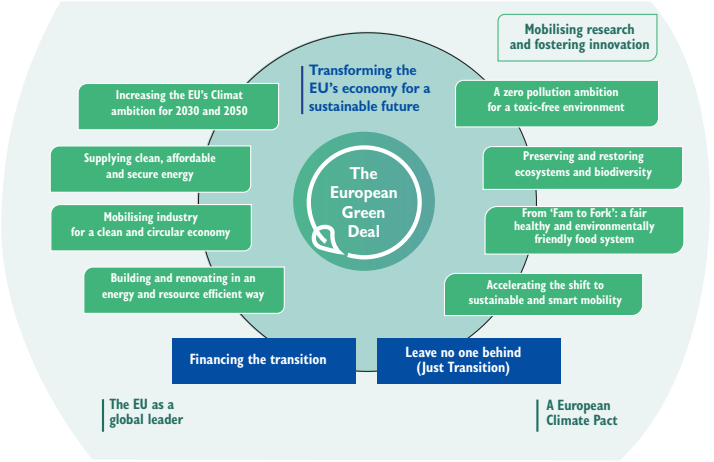


Figure 1. *The European Green Deal (European Commission, 2019).*

But what does "climate neutral" actually mean? According to United Nations Framework Convention on Climate Change "Climate neutrality refers to the idea of achieving net zero greenhouse gas emissions by balancing those emissions so they are equal (or less than) the emissions that get removed through the planet's natural absorption; in basic terms it means we reduce our emissions through climate action (United Nations Climate Change)". So, in order to stop the degrading of the Earth's climate, we need to stop polluting more than the planet can clean.

The European Commission's climate change strategy, which was launched in 2020, is focused on a promise to make Europe a net-zero emitter of greenhouse gases by 2050 and to encourage

economies to develop without increasing resource usage. The Green Deal has proposed also measures to ensure that nations that are already dependent on fossil fuels – which are more affordable - are not left behind in the transition to renewable energy.

It is also very important to mention that this is not only a European effort – it would make no sense for just one continent to reduce pollution – it is an effort of all nations and it is an integral part of the United Nation's 2030 Agenda and the sustainable development goals (UN DESA).

What are the main actions that the Green deal envisages?

- **Climate ambition**

The main goal and ambition of the European Green Deal, like we mentioned before, to reach climate neutrality by 2050 and this can be achieved by net-zero greenhouse gas emissions by 2050, which means a decrease of 50% - 55% of current gas emissions in Europe.

- **Clean, affordable and secure energy**

This action is related to the prioritization of energy efficiency, that means how we use energy, the use of renewable resources (solar, wind and other types of renewable energy), to secure an affordable EU energy supply and to have an integrated and interconnected EU energy market.

- **Industrial strategy for a clean and circular economy**

This action refers to the support and increase of the modern aspects of industries, influencing the exploration and creation of climate neutral circular economy friendly goods markets. This further entails the decarbonisation and modernisation of energy-intensive industries such as steel and cement.

- **Sustainable and smart mobility**

A reduction in emissions from transportation methods is another target area within the European Green Deal. The European Union would like to increase the adoption of sustainable and

alternative fuels in road, maritime and air transport and decrease the standard emissions of combustion-engine vehicles. For the urban are Smart traffic management systems and applications are envisioned.

- **Greening the Common Agricultural Policy/'Farm to Fork' Strategy**

The Farm to Fork strategy refers to a very simple aspect: to buy food as locally as possible and to make it as eco as possible. Some of the proposed measures refer to reducing the use of chemical pesticides, increasing the availability of health food options and aiding consumers to understand the health ratings of products and sustainable packaging.

This program includes the next targets:

- Making 25% of EU agriculture organic by the year 2030,
- Reduce by 50% the use of pesticides by the year 2030,
- Reduce the use of Fertilizers by 20% by the year 2030,
- Reduce nutrient loss by at least 50%,
- Reduce the use of antimicrobials in agriculture and antimicrobials in aquaculture by 50% by 2030,
- Create sustainable food labeling,
- Reduce food waste by 50% by 2030,
- Dedicate to R&I related to the issue €10 billion and
- Preserving and protecting biodiversity.

The main aspects of this target are the management of forests and maritime areas, environment protection and addressing the issue of losses of species and ecosystems. Another important aspect is the restoration of affected ecosystems which can take place by implementing organic farming methods, aiding pollination processes, restoring free flowing rivers and reducing pesticides that harm surrounding wildlife and reforestation. The EU Biodiversity Strategy for 2030 include the next targets:

- Protect 30% of the sea territory and 30% of the land territory especially primary forests and old-growth forests,
- Plant 3 billion trees by the year 2030,
- Restore at least 25,000 kilometers of rivers, so they will become free-flowing,
- Reduce the use of pesticides by 50% by the year 2030,
- Increase organic farming,
- Increase biodiversity in agriculture,
- Reverse the decline of pollinators,
- Give €20 billion per year to the issue and make it part of the business practice.

- **Towards a zero-pollution ambition for a toxic free environment**

The 'Zero Pollution Action Plan' that the European Commission aims to be adopted in 2021 intends to achieve no pollution from the air, water and soil by 2050. This refers mainly to industrial and agricultural industries, water management systems and micro-plastics.

- **Mainstreaming sustainability in all EU policies**

This action includes a Just Transition Mechanism, including a Just Transition Fund, initiatives to screen and benchmark green budgeting practices of the Member States and of the EU, align all new Commission initiatives in line with the objectives of the Green Deal and promote innovation and the Integration of the Sustainable Development Goals in the European Semester.

- **The EU as a global leader**

The European Union can become an example of good practice and a supporter and enhancer of the Sustainable development Goals and climate neutrality in the world.

ENVIRONMENTAL SUSTAINABILITY

Assoc. Prof. Efsun DİNDAR
Dr. Mehmet DUMAN

"The increasing scale of human activities relative to the biosphere is inflicting serious damage to the natural global environment."

One class of related environmental concerns includes global warming, ozone depletion, and loss of biodiversity, none of which are solvable without a widespread fundamental change in the structure of political, economic, religious, and cultural systems. Another class includes concerns that can be identified and defined as environmental problems to be solved or at least ameliorated through public policy and management efforts without basic systemic restructuring. Appropriate public policy and management responses to environmental problems are dependent on the quality of human thought. They involve complex considerations about ecology, goals, benefits, costs impacts, distributional effects, equity, implementation, and evaluation, among many other things. The quality of thought becomes relevant especially when the dimensions of the problems are not aligned with the way knowledge about these considerations is presented in institutions of learning.

Environmental sustainability is a concept based on a notion of ecosystem services – both renewable and non-renewable resources and waste absorptive capacity that provide benefits to

humans and thus improve their welfare. In order to enjoy and use the services throughout the ages, humanity must learn to live within the limitations of the biophysical environment. The discussion of environmental limits leads us to the edge of what traditional science may provide. Often, scientists and experts provide knowledge of what consequences might follow if certain limits are crossed, although the significance of such limits has to be determined by society at large.

A discussion of limits requires us to think about their implications in ways that transcend traditional disciplinary boundaries. Environmental sustainability, unlike the economic or social spheres, seems to be open for developing and using targets that are firmly rooted in the biophysical properties of the system. Scaling is an important issue here. Environmental limits represent a nested set of rather different constraints at the local through global levels (Dahl, 1999). At the local level, the challenge is to maintain the necessary quantity and quality of environmental resources that the community depends on. At the national level, the variety and diversity of local situations mean that some additional factors relevant to sustainability must be considered.

Climate change and developing countries

There is growing scientific evidence that global warming due to greenhouse gas emission is causing climate change at an alarming rate thereby posing a serious challenge to the social, economic, and ecological system across the globe. Existing and increasing concentrations of greenhouse gases seem likely to increase the mean and extreme air and ocean temperatures, rise in sea levels, changes in precipitation patterns, and increase in the intensity of extreme events. These changes are in turn likely to drive changes in the ecosystems upon which billions of people depend for their livelihoods and well-being. It is also hugely perceived that the poorest people in developing countries are going to be the worst affected as they are heavily dependent on climate-sensitive sectors.

Many scientific reports, in the last few years, have further contributed to this apprehension and observed climate change as one of the greatest threats in ensuring welfare in both developed and developing nations. Success in future environmental management in developing countries will rely heavily on improving the quality of the institutional arrangements through which social responses to problems are conducted. To successfully carry out effective environmental management programs, environmental decision-makers need to recognize and understand: (1) the basic dimensions and classification of environmental problems, (2) the different modes of environmental management, and (3) how to integrate these modes to effectively manage different types of environmental problems

Developing and Implementing an Environmental Management Program

In the conceptual design stages of developing and implementing an environmental management program, the first requirement is to recognize the inherent dimensions of the target environmental problem.

These basic dimensions can then be combined to form two classificatory attributes, (1) environmental complexity, and (2) political complexity.

In general, as the level of environmental and political complexities involved in an environmental problem increases, the jurisdiction should gradually shift to central authorities. Effective environmental management demands different institutional responses that are aligned with the corresponding type of environmental problem.

In turn, this puts a premium on the capacity of environmental managers to interpret the problem in a way that enables them to match problem dimensions with institutional responses. The appropriate place to start responding to an environmental problem involving high levels of environmental complexity

is with environmental planning. This enables information, scientific knowledge, and associated understanding of various disciplines to be integrated into environmental management practices.

The Integrative Management

The concept of integrative management represents Sustainable Development's SD's integrative view of aspects of social development, economic growth, and environmental protection. Integrating social, economic, and environmental concerns in planning and management for sustainable development has received considerable attention in recent years. It is believed that in order to achieve sustainability and ecological integrity, i.e. to preserve the natural capital stock, integrative and holistic management approaches are needed.

The Rio Declaration (UNCED, 1992) states that the protection of nature should form an integral part of the development process. Chapter 8 of Agenda 21 (UNCED, 1992) notes that the prevailing systems for decision-making in many countries tend to separate economic, social, and environmental factors at the policy, planning, and management levels, influencing the actions of all groups in society and affecting the efficiency and sustainability of development. Therefore, it proposed integrated systems of management to ensure that environmental, social, and economic factors are considered together in a framework for SD.

Four broad areas of work are identified: integrating environmental concerns and development at the policy, planning, and management levels; providing an effective legal and regulatory framework; making effective use of economic instruments and market and other incentives; and establishing systems for integrated environmental and economic accounting. It argues that an adjustment or even a fundamental reshaping of decision-making may be necessary in order to put the environment and development at the center of economic and political decision-making.

The integrative approach for achieving sustainability, according to Agenda 21, seeks to bring together all stakeholders. It argues that the responsibility for bringing about changes lies with governments in partnership with the private sector and local authorities, and in collaboration with national, regional, and international organizations. In addition, national plans, goals and objectives, national rules, regulations and law, and the specific situations in which different countries are placed are the overall frameworks in which such integration takes place.

Achieving Sustainable Development

Achieving sustainable development will require deep structural changes and new ways of working in all areas of economic, social, and political life. Economic growth patterns that actively favor the poor should be promoted. Fiscal policies that negatively affect the poor or promote environmental damage will need to be reformed. In the longer term, countries will want to ensure that their net wealth, including natural, man-made, and human capital, remains constant or increases. Innovation and investment in actions that promote sustainable development should be encouraged. Among other things, this will require the development of a market pricing structure in which prices reflect the full social and environmental costs of production and consumption.

Sustainable development, therefore, has important governance implications. At the national and local level, it requires cross-sectoral and participatory institutions and integrating mechanisms that can engage governments, civil society, and the private sector in developing shared visions, planning, and decision making.

Governments, corporations, and development cooperation agencies will also need to be more open and accountable for their actions. More generally, economic planning and policy making will have to become more participatory, prudent, and transparent, as well as longer-term so as to respect the interests of future generations. The difficulty of these challenges does

not mean they can be shirked. A strategy can offer a framework to organize and coordinate actions to address them. Codes of environmental behavior for businesses have also been developed in the 1990s, most notably, the Coalition for Environmentally Responsible Economies (CERES) principles. The CERES principles promote responsible economic activity for a safe, just, and sustainable future. In 1990 the International Chamber of Commerce also developed a set of 16 guiding principles known as the Business Charter for Sustainable Development or the Global Environmental Management Initiative (GEMI) Principles. Many empirical studies have also concluded that adopting environmental management does bring certain advantages for businesses.

Some studies illustrated that six critical elements are needed in order to create an effective proactive environmental management system. They suggest that a champion within the company is to assume responsibility for environmental issues. This environmental management champion must be a person with superior management skills and influence within the organization with the authority to allocate adequate resources to environmental management. He/she is likely to be a senior executive within the company. Proactive companies should also have environmental policies and strategies that reflect sound environmental goals. Furthermore, environmental goals and targets should be both clear and measurable. To ensure commitment to environmental policies, there is a need to decentralize environmental management. Everyone associated with the business must be involved in environmental management, including suppliers, customers, and employees. Training and education programs are thus essential for employees. An environmentally proactive company should also engage in monitoring, auditing, and reporting its environmental performance.

Achieving Environmental Excellence

Some studies emphasize that in order to manage change better, it is necessary to conduct assessments of environmental projects,

manage human resources; employees share the common vision and are empowered to act on it. They suggest that adequate training will also be needed for employees to avoid costly environmental mistakes and to increase environmental awareness. They also suggest that there is a need to hold managers accountable for environmental performance by linking merit systems to the achievement of environmental goals.

"Empowerment", "Education", "Efficiency" and "Excellence" were introduced as four key concepts: "Empowerment" recognizes the importance of leadership and the corporate vision in achieving environmental excellence. "Empowerment" comprises the involvement of employees in setting specific environmental goals to achieve the corporate environmental vision and the creation of "green" teams to implement environmental projects. "Education" consists of open communications and disclosure by the companies with their customers, suppliers, employees, regulators, and other stakeholders concerning environmental performance and practices. "Efficiency" recognizes the need for companies to improve their efficiency measures, which can be classified into three categories:

- **Pollution prevention**
- **Waste reduction**
- **Energy efficiency**

Total quality management (TQM) principles were merged with environmental management. The main underlying common concept for both TQM and environmental management is that both are trying to reduce waste. Zero defects mean zero waste. The importance of audits and benchmarking are also stressed under this concept. Welford (1994) suggests that for any company committed to improving its environmental performance, the starting point must be to make a clear statement of that commitment through an environmental policy.

Appropriate organizational structures must also be set up with clear lines of authority and communication channels.

All activities of the organization should be identified and documented. Environmental audits and reviews need to be carried out. The environmental impact of products must be evaluated via life cycle assessments.

Critical Factors of Environmental Management Explanation

Top Management Commitment to Environmental Management Setting an Environmental Vision or Corporate Policy.

An overall strategy was established to guide the company's effort to achieve the vision. Strategic planning by top-level management incorporates environmental inputs.

Environmental issues are being integrated into critical business functions and operations. Participation of top-level managers in environmental projects. Sufficient resources allocated to implement certain environmental projects.

Total Involvement of Employees

"Green" teams are being set up to tackle environmental problems. Employees are empowered to handle environmental problems and are actively involved in the process of determining environmental goals.

The company's suggestion schemes encourage employees to give suggestions on environmental performance improvement. Employees are recognized for their contribution to improving the environmental performance of the company. Performance evaluation is linked to the achievement of environmental objectives.

Training

Employees to be trained in skills that are required to fulfil their environmental responsibilities and achieve their environmental goals. Educate employees to increase their environmental awareness.

Environmental training scope and content should also be regularly reviewed and improved. Resources must also be allocated for training.

Green Product/Process Design

Design production processes and products in such a way that it minimizes adverse impact on the environment. Life cycle analysis is used to assess the environmental impact of products throughout the entire life span of the products. Products are redesigned to reduce the negative environmental impact. Production processes are examined to reduce the amount of waste, energy consumption, and emissions. Adopt a preventive approach and integrate environmental concerns into the product during its design phase. Recycling activities are carried out to ensure the full usage of resources.

Supplier Management

Environmental performance is used as one of the criteria when choosing a supplier. Environmental expectations of the company are communicated to the supplier. The company should educate the supplier with regard to environmental issues and involve suppliers during the product development phase. Environmental audits or certification programs are to be carried out by the firm on its suppliers.

Measurement

Objective measures were established to gauge the level of environmental performance. Life cycle cost assessment is used to estimate the cost of environmental impacts of a product. Environmental audits are carried out periodically to ensure in compliance with environmental rules.

Information management

Environmental information must satisfy four main criteria; timeliness, accessibility, accuracy, and relevance. An effective information management system is established to collect and maintain environmental information.

Challenges and Opportunities For The Environmental Performance in Developing Countries

Industrial environmental problems can be related to energy use, resource use, water and air pollution, waste generation, environmental risks, biodiversity, transport, and so forth. The severity of these environmental consequences may vary, depending on the technologies used in the industrial production processes, the organization and management of the production, the coordination of the various steps in the production-consumption chain (in terms of information flows, substance flows, management preferences, etc.), the regulatory regimes at various levels (from local to supra-national), and the reactions from citizens and consumers towards products and production. These environmental problems occur within the context of a rapidly changing world where technological innovations, new organizational and management approaches, globalizing production-consumption chains, increasing communication and information exchange possibilities, and changing power balances. These economic, political, and technological transitions provide new challenges but also new opportunities for the environmental performance in these countries. The export-oriented character of most Asian industries forces them, for example, to include the global environmental requirements for the industrial chains and their products, a pressure which may be expected to become more intense in the coming years.

At the same time, the social, political, economic, cultural, and geographic conditions and resources of each country are unique, contributing to important particular challenges and novel solutions. Variations in dynamics and conditions among Southeast Asian nations can be found at the national as well as at the local and sector levels.

At the same time, most of the small- and medium-sized enterprises need financial support and technological expertise to seriously tackle the resulting wide range of environmental problems, mainly caused by inefficient production processes and by the inability to adopt adequate environmental treatment measures.

Although sometimes rather simple organizational or technical measures, based on the principles of cleaner technology, could generate promising results in reducing pollution intensity at low or negligible costs, small and medium-sized enterprises are yet constrained in implementing them by various attitudinal, institutional, organizational, technical and economic barriers.

In general, government authorities and social organizations increasingly realize that effective environmental governance depends on transparency, accountability, and the availability of high-quality information concerning economic processes and related environmental effects.

Therefore, environmental concerns must be integrated across sectors and mainstreamed into economic policy and practice. Environmental protection must be considered an essential factor in the basic decision-making process of firms, households, and policy makers.

Thousands of enterprises across the EU are covered by the authorization scheme introduced by the Integrated Pollution Prevention and Control (IPPC) Directive. It aims to prevent, reduce and eliminate pollution at source, through the efficient use of natural resources and the establishment of an EU-wide integrated permitting system.

The IPPC Directive represents a departure from the traditional command and control approach towards a more integrated and flexible approach as it does not prescribe the technology to achieve the desired environmental outcome. Emissions reduction and environmental improvements are required, on the basis of what is achievable with the best techniques available in the individual industrial sectors falling within the scope of the Directive.

MAIN ENVIRONMENTAL ISSUES

Assoc. Prof. Efsun DİNDAR
Dr. Mehmet DUMAN

Young people's environmental views are typically conflicted, with little recognition of the links between environmental issues or between environmental responsibility and action. The purpose of this study was to clarify whether young people's understanding of the environment is in conflict or whether they are forming interconnections between issues, responsibility and action that have not yet been identified. The value of a unifying framework of environmental interconnectedness is particularly relevant for young people. Current literature indicates that this population struggles with a sense of confusion related to environmental information, frequently reporting many discrepancies in the way they think about environmental responsibility, environmental issues and environmental action (Boyes, Skamp, and Stannisstreet 2009; Levy and Zint 2013).

Air emissions

Air pollution has been recognized as a threat to human health since the time of Hippocrates, ca 400 BC (Fowler et al., 2020; Table 1). The growth of the world's population has been followed by the increase of the population living in urban areas, which very often results in additional pressures over space, ecosystems, infrastructures, facilities and the way of life. Domestic and

industrial sources, and mainly motorised traffic, are responsible for pollutant emissions and noise which decisively affect life in today's cities (OECD, 1995).

The main source of ambient air pollution is emissions from fossil fuel vehicles, and air pollution is generally worse in cities.

Urban air pollution became one of the main factors of degradation of the quality of life in cities, mainly in roadside areas. This problem tends to worsen due to the unbalanced development of urban spaces and the significant increase of mobility and road traffic. The quantitative evaluation of traffic noise levels and air pollutant concentrations is the basis upon which noise and air pollution control policies stand (Silva 2008).

Traffic-related air pollution has been linked to a range of negative health effects, including cardiovascular and respiratory diseases, lung cancer, dementia, diabetes, autism, and mental health disorders.

The main air pollutants of interest examined here are sulfur dioxide (SO2), nitrogen oxides (NOx), ammonia (NH3), volatile organic compounds (VOCs), primary particulate matter (PM), and their reaction products, including fine particulate matter (PM2.5) and tropospheric ozone (O3). Air pollution can have a disastrous effect on all components of the environment, including groundwater, soil, and air. Additionally, it poses a serious threat to living organisms.

Acid rain, global warming, the greenhouse effect, and climate changes have an important ecological impact on air pollution.

Table 1. Air pollution events (Fowler et al., 2020)

date	air pollution event
400 BCE	The relationship between air and health developed as an important part of the book *Airs, waters and places* attributed to Hippocrates
first century AD	Writers from imperial Rome, e.g. Seneca and Frontinus, refer to the probable health impacts of smoke
947–1279	Smoke and gaseous pollutants from coal burning identified as a problem in Central Asia by Al-Mas'ūdī (947) and in China during the Song Dynasty (960–1279)
1273	The Smoke Abatement Act, the earliest legislation in England, prohibits use of coal as it is 'prejudicial to health'
1610	*The Law of Nuisance (UK): William Aldred's pig farm* case
1661	John Evelyn published *Fumifugium or The Inconvenience of the Aer and Smoak of London*
seventeenth century	Harmful effects of air ascribed to various components, e.g. Kenelme Digby (acids), Nehemiah Grew (lead), John Evelyn (sulfur) and John Hall (antimony or mercury)
eighteenth century	Guillaume François Rouelle detects SO_2 by absorbing the gas in strong alkalis; Carl Wilhelm Scheele detects NH_3 via absorption with acids
1872	Robert Angus Smith publishes *Air and Rain: The Beginnings of a Chemical Climatology*, having undertaken the first multisite, multipollutant measurements
1878	The UK Royal Commission on Noxious Vapours
1894	The 'great horse manure crises' of London and New York
1905	Smoke Nuisance Acts in Bengal 1905
1952	The Great London Smog; 12 000 die in two weeks [1] Los Angeles smog, chemistry and effects described [2]
1956	The UK Clean Air Act
1960	Extensive local ecological damage by smelters (e.g. [3])
From 1967, air pollution problems are recognized as international issues	
1960s	Acid rain extensively described by Svante Oden
1972	United Nations Stockholm Conference confirms acid rain as an important international issue in Europe
1970s	Ground-level ozone threat to ecosystems identified in North America and Europe following earlier concerns of effects of the ozone on human health
1977	USA establishes its National Acid Deposition Program (NADP)
1979	UNECE Convention on Long Range Transport of Air Pollution (LRTAP) established
1980s	Forest decline recognized in Europe and North America
1985	Helsinki Protocol: Commitment to reduced SO_2 emissions by 30% (The 30% club)
1980s–1990s	Eutrophication of ecosystems by nitrogen deposition recognized
1991	Canada-USA Air Quality Agreement
1993	The 'Six Cities' study in North America re-focuses attention on the human health effects of air pollution PM_{10}
1995	Launch of the first satellite for passive remote sensing atmospheric composition (GOME) for global ozone monitoring [4]

(*Continued*.)

Table 1. Air pollution events (continued)

Table 1. (*Continued*.)

date	air pollution event
1999	The UNECE Gothenburg Protocol adopted to tackle multipollutant multieffects (acidity, ozone and eutrophication)
2000s	Emissions of SO_2 and NO_x in Asia increasingly dominate global emissions and adverse effects
2010	Widespread evidence of recovery from effects of acid deposition in Europe and North America with the decline in emissions of SO_2 and NO_x
2012	Beijing smog, 13th January, with concentrations of PM and SO_2 similar to London 1952
2015	Global SO_2 emissions reduced by 15% from the 1990 peak, while all other air pollutants still increasing
2018	Emissions of SO_2 and NO_2 declining rapidly in China
2018	Peak global NO_x emission? Global emissions of NH_3 and VOC continue to rise
2020	COVID-19: The global pandemic dramatically reduces emissions of industrial- and transport-related emissions of SO_2, NO_x, VOC and primary PM

1960s Acid rain

Acid rain is wet (rain, fog, snow) or dry (particulates and gas) precipitation containing toxic amounts of nitric and sulfuric acids. They are able to acidify the water and soil environments, damage trees and plantations, and even damage buildings and outdoor sculptures, constructions, and statues. Sulfur and nitrogen oxides are involved in the formation of acid rain and are harmful to plants and marine organisms. Table 2 provides links to this series of meetings which shows the developing global scale of air pollution issues through the latter decades of the twentieth century, beginning with acid rain.

Table 2. The series of international conferences on acid deposition showing the broadening of issues and scale from 1976 to 2016 (Fowler et al. 2020)

date	issue	location	reference to proceedings
1976	acid rain	Columbus, OH, USA	Dochinger & Seliga [67]
1980	acid rain	Sandefjord, Norway	Drabløs & Tollan [68]
1985	acid deposition, forest decline	Muskoka, Ontario, Canada	Martin [69]
1990	acid deposition, eutrophication, ozone	Glasgow, UK	Last [70]
1995	acid deposition, eutrophication, ozone, critical levels	Gothenburg, Sweden	Grennfelt [71]
2000	acid deposition, eutrophication, ozone, recovery	Tsukuba, Japan	Satake [72]
2005	acid deposition, eutrophication, ozone, recovery	Prague, Czech Republic	Brimblecombe *et al*. [73]
2011	acid deposition, eutrophication, ozone, recovery	Beijing, China	
2016	acid deposition, eutrophication, ozone, recovery	Rochester, NY, USA	Aherne *et al*. [74]

Air quality is understood as the levels of pollutants in the air and how these compare with permissible levels (Kuklinska et al., 2015). The key air pollutants are: particulate matters (PM2.5 and PM10), nitrogen oxides (NOX), sulphur dioxide (SO2), carbon monoxide (CO), and volatile organic compounds (VOCs). Table 3 summarises the sources of the different air pollutants and how these are formed (Hesketh et al., 2017).

Table 3. Air pollutants

Pollutant	Sources	More Information
Particulate matter (PM)	Transport (including exhaust fumes and tyre and brake wear), combustion, industrial processes, construction and demolition.	Harmful particulate matter are particles with a diameter of less than 2,5 and 10 micrometers (PM_{25} and PM_{10}).
Nitrogen Oxides (NO_x)	Transport and combustion.	NOx is the umbrella term for nitrogen oxides most relevant to air pollution, including nitrogen dioxide (NO_2) and nitric oxide (NO).
Sulphur Dioxide (SO_2)	Transport and combustion (especially coal).	
Carbon Monoxide (CO)	Transport (especially petrol-based), combustion and industry.	
Volatile Organic Compounds (VOCs)	Various, including transport and combustion.	VOCs are organic compounds which evaporate easily and react with other substances in the sunlight.
Ozone (O_3)		O forms when Volatile Organic Compounds (VOCs), hydrocarbons and NO react in sunlight.

Particulate matter (PM) is usually formed in the atmosphere as a result of chemical reactions between the different pollutants. The penetration of particles is closely dependent on their size (Wilson and Suh 1997) Particulate matter pollution includes particles with diameters of 10 micrometers (μm) or smaller, called PM_{10}, and extremely fine particles with diameters that are generally 2.5 micrometers (μm) and smaller. Particulate matter contains tiny liquid or solid droplets that can be inhaled and cause serious health effects.

Particles <10μm in diameter (PM_{10}) after inhalation can invade the lungs and even reach the bloodstream. Fine particles, $PM_{2.5}$, pose a greater risk to health. (Kelishadi and Poursafa 2010).

Ozone, as discussed previously, occurs both at ground level and in the upper level (stratosphere) of the Earth's atmosphere. Stratospheric ozone is protecting us from the Sun's harmful ultraviolet (UV) rays. In contrast, ground-level ozone is harmful to human health and is a pollutant. Unfortunately, stratospheric ozone is gradually damaged by ozone-depleting substances

(i.e., chemicals, pesticides, and aerosols). If this protecting stratospheric ozone layer is thinned, then UV radiation can reach our Earth, with harmful effects for human life (skin cancer) (Madronich and de Gruijl, 1993) and crops (Teramura 2006). In plants, ozone penetrates through the stomata, inducing them to close, which blocks CO_2 transfer and induces a reduction in photosynthesis. Ozone (O_3) is a gas formed from oxygen under high voltage electric discharge (Bezirtzoglou and Alexopoulos, 2009). It is a strong oxidant, 52% stronger than chlorine. It arises in the stratosphere, but it could also arise following chain reactions of photochemical smog in the troposphere (Villányi et al., 2010). Ozone can travel to distant areas from its initial source, moving with air masses. It is surprising that ozone levels over cities are low in contrast to the increased amounts occuring in urban areas, which could become harmful for cultures, forests, and vegetation (Lorenzini et al., 2003) as it is reducing carbon assimilation (Fares et al., 2013). Ozone reduces growth and yield and affects the plant microflora due to its antimicrobial capacity. Ozone increases DNA damage in epidermal keratinocytes and leads to impaired cellular function (McCarthy et al., 2013).

Carbon Monoxide (CO) Carbon monoxide is produced by fossil fuel when combustion is incomplete. The symptoms of poisoning due to inhaling carbon monoxide include headache, dizziness, weakness, nausea, vomiting, and, finally, loss of consciousness. Carbon monoxide affects the greenhouses gases that are tightly connected to global warming and climate. This should lead to an increase in soil and water temperatures, and extreme weather conditions or storms may occur (Emberson et al., 2018).

Nitrogen Oxide (NO_2) Nitrogen oxide is a traffic-related pollutant, as it is emitted from automobile motor engines (Richmont-Bryant et al., 2017). It is an irritant of the respiratory system as it penetrates deep in the lung, inducing respiratory diseases, coughing, wheezing, dyspnea, bronchospasm, and even pulmonary edema when inhaled at high levels. High levels of nitrogen dioxide are deleterious to crops and vegetation, as

they have been observed to reduce crop yield and plant growth efficiency. Moreover, NO_2 can reduce visibility and discolor fabrics (Chen et al., 2007).

Sulfur Dioxide (SO_2) Sulfur dioxide is a harmful gas that is emitted mainly from fossil fuel consumption or industrial activities. The annual standard for SO_2 is 0.03 ppm (EPA 2019). It affects human, animal, and plant life. Susceptible people as those with lung disease, old people, and children, who present a higher risk of damage. Environmental adverse effects, such as acidification of soil and acid rain, seem to be associated with sulfur dioxide emissions (WHO, 2000).

Volatile Organic Compounds (VOCs) Volatile organic compounds (VOCs), such as toluene, benzene, ethylbenzene, and xylene, have been found to be associated with cancer in humans.

Air pollutants can be reduced by using a wide range of air pollution control devices in order to prevent their adverse effects of to the environment and human health. Many technological applications serve this purpose. Incinerators, gravitational settling chambers, electrostatic precipitators, cyclone separators, selective catalytic reduction systems, fabric filters, biofilters, and scrubbers are the main air pollution prevention technologies. The decision of the suitable control devices depends on the type of air pollutants and condition at the sources. If the amount of pollutants emitted to the atmosphere is decreased, the atmospheric concentrations of the pollutants will also decrease.

Wastewater

Wastewater is the polluted form of water generated from rainwater runoff and human activities. Wastewater is affected by domestic, industrial and commercial use, thus constantly changing its composition and making it rather difficult to define. (Figure 2).

The composition of wastewater is %99.9 water and the remaining %0.1 is what is removed. This %0.1 contains organic matter, microorganisms and inorganic compounds. Wastewater effluents are released to a variety of environments, such as lakes, ponds, streams, rivers, estuaries and oceans. Wastewater also includes storm runoff, as harmful substances wash off roads, parking lots and rooftops.

Domestic wastewater originates from activities such as restroom usage, bathing, food preparation and laundry. Commercial wastewater from non-domestic sources, such as beauty salons or auto body repair shops, for example. This wastewater may contain hazardous materials and requires special treatment or disposal. Industrial wastewater originates from industrial or commercial manufacturing processes, such as agriculture, and are usually more difficult to treat than domestic wastes. Industrial wastewater's composition varies on an industry-by-industry basis.

***Figure 2**. Wastewater (untreated water) discharge*

Industrial wastewater usually contains specific and readily identifiable chemical compounds, depending on the nature of

the industrial process. The organic content of wastewater is made up of human feces, protein, fat, vegetable and sugar material from food preparation, as well as soaps. Naturally occurring soil and water bacteria eat the organic waste in wastewater and use it as a food and energy source to grow rapidly. In a natural water environment where there is plenty of oxygen dissolved in the water, aerobic bacteria eat the organic material and form a slime of new bacterial cells and dissolved salt-waste products.

We need to remove the wastewater pollutants to protect the environment and protect public health. When water is used by our society, the water becomes contaminated with pollutants. If left untreated, these pollutants would negatively affect our water environment. For example, organic matter can cause oxygen depletion in lakes, rivers, and streams. This biological decomposition of organics could result in fish kills and/or foul odors. Waterborne diseases are also eliminated through proper wastewater treatment. Additionally, there are many pollutants that could exhibit toxic effects on aquatic life and the public health.

The treatment of wastewater is accomplished by four basic methods or techniques; physical, mechanical, biological and chemical (Figure 3). Physical methods of treatment include the use of tanks and other structures designed to contain and control the flow of wastewater to promote the removal of contaminants. Mechanical treatment techniques involve the use of machines, both simple and complex in design and operation. The action of bacteria and other micro-organisms are biological methods of treatment, which play a vital role in the removal of pollutants which cannot be effectively achieved by other means. Chemical treatment methods enhance the efficiency of other process operations and provide specialized treatment as a result of their addition at various treatment stages.

Figure 3. *Wastewater treatment plant*

Wastewater Reuse

Wastewater reuse is a solution for the future to combat water scarcity. Water reuse can provide alternatives to existing water supplies and be used to enhance water security, sustainability, and resilience (EPA 2021, https://www.epa.gov/waterreuse/basic information-about-water-reuse). After treatment, wastewater can be used for a variety of applications including watering green spaces and golf courses, crop irrigation, fire-fighting and street cleaning, or it can be used to recharge aquifers (Figure 4). A combination of water stress, fast-growing populations and the climate emergency means many countries struggle to provide their people with sufficient clean water. Recycled wastewater is the only resource that increases in step with economic growth. It is a virtuous solution that protects nature by limiting the risks of pollution discharges into the environment. It is a circular economy model that strengthens countries' water self-sufficiency by giving them access to a reliable resource located within their territory, and therefore protected from adventurous neighbors.

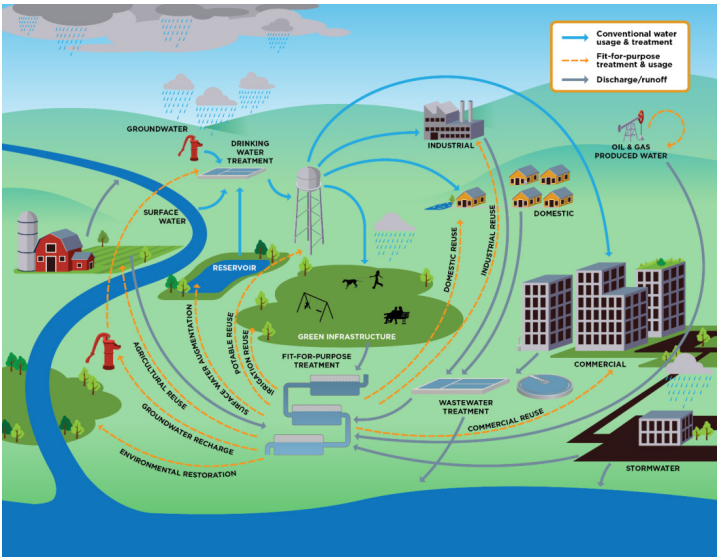


Figure 4. *Examples of water sources and use applications (EPA, 2021)*

Solid Waste

Solid waste is generated from industrial, residential, and commercial activities in a given area, and may be handled in a variety of ways. Waste can be categorized based on material, such as plastic, paper, glass, metal, and organic waste. Categorization may also be based on hazard potential, including radioactive, flammable, infectious, toxic, or non-toxic wastes. Categories may also pertain to the origin of the waste, whether industrial, domestic, commercial, institutional, or construction and demolition (Table 4). Waste composition is closely related to the socio-economic structure level of the region that wastes are comprised.

Table 4. Sources and Types of Solid Wastes

Source	Typical waste generators	Types of solid wastes
Residen-tial	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g., bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes.).
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plants.	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes.
Commercial	Stores, hotels, restaurants, markets, office buildings, etc.	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes.
Institutional	Schools, hospitals, prisons, government centers.	Same as commer-cial.
Construction and demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, etc.

Municipal services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants.	Street sweepings; landscape and tree trimmings; general wastes from parks, beaches, and other recreational areas; sludge.
Process (manufacturing, etc.)	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing.	Industrial process wastes, scrap materials, off-specification products, slay, tailings.
Agriculture	Crops, orchards, vineyards, dairies, feedlots, farms.	Spoiled food wastes, agricultural wastes, hazardous wastes (e.g., pesticides).

Solid waste management is defined as the discipline associated with control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economic, aesthetic, engineering, and other environmental considerations (Muşdal, 2007).

Solid waste management includes planning, administrative, financial, engineering, and legal functions. Solutions might include complex inter-disciplinary relations among fields such as public health, city and regional planning, political science, geography, sociology, economics, communication and conservation, demography, engineering, and material sciences.

Waste management includes the incorporation of a hierarchy of waste management practices in the development of waste management plans (Figure 5).

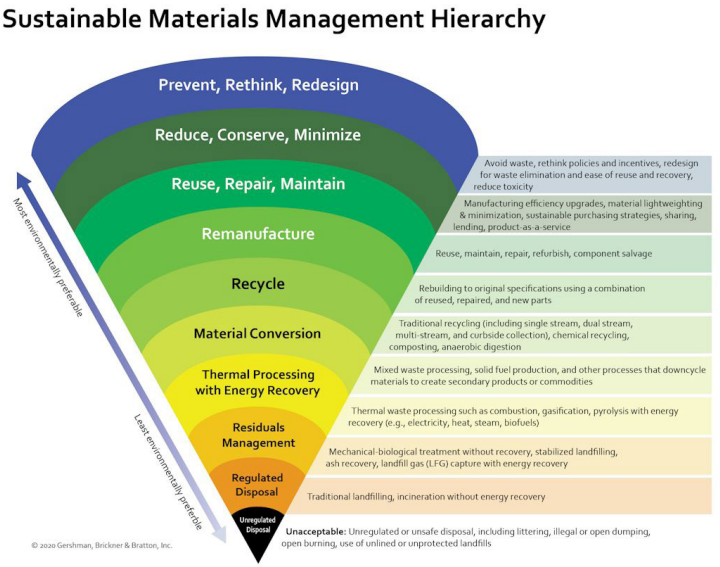


Figure 5. *Sustainable Waste Management Hierarchy*

3R: Reduce, Reuse, Recyle

Generally, the waste hierarchy refers to the "3 Rs" Reduce, Reuse and Recycle, which classify waste management strategies according to their desirability in terms of waste minimization. (Ahammad Sharif et al., 2017).

-Waste recycling: In instances where source reduction is not technically and economically feasible, recycling methods must be considered. Recycling involves the conversion of wastes into usable materials and/or extraction of energy or materials from wastes. Recycling may also involve the use or reuse of a waste as a substitute for a commercial product, or as feedstock in an industrial process. Recycle helps to preserve of raw materials and reduces the amount of material that requires disposals.

-Waste reuse or recovery: The use of materials or products that is reusable in their original form such as oily wastes for road

construction and stabilization and burning waste oil for energy lessens the quantity of the waste released into the environment. If feasible, drilling fluid may be reused in another drilling project. The result of this is a significant cost savings and highly reduced waste management concerns. If reuse within a company is not feasible, there are several companies that take waste drilling fluids for reconditioning and reuse. This also has an economic benefit in that; materials that are to be disposed at a cost may be reused for extra income.

Zero Waste

Zero waste is a goal defined as waste management philosophy that involves preventing the wastage, using the resources more efficient, reviewing the reasons for waste formation, preventing or minimizing waste formation, and collecting and recovering waste at source separately.

According to the EPA, only around 30% of the US waste stream is recycled and around 140 million tons of waste is sent to landfill each year. When it comes to single-use plastics only around 9% are recycled.

Landfills cannot continue to hold our waste, they are not only harmful to the environment, but they also release CO_2, methane, hydrogen sulfide, and other harmful gasses. Additionally, leachate from landfills enters our groundwater and pollutes farmland and drinking water.

In practical terms, Zero Waste has 5 overarching strategies:

1. The goal to end waste disposal in dumps, landfills and incinerators
2. Industrial responsibility and redesign of products
3. Taking consumption patterns within ecological limits
4. Developing systems and infrastructure to recover resources at their highest and best use
5. Ensuring social and environmental justice, respecting and engaging all sectors that form the resources ecosystem

A Zero waste strategy may be applied to businesses, communities, industrial sectors, schools and homes. When designing and implementing Zero Waste plans at local level, municipalities must respect and engage all actors that form the waste ecosystem, including communities, formal and informal workers.

Energy Consumption

The environmental problems directly related to energy production and consumption include air pollution, climate change, water pollution, thermal pollution, and solid waste disposal.

Energy is essential for economic and social development andimproved quality of life in all countries. Energy is defined as the ability to do work and it can be found in different forms such as chemical, thermal, electricity, mechanical, gravitational, nuclear, radiant, sound, and motion. Energy can be stored, converted and/or amplified depending on the application. Energy sources can be fossil (petroleum, coal, betumes, natural gas, shale oil, etc.), renewable (alternative) (biomass, hydro, wind, solar, geothermal, marine, hydro-gen, etc.) and fissile (uranium, thorium, etc.) The increases in economical growth of the developing countries in the last decades have caused rapid increase in energy consumption.

Most electricity generation in many countries today takes place in thermal power plants, which burn either fossil fuels like coal and natural gas, biofuels, or nuclear fuel in order to heat water and produce steam. The steam spins a turbine to produce electricity, which is then fed into the utility grid. When we burn fossil fuels for electricity, we also produce greenhouse gas emissions that contribute to climate change. As you improve the energy efficiency of your home, you need less electricity and thus rely less on carbon-intensive power plants. This reduces your home's demand from the plant, which in turn benefits the environment by reducing their carbon dioxide emissions (Panwara et al., 2011).

Energy efficiency contributes to cleaner production, reduction in carbon dioxide emission, reduction in ecological footprint, sustainable development, reduce energy poverty and increase access to quality energy.

Energy efficiency can be improved by three different approaches as follow:

1. Energy savings by management
2. Energy saving by technologies
3. Energy saving by policies/regulations

The following are a group of possible impact of energy efficiency on the populations and on the environment:

- Health and well-being impacts: This mainly relates to the public health improvements observed as a result of improved heating and cooling of buildings and air quality from more efficient transport and power generation and less demand for both.

- Poverty alleviation: Energy affordability and access: As energy demand and bills are reduced for the poor, these households have the ability to acquire more and better energy services, as well as free up income to spend on satisfying other critical needs. In addition, as utilities (notably in developing countries) improve their supply-side efficiency, they can provide more electricity to more households, thereby supporting increased access initiatives which is often an important stated objective of supply-side energy efficiency activities in developing countries.

- Increased disposable income: Across all income levels, when energy efficiency improves, reduced energy bills provide increased disposable income for households, individuals, and enterprises. The effect of increased spending and investment can in turn result in positive macroeconomic effects.

- Industrial productivity and competitiveness: Benefits for industrial firms from improvements in energy efficiency

improvements include reductions in resource use and pollution, improved production and capacity utilization, and less operating and maintenance, which leads to improved productivity and competitiveness.

- Energy provider and infrastructure benefits: Improved energy efficiency can help energy providers provide better energy services for their customers, reducing operating costs and improving profit margins.

- Increased asset values: There is evidence that investors are willing to pay a rental and sales premium for property with better energy performance. Some values of this premium have been estimated for commercial property.

- Job creation: Investment in energy efficiency and the increased disposable income can lead to direct and indirect job creation in energy and other sectors. This makes energy efficiency important part of governments' green growth strategies.

- Reduced energy-related public expenditures: The public budgetary position can be improved through lower expenditures on energy in the public sector (including by government agencies on energy consumption and state-owned utilities on fuel purchases). In countries where fuels are imported there is a related likely positive impact on currency reserves, and in energy-exporting countries domestic energy efficiency can free up more fuels for export. In addition, for countries with energy consumption subsidies, reduced consumption means lowered government budgetary outlays to finance these subsidies.

- Energy security: Improvements in energy efficiency leading to reduced demand for energy can improve the security of energy systems across the four dimensions of risk: fuel availability (geological), accessibility (geopolitical), affordability (economic) and acceptability (environmental and social).

- Macroeconomic effects: Energy efficiency can have positive macroeconomic impacts, including increases in GDP, and the cumulative benefits of the above-mentioned impacts of improved trade balance (for fuel importing countries), national

competitiveness, and employment support. These are mainly indirect effects resulting from increased consumer spending and economy-wide investment in energy efficiency, as well as from lower energy expenditures.

• Reduced GHG emissions: Greenhouse gas (GHG) emissions are reduced when energy efficiency improvements result in reduced demand for fossil fuel energy. Many climate change mitigation strategies put energy efficiency measures at their core as the most cost-effective way to reduce greenhouse gas emissions.

• Moderating energy prices: If energy demand is reduced significantly across several markets, energy prices can be reduced, particularly relative to the impact of the counter-factual of increased energy demand. This can have implications on economic competitiveness of countries, and, for individuals across borders, improves the affordability of energy services and the availability of resources for other expenditures.

• Natural resource management: At an aggregated international level, less demand can reduce pressure on resources, with potential beneficial impacts on prices (at least for importing countries), as well as overall resource management. For example, in the context of peak oil and related supply constraints, energy efficiency can help to relieve pressure on a scarce resource. Similarly, expanding demand for oil etc., is pushing industry to increasingly challenging contexts for extraction (such as deep off-shore and shale oil extraction), with related incremental investment costs and technological and environmental uncertainties.

• Development goals: Improved energy efficiency is important in achieving economic and social goals in developing countries, including improved access to energy services, eradicating poverty, improving environmental sustainability, and economic development. Advancing development in these countries in a sustainable way is a shared international goal with benefits for developing countries themselves and for OECD countries alike.

Renewable Energy

Renewable energy, often referred to as clean energy, comes from natural sources or processes that are constantly replenished. Renewable energy resources will play an important role in the world's future. The energy resources have been split into three categories: fossil fuels, renewable resources and nuclear resources. Renewable energy sources are those resources which can be used to produce energy again and again, e.g. solar energy, wind energy, biomass energy, etc. and are also often called alternative sources of energy. Renewable energy sources that meet domestic energy requirements have the potential to provide energy services with zero or almost zero emissions of both air pollutants and greenhouse gases. (Rathore and Panwar, 2007).

Solar energy: Solar energy is a very important energy source because of its advantages. There are many remote areas in the world where electricity is not available, but solar irradiation is plentiful, thus the utilization of solar energy to produce electricity in these areas is quite possible. Solar thermal electricity power system is a device which utilize the solar radiation for the generation of electricity through the solar thermal conversion; basically collected solar energy is converted to electricity through the use of some sort of heat to electricity conversion device (Kumar and Kandpal, 2005).

Wind energy: Of the renewable energy technologies applied to electricity generation, wind energy ranks second only to hydroelectric in terms of installed capacity and is experiencing rapid growth. India is one of the most promising countries for wind power development in the world. Expansion of wind energy installed capacity is poised to play a key role in climate change mitigation. However, wind energy is also susceptible to global climate change. Some changes associated with climate evolution will most likely benefit the wind energy industry while other changes may negatively impact wind energy developments, with such 'gains and losses' depending on the region under consideration. Wind power may prove practical for small power

needs in isolated sites, but for maximum flexibility, it should be used in conjunction with other methods of power generation to ensure continuit (Pryor and Barthelmie, 2010).

Biomass energy: Bioenergy is a renewable energy derived from biomass. Biomass is organic matter that comes from recently living plants and organisms. There are various methods used to generate energy through the use of biomass. This can be done by burning biomass, or harnessing methane gas which is produced by the natural decomposition of organic materials in ponds or even landfills. The use of biomass in energy production creates carbon dioxide that is put into the air, but the regeneration of plants consumes the same amount of carbon dioxide, which is said to create a balanced atmosphere.

Other Issues

Soil pollution: Soil is an important component of the biosphere where all the three components lithosphere, hydrosphere and atmosphere interface. Hence disturbing any component of the biosphere affects the other components severely because of the interlinking of different ecological functions operating within. A range of chemical substances is liberated into the environment by the activities of human at global level and can be seen ubiquitously including in soil system. Anthropogenic activities leading to soil pollution have severe impacts on the quality of living organisms ranging from impairment of functional quality to complete elimination of a species in most severe cases (Jayanta et al., 2017).

Soils contaminated from water or air and by artificially applied toxic substances from pesticides, as well as mineral fertilizers, accumulate toxic elements, including heavy metals, having an extremely adverse impact on the living organisms (Figure 6).

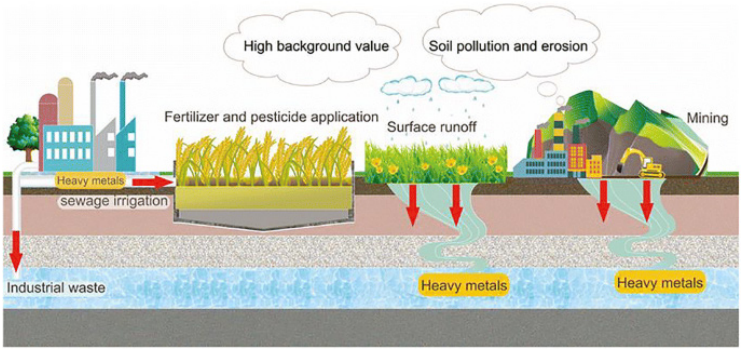


Figure 6. *Soil Heavy Metal Pollution (Zhang and Wang 2020)*

High intensity input of agricultural chemicals was an important cause of large area pollution of cultivated soil (Dong et al 2020). Most studies have indicated that due to the inherent characteristics of the soil, it has a strong buffer capacity, so the impact of fertilizers and pesticides on the soil was not immediately visible. Residual pesticides will remain in plants, soil, air, and water, causing environmental pollution. The most direct impact of pesticide residues on agricultural production (agriculture, forestry, animal husbandry, and fishery) was to cause financial losses, indirect effect was the pollution of the environment, which was transferred to us through the enrichment of the food chain, thus causing harm to human health (Bigalke et al 2017).

Furthermore, improper use of chemical fertilizers and pesticides will also affect the activities of soil microorganisms, reduce the organic matter of soil, change the soil structure, resulting in soil acidification, thus reducing the porosity of soil moisture, making crops short of bad growth, low yield (Shuo et al. 2019).

Enviromental noise: Noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms. According to the World Health Organization, sound levels less than 70 dB are not damaging to living organisms, regardless of how long or

consistent the exposure is. Exposure for more than 8 hours to constant noise beyond 85 dB may be hazardous. If you work for 8 hours daily in close proximity to a busy road or highway, you are very likely exposed to traffic noise pollution around 85dB.

Environmental noise pollution, a form of air pollution, is a threat to health and well-being. It is more severe and widespread than ever before, and it will continue to increase in magnitude and severity because of population growth, urbanization, and the associated growth in the use of increasingly powerful, varied, and highly mobile sources of noise (Jariwala et al., 2017). The potential health effects of noise pollution are numerous, pervasive, persistent, medically and socially significant. Noise produces direct and cumulative adverse effects that impair health and that degrade residential, social and working environment with corresponding real (economic) and intangible (well-being) losses. Noise represents an important public health problem that can lead to hearing loss, sleep disruption, cardiovascular disease, social handicaps, reduced productivity, negative social behaviour, annoyance reactions, absenteeism and accidents (Singh and Davar 2004).

Environmental noise and in particular road traffic noise, remains a major environmental problem affecting the health and well-being of millions of people in Europe. Twenty percent of Europe's population are exposed to long-term noise levels that are harmful to their health. That corresponds to more than 100 million people within Europe.

Odor Pollution: Environmental odor pollution problems generate a significant fraction of the publicly initiated complaints received by air pollution control districts. Such complaints can trigger a variety of enforcement activities under existing state and local statutes. Noxious environmental odors may trigger symptoms by a variety of physiologic mechanisms, including exacerbation of underlying medical conditions, innate odor aversions, aversive conditioning phenomena, stress-induced illness, and possible pheromonal reactions.

Radioactive Pollution: Radiation is the emission of particle or energy in wave form. This is stated as electromagnetic radiation. Examples consist of: visible light, radio waves, microwaves, infrared and ultraviolet lights, X-rays, and gamma-rays (Tabatabaei, 2012). Radiation can be described as two basic types, ionizing and non-ionizing radiation. Radioactive substance can penetrate into the body by inhalation, ingestion or dermal absorption. In addition, gamma radiation external to the body can enter the skin and produce a dose various tissues (Kwan-Hoong 2003). Non ionizing radiation refers to radioactive energy which as opposed to produce charged ions when passing through matters has enough energy only for excitation. However it is known to cause biological effects. Non ionizing radiations usually work together with tissue through the generation of heat. The hazard depends on the ability to go through the human body and the absorption characteristics of different tissues (Mathew et al., 2012). If each and every one of these types of radiation added by human activities can cause radiation pollution. The meaning of radiation pollution is that while there are omnipresent sources of radiation, generally the highenergy radiations cause radiation pollution with a serious health risk (such as cancer or death).

Ecological light pollution: Light pollution is one of the most rapidly increasing types of environmental degradation. Ecological light pollution has demonstrable effects on the behavioral and population ecology of organisms in natural settings. As a whole, these effects derive from changes in orientation, disorientation, or misorientation, and attraction or repulsion from the altered light environment, which in turn may affect foraging, reproduction, migration, and communication.

ENVIRONMENTAL LEGISLATION

Dr. Ionica ONCIOIU
Nelu NEACSU

The European Union Environmental Legislation

One of the major challenges of our time, sustainability also implies the need for future-oriented thinking and action. Without anticipating the future, taking into account the range of potential human impact in the form of, for example, nature consumption, climate change or social division, there is no greater risk to people than themselves - people nowadays do not have to choose rather than take responsibility for the future in their own survival interests.

The basic need for sustainable development has thus become clear and calls for appropriate environmental legislation. It is now necessary at a European level to outline the modalities available for achieving this development strategy, on the basis of which global context changes should be made, which factors should make global social cooperation work and which key actors should play a role.

Since the late 1980s, key areas of national environmental law have shifted to European Community law. EC legislation has thus become part of (extended) domestic policy. From 1988, 80% of all regulations in the field of commercial law were

provided for by EC and almost 50% of laws were based on EC law. In particular, the EC is increasingly implementing environmental procedural law, which is heavily involved in general administrative law and requires considerable changes to the system.

The importance of EC environmental legislation and its impact on other areas of law can be seen in recent examples such as the EIA guidelines, the Organic Audit Regulation, and the Access to Information Policy, which has become increasingly clear.

In this context, the "Commission Communication on the implementation of Community environmental legislation" of October 1996 and the related Council Resolution on the formulation, implementation and enforcement of Community environmental legislation of July 1997 play an important role. The Commission sees in particular 3 new areas of action:

- improving enforcement controls: the Commission is considering developing recommendations for criteria for uniform enforcement controls,
- verification of the activity of environmental authorities: the Commission envisages the introduction of a general right of appeal against the decisions of environmental authorities,
- finally, when it comes to access to courts: the Commission is considering an extension of the right of access, in particular for associations in national courts.

It therefore follows that the EC places particular emphasis on the implementation of a common environmental administrative procedural law.

Administrative authorization for environmental protection

Emerging challenges, such as resource efficiency and sustainability, biodiversity protection, climate change and the risks of accidents and disasters, have become much more important in policy formulation, leading the EU to strengthen its environmental impact assessment procedure. At the same time,

Europe 2020 - The European Economic Growth Strategy aims to eliminate the shortcoming of the European economic model and achieve favourable conditions for smarter, more sustainable and inclusive growth. The EU aims to achieve ambitious energy and climate change goals by 2020: a 20% reduction in greenhouse gas emissions, a 20% increase in the share of energy from renewable sources in final energy consumption, and 20% increase in energy efficiency.

As a result, the development of environmental impact assessment at European level is a "cross-cutting tool". The administrative procedures for approving a project provided for in various specialized laws are based on this common instrument. This means that a regulation of Community law on environmental impact assessment intervenes in broad areas of national environmental material and procedural legislation.

These areas are now largely beyond the control of the Member States. It documents the growing influence of Community law on parts of national law which have hitherto remained untouched. This influence applies both in breadth and in depth it covers additional areas of application and, at the same time, aims at a particularly intense regulation, which also regulates the details of procedural law.

By extending the scope of environmental impact assessment, Community law now includes the approval and planning procedure for almost all projects of some relevance to the environment. The implementation of the environmental impact assessment for the project changes will be of particular practical importance.

Further development of the environmental impact assessment is also carried out through ongoing Community law procedures informing the Commission and monitoring by the Commission and the European Court of Justice. These procedures have two functions: on the one hand, they serve to inform the Commission of national enforcement practices, and on the other hand, they can prepare the possible action of the Commission under Article 169 of the EC Treaty against a Member State for an infringement community.

Regarding the European norms on environmental impact assessment, an important moment was the adoption of Directive 85/337/ECC. It updates the environmental protection rules, requiring the initiators of public and private projects to carry out a thorough assessment of the impact that their projects could have on the environment before they receive approval.

In recent years, a number of complaint proceedings have been pursued by the Commission as "infringement proceedings". Thus, the case law of the European Court of Justice has a considerable influence on national law. This also applies to the case law of the European Court of Justice against other Member States. For example, two judgments of the European Court of Justice against Belgium and the Netherlands in recent years are of considerable importance for understanding Annex II to Directive

85/337/ECC and setting thresholds for determining the environmental impact assessment obligation under Directive 2014/52/EU on Environmental Impact Assessment (EIA). Therefore, the criteria and thresholds are intended to facilitate the examination of the current characteristics of a given project in order to determine whether or not it is subject to the requirement to carry out an environmental impact assessment.

Although the amendment did not change the categories of projects in Annexes I and II to Directive 2014/52/EU, it introduced changes aimed at better environmental protection, while reducing the administrative burdens resulting from EU law, in accordance with the aim of the European Commission for smarter regulation. However, the 2014 amendment brought about changes in the framework, but retained the approach to determining thresholds and assessing the effects of projects. First, the amendment provides that classification decisions (both 'positive' and 'negative') will be justified and mentions the main reasons why the assessment is necessary or not.

Following the analysis of the application and effectiveness of the Environmental Impact Assessment Directive, the Commission

noted that in theory there is no overlap with Directive 2001/42/EC on the assessment of the effects of certain plans and programs on the environment Directive on Strategic Environmental Assessment or (SEA). However, different areas of possible overlap in the application of the two directives have been identified.

Different approaches have been chosen by Member States in dealing with the possible inefficiency resulting from the overlapping of procedures. However, several Member States often consider that they do not have sufficient experience in properly identifying and assessing overlap issues. That is why few Member States have recommended strengthening the two directives. Many Member States emphasized that each process will be maintained and differentiated because these are complementary procedures that address different stages and processes. Member States also requested the submission of guidance documents.

In addition, according to Directive 2001/42/EC on Strategic Environmental Assessment (SEA), an additional assessment at the level of planning for spatial planning plans and programs, as well as the fields of transport, energy, waste management, water management, industry, telecommunications and tourism will significantly change the planning process.

Last but not least, it should be noted that Article 11 of the SEA Directive emphasizes that the assessment under the SEA Directive is without prejudice to the requirements of the EIA Directive and other requirements of Union law. Therefore, in order to comply with the law, Member States must ensure that they comply with the requirements of both Directives when both apply.

The required environmental assessment must be carried out before the relevant competent authority decides on a plan / program or presents the draft plan/program in the legislative decision-making process. The environmental test requires an environmental statement by the competent authority, in which the significant effects of the plan/program on the environment

must be presented and assessed in detail. The responsible authority must involve the environmental authorities in the preparatory work for the preparation of the environmental statement. The draft environmental statement must then be made available to the environmental authorities and the public concerned for comments. Traditionally, this area is very different in each Member State - depending on the understanding of the state.

In 1996, the European Union adopted a general framework for integrated pollution prevention and control (Integrated Pollution Prevention and Control Directive 96/61/EC - IPPC) which provides for the necessary measures for the implementation of integrated pollution prevention and control to achieve a high level of protection of the environment as a whole. The objective of Directive 96/61/EC - IPPC is to achieve an integrated system for the prevention and control of pollution from the activities specified in Annex I of the IPPC Directive.

Techniques: refer to the technology used and to the way in which the installation is designed, built, maintained, operated, as well as to its decommissioning and, as the case may be, the remediation of the site,

- Available techniques: those techniques that have registered a stage of development that allows their application in the respective industrial sector, in viable economic and technical conditions, taking into account the costs and benefits, regardless of whether or not these techniques are performed or used at national level, provided that they are accessible to the operator under acceptable conditions,

- The best techniques: the most efficient techniques for achieving an overall high level of environmental protection as a whole.

The IPPC Directive allows the competent public authorities responsible for issuing the integrated environmental permit to take into account when determining the permit conditions: (a) the technical characteristics of the installation, (b) its geographical

location and (c) the local environmental conditions. In addition to the exchange of information, the IPPC Directive promotes public access to information, public participation and access to justice, in connection with the procedure for issuing the integrated environmental permit.

The public has the right to participate in the environmental decision-making process, and to be informed of the consequences of environmental decisions and has access to: (a) requests for integrated environmental permits to express their views; (b) the results of emission monitoring; or (c) the Register of Emitted and Transferred Pollutants (EPER).

It should be noted that the main responsibility for the effective implementation of the requirements of the Industrial Emissions Directive lies with the competent national authorities. Their tasks include issuing permits, assessing the appropriate emission limit values and other conditions, examining applications for exemption and, in general, ensuring that installations are operated correctly. The Commission shall support these authorities so as to ensure comparable, harmonized approaches at national level in accordance with the law.

The Industrial Emissions Directive also creates rights for affected parties to challenge permit conditions and request unannounced environmental inspections. This approach has the potential to mobilize thousands of people to oversee the operation of the legislation.

The Commission considers that national administrative or judicial bodies are primarily responsible for verifying specific non-compliance situations and have the appropriate means to deal with them, if the concerns expressed are considered justified. The Commission would intervene mainly in the event of systemic deficiencies or where infringements have a very significant impact on the environment.

Waste Management European Union Directive 2008/98/EC

The concept of circularity is closely related to the efficiency of the

use of natural resources at system level, respectively throughout the entire product life cycle, as well as to the transformation of waste into new resources for other industries. In this respect, the Waste Framework Directive 2008/98/EC sets out, inter alia, the so-called "waste hierarchy" (in Article 4), as well as the criteria for defining by-products (in Article 5), important aspects in promoting circularity and revaluation in the market of new products resulting from waste processing.

In October 2008, the EU adopted a new Simplified Waste Directive, which at the same time set targets for Member States. Targets are mandatory for all Member States, but accession negotiations included transition periods for the new Member States to allow sufficient time for implementation. However, the question now is whether the transition periods were realistic as the first deadlines approach and even countries that have joined the EU earlier and are more prosperous are working hard to reach the set targets.

Member States have an obligation to recover and dispose of waste in a way that does not endanger human health and the environment, prohibiting the abandonment, unloading or uncontrolled disposal of waste. Waste must be treated without creating a risk to water, air, soil, plants or animals, without causing nuisance due to noise and without affecting the landscape or areas of special interest.

In this context, the main objective of the new Framework Directive, Directive 2008/98/EC on waste, is to prevent the generation of waste and reduce its associated environmental impact, but also to reduce the overall effects of resource use and increase the efficiency of their use. Important changes of this Directive are:

- The addition of a mechanism to clarify when an end of waste ceases to be waste,
- Clarification of the definitions of certain waste management operations,

- Introducing the waste hierarchy as an order of priorities for what is the best option in terms of environmental protection, including provisions regarding hazardous waste,

- Clarification of the provisions regarding the waste management plans and specifying the need to take into account the entire waste life cycle, at the time of elaboration of the plans,

- Requesting Member States to develop waste prevention programs.

The Waste Framework Directive 2008/98/EC contains, inter alia, provisions in the field of prevention (adoption of indicators for monitoring prevention, adoption of an eco-design policy, setting prevention targets through the application of best practices) and in the field of recycling. Preparation targets are required for reuse and recycling of waste of at least 50% of the total mass for household and similar waste by 2020 and preparation for reuse, recycling and other material recovery operations, including landfill operations using waste, for min 70 % of the mass of waste from construction and demolition activities.

At the same time, Directive 2008/98/EC simplifies the existing legislative framework in the field of waste management by:

- Repealing Directive 91/689/EEC on hazardous waste and including provisions on such waste as a consequence of the need to remove obsolete provisions, amending certain provisions on the handling/disposal of hazardous waste laid down in Directive 91/689/EEC in order to greater clarity of text, as well as clarification of the mode applying the prohibition on mixing of waste laid down in Directive 91/689/EEC and the derogations from this prohibition which should in addition satisfy the condition with the best available techniques,

- Repeal of Directive 75/439/EEC on the disposal of waste oils, the relevant provisions being included in the new directive. Waste oil management must be carried out in accordance with the order of priority of the waste hierarchy and priority must be

given to the options that provide the best overall results in terms of environmental protection.

Moreover, this Directive promotes sustainable use of natural resources; and the practical application of the waste hierarchy;

Minimizing the negative impact on the health of the population and the environment due to waste generation;

Consideration of the entire life cycle; measures aimed at decoupling (breaking) the link between economic growth and waste generation;

The introduction of measures to streamline the system of sanctions, proportionate and dissuasive, for those who infringe the provisions of this Directive;

Introduction of measures to ensure sorting at source, collection and recycling of priority waste streams.

In order to improve the legal certainty of waste legislation and to ensure a greater ease of understanding and application of the definition of waste, the Directive 2008/98/EC distinguishes between product, secondary raw material and waste. Thus, the product includes all materials deliberately created in a production process. In many cases, one or more "primary" products can be identified as the main material produced. Basically, the adoption of a circular economy aims to minimize waste. When a product reaches the end of its life, the materials from which it is made are kept in the economy whenever possible, most often being either recycled and used for other purposes, or becoming a secondary raw material for other products. By repeated use, it creates an additional value of that matter and product, in its various forms.

Therefore, at the level of the European Union, the aim is to accelerate the transition to a circular economy, based on a high level of resource efficiency, waste reduction and high recycling rates in all sectors. Environmental protection is perhaps one of the most present topics today, presenting challenges that are difficult to manage, given its complexity.

Directives Aimed at the Protection of Individual Environmental Elements

Directive 2000/60/EC is the most important legislative act in the field of water. The novelty is the goal of integrating all aspects of water into a single management plan for equal treatment of all water consumers, from human communities to aquatic ecosystems. The elements emphasized in this Directive are:

- water management in Europe will be achieved at the basin level,
- integrated management of surface water - groundwater - wetlands and other types of ecosystems dependent on aquatic ecosystems,
- establishing the common objective of "good condition", which must be achieved after the implementation of the measures included in the Water Management Plan,
- characterizing the water status in 5 quality categories depending on the biological elements, considering that these elements integrate and reflect synergistically all types of impact and environmental conditions over a longer period of time. The physico-chemical, hydrological and morphological elements are helpful elements for characterizing the state of the waters,
- defining the reference state for surface waters,
- defining the category of "heavily modified water bodies" and "artificial water bodies",
- cost recovery for water services,
- public participation in the elaboration of the Water Management Plan,
- According to the Directive, the river basin management plan must be a basis for dialogue and the development of strategies for other important areas in the future. This means that progress and results in the planning process should be integrated into the policy of other areas such as agriculture, regional development, rural restoration, waste management. Also, the main objectives are represented by the following points:

- preventing damage, protecting and improving the state of aquatic ecosystems, taking into account their water requirements, permanent interactions between aquatic ecosystems and adjacent terrestrial ecosystems and wetlands,

- promoting the sustainable use of water based on the

long-term protection of water resources,

- intensifying the protection and improvement of the aquatic environment through specific measures of progressive reduction of emissions and losses of priority substances and total or phased closure of emissions and losses of priority hazardous substances in water,

- preventing groundwater pollution and progressive reduction of their pollution,

- reducing the negative effects of dangerous hydro meteorological phenomena - floods and droughts.

The river basin management plan is the instrument for implementing the Water Framework Directive regulated by Article 13 and Annex VII and aims towards a balanced management of water resources and protection of aquatic ecosystems, with the main objective of achieving a "good state" of surface waters and underground. Article 14 of the Water Framework Directive 2000/60/EC specifies that Member States must inform and consult the public and users.

Also, the Management Plan establishes the necessary decisions in the water economy and for the development of objectives for a sustainable, unitary, balanced and complex management of water resources. As the basic infrastructure of the economy, water management must provide solutions to ensure the current and future water needs of the population and the economy, starting from the renewable but limiting nature of freshwater resources, as well as the principles of unitary management on hydrographic basins of surface and underground resources. Therefore, the implementation of this Directive will contribute to a sustainable socio-economic development by ensuring the necessary water for use, both in terms of quality and quantity.

The EU is also working to increase air quality by controlling emissions of harmful substances into the atmosphere, increasing fuel quality and integrating environmental protection requirements into the transport and energy sectors. Air quality monitoring occupies an essential place in the environmental monitoring system, the atmosphere allowing the achievement of the best conditions for the spread of pollutants, whose effects are felt from the local to the global level.

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and clean air for Europe, also known as the Clean Air for Europe (CAFE) Directive, establishes the need to reduce pollution to levels that minimize harmful effects. on human health, to improve air quality monitoring and assessment and to provide information to the public. The European air quality targets for 2020 and 2030 are set in the program called "Clean Air for Europe" and provide for stricter pollution limits. The strategy will be implemented in a revised form of the National Emission Ceilings Directive. In addition, the Commission proposes a specific directive to reduce pollution in medium-sized, previously unregulated combustion plants - for example, plants used to generate energy for streets or large buildings.

The main purpose of this European directive is to assess and manage air quality in a comparable way and on the basis of the same criteria throughout the European Union. This information is also transmitted to the public.

The state regarding the quality and pollution of the ambient air is highlighted by indicators that characterize the environmental factor "AER": emissions of acidifying substances (SO_2, NOx, NH_3); ozone precursor emissions; emissions of suspended dust precursors (PM_{10} and $PM_{2.5}$); exceeding the limit values of air quality indicators in urban areas; production and consumption of ozone-depleting substances.

Air quality monitoring occupies an essential place in the environmental monitoring system, the atmosphere allowing the

achievement of the best conditions for the spread of pollutants, whose effects are felt from the local to the global level. The European Environment Agency publishes an annual report on the state of the environment accompanied by the acronym SOER.

Another approach to legislation to improve air quality is to set annual emission limits for certain pollutants. In these cases, countries are responsible for putting in place the necessary measures to ensure that their emission levels are below the ceiling set for that pollutant. The Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution (LRTAP) of the United Nations Economic Commission for Europe and the EU Directive on National Emission Ceilings (2001/81/EC) also set limits for European countries with air pollutants, including those pollutants responsible for acidification, eutrophication and ground-level ozone pollution (troposphere).

In addition to setting air quality standards for certain pollutants and annual country-wide ceilings, European legislation is also designed to directly target certain sectors that act as sources of air pollution. Emissions of atmospheric pollutants from the industrial sector are regulated, inter alia, by the Industrial Emissions Directive 2010 (2010/75/EU) and the 2001 Directive on the limitation of emissions of certain pollutants into the air from large combustion plants (2001/80/EC).

Current European air quality legislation is based on the principle that EU Member States divide their territories into several management areas, in relation to which they must assess air quality using measurements or models. Most large cities are declared to be such areas. If air quality standards are exceeded in an area, the Member State must report this to the European Commission and explain the reasons. Countries are also asked to draw up local or regional plans to explain what measures they intend to take to improve air quality. It could, for example, establish so-called low-emission zones, in which access to more polluting vehicles is restricted. Cities can also encourage a shift

to less polluting modes of transport, including walking, cycling and public transport. They can also ensure that industrial and commercial combustion sources are equipped with emission control equipment, according to the latest and most appropriate technologies available.

Directive 2004/35/EC on Environmental Liability Directive (ELD)

Directive 2004/35/EC establishes a special legal liability regime for pure environmental damage. This normative act brings together both preventive measures and specific remedial measures (civil and administrative in nature). A distinctive element of this derogating legal regime is the fact that the passive subject of liability is the operator (a natural or legal person carrying out professional activities), and the active subject can only be a public authority. Individuals are not given the right to take action by the Directive, but they can also report and influence the work of public authorities.

With regard to key concepts, the Directive defines three types of environmental damage that fall within its scope, namely those to protected species and natural habitats, those to water and those to soil. The Directive applies when these "environmental damage" are considered "significant". It does not provide criteria for assessing damage or determining the significance threshold for water and soil damage.

The Directive establishes also a dual liability regime, depending on the seriousness of the act. Thus, for acts committed in the context of high-risk professional activities, listed in Annex III of the document, the liability is of an objective nature. On the contrary, for acts committed in the exercise of other activities than those mentioned in Annex III, which generated a state of danger or damage to species and natural habitats, the liability remains subjective, being necessary to prove the guilt of the operator.

The precautionary action covered by Directive 2004/35/EC shall include urgent measures taken by the operator or the

competent authority immediately after the harmful act has been committed, but before the negative consequences materialize, in order to limit or prevent the occurrence of environmental damage. Repair action under the auspices of the Directive takes the form of a tripartite hierarchical structure, consisting of: primary repair (bringing the environment to its original state or at least to a similar state, usually using the natural regenerative capacities of the affected natural factors); complementary reparation (replacement of affected resources with qualitatively and quantitatively equivalent resources) and compensatory reparation (compensation of intermediate losses of resources until their regeneration). Regardless of the person who implemented the measures presented above, the costs will be fully borne by the operator, based on the "polluter pays" principle.

Then, environmental liability means that economic operators who cause damage to the environment have an obligation to pay for its rehabilitation and are thus encouraged to avoid damage. According to the Directive, where an economic activity considered to be risky (as detailed in Annex III to the Directive) causes significant damage to the environment, soil, water and biodiversity, the responsible operator must take all necessary measures to remedy it, at his expense. For economic activities that are not considered environmentally hazardous, including for agriculture, the Directive obliges operators to remedy damage to biodiversity only when it is due to fault or negligence.

Following the evaluations, the Commission concluded that this Directive remained relevant and that Member States had made progress towards achieving its objectives. However, it was found that some aspects, either from the point of view of policy development or from the point of view of their implementation, made the efficiency and effectiveness of the liability regime more difficult:

- the lack of coherent and comparable data on the implementation of the Directive,
- poor knowledge of the regime by stakeholders,

- unclear key concepts and definitions,
- limitations of the scope due to exceptions and defence mechanisms,
- lack of financial guarantee in insolvency cases.

Based on this assessment, the Commission, in consultation with experts from the Member States, adopted a multi-annual work program on Directive 2004/35/EC on Environmental Liability Directive (ELD) for the period 2017-2020, in order to address the identified gaps. In 2020, the Commission approved a new work program with actions for the period 2021-2024. One of the actions was to report the data. The evaluation concluded that the reported data were of poor quality and prevented the Commission from reaching sound conclusions on the implementation of the Directive. The evaluation showed that, although some Member States provided detailed and well-structured data, others did not provide all the information needed for a full evaluation.

The Commission intends to encourage the use of the information system by discussing with Member States how to organize data collection at national level. Given the differences between legal systems, there is no guarantee that this new system will support a uniform analysis at EU level. Following consultations with Member States, the Commission issued information in March 2021 on the legal interpretation of the definition of the term "environmental damage". The Commission's interpretation is not mandatory and does not contain specific criteria or thresholds from which the Directive should apply. This would require a legislative change.

The Paris Agreement

Anthropogenic climate change is one of the major threats of the 21st century, as man-made greenhouse gas emissions and land use change will lead to significant global warming beyond sustainable levels if left unchecked.

On 12 December 2015, the 195 States participating in the XXI Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change adopted the Paris Agreement, which laid the foundations for a comprehensive plan. Action that humanity should take to avoid dangerous climate change, limiting global warming to below 2 ° C. The agreement is the result of years of efforts by the international community to reach a multilateral agreement on climate change.

The agreement includes the commitments of all major emitting countries to reduce their climate-changing pollution and to strengthen these commitments over time. The agreement provides a way for developed countries to thrive in their climate mitigation and adaptation efforts and provides transparent monitoring, reporting and information on individual and collective climate goals for countries.

The main elements of the agreement are:

- operationalizing the long-term goal of limiting the increase of the global average temperature below 2 degrees Celsius,
- long - term vision of the necessary transition to

low - emission and climate - resilient economies during this century, in the context of sustainable development and poverty eradication,

- a commitment review cycles every five years, which ensures the ambition and sustainability of the agreement; subsequent commitments must not be below existing levels of ambition,
- a qualitative global objective in the field of adaptation to the effects of climate change, aiming at increasing adaptability and resilience and reducing vulnerability to the effects of climate change; states will need to develop adaptation plans and regularly communicate these plans and implementation measures,
- losses and damage associated with the impact of climate

change: States recognize the need to cooperate and increase understanding, action and support in various areas such as early warning systems, emergency preparedness and risk insurance,

- a global assessment process of progress towards the targets set (emission reduction, adaptation and financing), based on a monitoring and reporting system to ensure the transparency and accountability of this progress,

- commitments of developed countries to mobilize sources of funding for developing countries and to ensure technology transfer and increase their capacity to adapt to the effects of climate change and to implement measures to reduce greenhouse gas emissions.

The 2015 climate negotiations aim to establish a binding global framework for a comprehensive climate policy from 2020. To this end, the aim of the new agreement is to first show ways to coordinate national climate policy activities and align them with the long-term goal of limiting greenhouse gas emissions so that the two-degree target can be achieved. To do this, the information must be made available, the objectives must be reviewed and renegotiated over time. Second, the agreement must attribute or share the risks associated with both climate policy and ongoing climate change. To this end, agreements need to be concluded on adaptation measures, loss and damage settlement and support services (finance and technology).

The possibility of tightening targets should already be taken into account when revising the emissions trading directive and when designing the upcoming distribution of the reduction efforts among the member states (the so-called effort sharing decision). In addition, the EU should back up its reduction commitments with sufficiently ambitious measures, which will affect the "sub-goals" of the 2030 climate and energy package for promoting energy efficiency and renewable energy sources as well as the upcoming reform of the EU emissions trading system. The need for higher goals should be taken into account when reviewing the relevant guidelines this year.

The Paris Agreement is also based on the REDD + instrument of reducing emissions from deforestation and forest degradation and expanding emissions trading and CO2 markets. The exact structure of financing an instrument such as REDD + - through funds or emissions trading - is and remains a point of contention. However, anchoring a new global market mechanism for forest protection in the Paris Climate Agreement is not auspicious here.

The term "zero" emissions can be found in the Paris Agreement. Article 4, dealing with the "long-term goal", was one of the paragraphs "in square brackets" that was contested in Paris until the last day. The focus was on options such as climate neutrality, net zero emissions or decarbonisation, which may sound similar, but differ significantly in their meaning. Finally, as a compromise, a formulation by the Intergovernmental Panel on Climate Change (IPCC) was adopted to reach the peak of greenhouse gas emissions as quickly as possible, "in order to create a balance between man-made emissions and the binding of CO2 in sinks in the second half of the century".

In the 1.5 ° C scenarios, the need to use such technologies increases again significantly. The most important technology mentioned here is BECCS (Bioenergy with Carbon Capture and Storage). The idea is as follows: Biomass is planted on gigantic areas, they should first store large amounts of CO2 and thereby produce "bioenergy". Then the biomass is burned. The aim is to capture the CO2 and then "safely" store it underground forever. The area required annually for this is estimated at the area of India or up to twice the amount of the currently globally used agricultural area. This is not yet a "realpolitik", but part of the scenarios that are being discussed and researched. BECCS threatened further massive land use changes that would call global food security into question and cross various planetary boundaries (e.g. loss of biodiversity, fresh water availability, nitrogen cycle).

In the six years since the agreement was signed, the highest temperatures have been recorded and 200 gigatonnes of CO2 have been emitted. At the extremely fast pace of current emissions, the remaining carbon budget for the 1.5 ° C target

will disappear completely in the next 7 years, long before we can reach our proposed targets for 2030 and 2050, respectively.

Scientists warn that EU emissions must fall at least twice as fast as they do now to limit global warming below 1.5 ° C. and to avoid a climate catastrophe. Doing so and reaching zero emissions means that there is no room for fossil fuels such as gas, industrial agriculture or risky and expensive technologies such as nuclear energy. It also means that there is a need for proper laws and clear benchmarks, including in the short term, without which the target of climate neutrality until 2050 risks remaining at a declarative level. The climate and environmental crisis cannot be combated without systemic change.

Now more than ever, the focus is on the question of which policies, technologies and instruments should be used to achieve the goal. Implementation scenarios for 1.5 degrees do not exist in abundance and there are technologies and instruments under discussion that need a more detailed societal and political consideration, especially with regard to their social and ecological effects.

In conclusion, the Paris Agreement can be seen as a first step towards reducing greenhouse gas emissions and trying to limit global warming. Its implementation depends on a multitude of state actors and will certainly not be easy. By 2100, the planet's population could reach 11 billion and fossil fuels should be eliminated. It remains to be seen whether 12.12.2015 will go down in history as the day when humanity understood the importance of preserving the Earth, or the date when 195 bureaucrats signed another worthless paper. It offers the chance for real socio-ecological transformation, giving priority to socially and ecologically compatible technologies and policies, such as renewable energies and socio-ecological agriculture. And there must be democratic processes of negotiation on the path to transformation, which, however, requires an independent civil society and the media, as well as democratically legitimate parliaments, to help prevent wrong and immature technical solutions and technological aberrations.

Conclusion

EU environmental policy has greatly contributed to the effective improvement of environmental protection. However, it must be criticized that increasingly detailed EU procedural rules are being issued and that extensive reporting obligations are required from Member States - often without any recognized added value for the environment. In this context, the Environmental Advisory Council highlights the EU's role for environmental protection in the European multilevel system and reflects this on current developments at European level, in particular the European Green Deal.

Today, all Member States are in the midst of a global pandemic and in the midst of the climate crisis. Both exposed the profound errors of the current system and became a pretext to shake the foundation of multilateral cooperation and social justice.

In reality, the restrictions created by the pandemic have slowed the level of carbon dioxide emissions only temporarily, and private interests will cause it to continue to grow considerably next year and biodiversity to continue to slip into a major decline, while in the imbalance created by climate injustice, the most vulnerable communities, which should be supported, should continue to be exploited and endangered.

As humanity retreats to the new normal of self-isolation, social distancing and reflection, the opportunity to innovate and create models for a fair future continues to be set aside in favour of an older one - business as usual. Paradoxically, support schemes for billionaire corporations and large polluters have continued to increase exponentially since the Paris Climate Agreement was signed.

In conclusion, the polluter pays principle underpins EU environmental policy and requires polluters to bear the costs of the pollution they cause, including the cost of measures taken to prevent, combat and remedy pollution, as well as the costs it imposes on society.

The Commission's actions to support the implementation of the European Directives by the Member States have not made it possible to address the key shortcomings. Sometimes the EU budget is used to fund clean-up actions which, according to the polluter pays principle, should be borne by polluters.

Although EU waste legislation requires Member States to fully apply the polluter pays principle, the funding gap remains wide and significant public investment is needed to achieve recycling targets. For example, although progress has been made on certain pollutants, for many companies the price of water does not cover the costs of the pollutants they release into the water.

The Commission should therefore assess regulatory and administrative changes, as well as the overall cost-benefit ratio of better application of the polluter pays principle, in particular as regards: lowering emission limit values to further reduce emissions. much residual pollution and combating diffuse water pollution for all sources of origin, including agriculture.

Regulation Cases in Turkey, Belgium, Republic of North Macedonia and Romania

Regulation Cases in Turkey

The Green Deal declared by the EU in December 2019 to fight against climate change is also very important for Turkey due to its relationship and trading volume with the EU. The Green Deal sets further targets in addition to the ones provided under the Paris Agreement with the aim to make Europe carbon neutral by 2050 and reduce greenhouse gas emissions by 55% compared to 1990 levels by 2030.

To achieve its objectives under the Green Deal, the EU has presented numerous policies, one of them being the Carbon Border Adjustment Mechanism **(CBAM)**. Officially proposed by the European Commission on 14 July 2021, CBAM expects EU importers to pay a carbon tax for their goods' carbon emissions as if they were manufactured under EU carbon pricing regulations. This mechanism aims to block carbon leakage and create an incentive globally for environmentally sensitive

production. The mechanism is expected to be fully applicable as of 2026 following the transitional period between 2023 and 2025.

Following the declaration of Green Deal and CBAM, the Turkish Republic Ministry of Trade released an action plan (https://ticaret.gov.tr/data/60f1200013b876eb28421b23/MUTABAKAT%20YE%C5%9E%C4%B0L.pdf). The Green Deal Action Plan prepared by the Ministry of Trade and approved with the Presidential Circular numbered 2021/15 (Action Plan), is a roadmap aiming to support green transformation in all relevant policy areas. Action Plans mainly aims to establish Turkey's compliance with the European Green Deal (European Green Deal) issued by the European Union (EU).

The European Green Deal addresses climate and environmental challenges in a broader and more effective way with the EU's strategy of zeroing net greenhouse gas emissions by 2050, as well as creating jobs and improving quality of life while reducing emissions.

The Action Plan aims harmonization with the regulations and principles adopted under the European Green Deal, in order to contribute to Turkey's transition to a more sustainable, resource-efficient and green economy, in a way that will preserve

Regulation Cases in Belgium

According with the 2019 EU Eco-Innovation Index rating, in Belgium, initiatives legislation implementation under the Green Deal are mostly carried out by policies and programs at the regional level. While this division can be an obstacle to a strong eco- environment, it also presents diversification of initiatives. The Wallonia region has undertaken many projects focusing on varied areas of sustainability (construction, energy, natural resources, biochemistry, digitalisation). Several initiatives have been also developed in the Brussels Region to support eco-innovation in a variety of areas, including construction, digitalisation, waste treatment; support is also provided SMEs and Self-Employed to develop eco-innovation activities.

As well, the Green Deal, launched on 27 March 2017, is an engagement between several parties and the Flemish government. At the kick-off, 80 organisations have signed the deal with three Flemish Ministers: Bart Tommelein (Energy),Ben Weyts (Transport and public works) and Joke Schauvliege (Environment). This deal makes use of the dynamics, creativity and knowledge of the different partners to promote the circular economy. The Flemish region also has developed eco-innovation activities in transportation, clean energies, construction, and waste treatment.

One of the many innovation initiatives, GreenWin, supports innovations in green chemistry, sustainable materials, techniques for re-using, recycling end of life of products and using landfills as a new source for raw materials. As such, Greenwin launched the Polymers Ecocircularity Platform for an Industrial Transition (PEPIT), inviting citizens and businesses to submit project proposals for the establishment of a circular model of plastic industry as soon as March 2019 (https://www.greenwin.be/fr/page/pepit). In this area, a call for cooperation project was also launched in early 2019 with a budget of 10 million euros to support industrial "pilot units" and "demonstrators" co-financed by the ERDF (COOPILOT). Finally, 12 million euros was allocated to WELBIO, the Wallon interuniversity institute for research in life sciences, to continue strategic research and its industrial valorisation until 2021.

In this context, the Brussels' Platform for the re-use of construction elements in Brussels brings together players from different spheres and areas (research centres, federations, actors of the associative sector, building professionals, distributors, training bodies, and public institutions) that are engaged in the Development of a circular economy for building components. It aims to create a context to harmonise initiatives and to trigger new collaborations (https://www.nweurope.eu/projects/project-search/fcrbe-facilitating-the-circulation-of-reclaimed-building-elements-innorthwestern-europe/events/20190919-3-workshops-in-brussels-reuse-in-academic-education-inventory-and-prescription/).

On top of that, Brussels Environment, as the administration responsible for the environmental policy of waste, recognises the need to move towards a zero-waste model in the Brussels-Capital Region. It promotes such a transition through financial and advisory support and it also participates in the Zero Waste Belgium initiative: the year 2018 has been designated as a "Zero Waste" thematic year by the Brussels Minister of the Environment (http://www.zerowastebelgium.org/en/). The number of ISO 14001 organisations that were registered in 2018 is 89 (per million population) which is significantly below the EU average score (172). However, Belgium has 0.25% of its small and medium enterprises who have implemented sustainable products, which equals the EU average.

In regard to the four resource efficiency indicators (material productivity, water productivity, energy productivity and GHG emissions intensity), Belgium has scored a 118 on the outcome index, above the EU average of 100. It is important to note that Belgium decreased its performance in energy productivity with 7.81 euros per tonnes of oil equivalent in 2018 (8.46 in 2016). That score positions Belgium slightly below the EU that has an average score of 9.88.

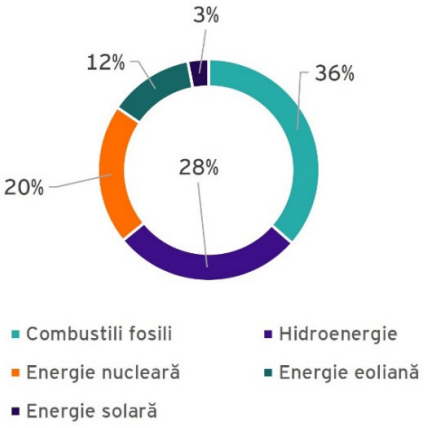
On the other hand, the Clean Power for Transport action plan supports the development of electric and other alternative fuel vehicles in Flanders. The plan contains objectives in terms of number of vehicles and charging stations, for example to increase the number of battery electric cars to 60,500 and number of charging stations to 7,400, by 2020. The main measures aim to give incentives to the environmentally friendly vehicles market and to support the development of the necessary infrastructure, for example in April 2019 a purchase bonus of up to 5,000€ per vehicle, removal of tax of entry into service and annual traffic tax for this type of cars (http://milieuvriendelijkevoertuigen.be/).

Regulation Cases in Romania

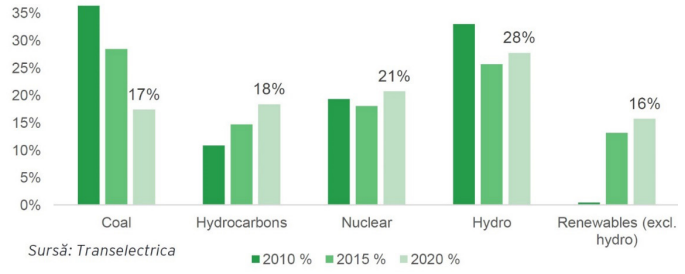
Romania reached its 2020 EU renewables target of 24% of final energy consumption coming from renewables several years ago.

In order to reach its 2030 renewables target of 30.7%, Romania plans to add around 7 GW of new renewables capacity, of which around 3.7 GW is projected to be solar projects, according to the plan.

In terms of energy consumption, in 2019, little over of 24% energy consumption originated from renewable energy sources, placing our country on the 10th place in the EU and above the union's average level.



In 2020, electricity production in Romania was comprised of 12.4% wind power, 3.4% from photovoltaic solar panels, while 27.6% of the electricity production was coming from hydropower. In total, renewable energy production (wind, photovoltaic and biomass) amounted to 16%.



Romania's greenhouse gas emissions fell over 50% compared to 1990's levels due to a significant reduction in energy demand and industrial activity, increase in energy efficiency and gradual compliance to more restrictive environmental standards. Energy still represents the main source, accounting for 2/3 of national GHG emissions, followed by agriculture, industry and waste management. (EU Climate Action Progress Report, November 2020).

According to a report elaborated by EY Romania: "in the context of the introduction of the European Green Deal, several multinational energy companies have assimilated the wave of changes and implemented the sustainability agenda in their business strategy. At the same time, they announced their intention to invest in clean energy projects at the local level." (Pactul Verde European – Decarbonarea sectorului energetic din Romania prin energii regenerabile, April 2021).

At governmental level, last year Power Purchase Agreements were introduced, in order to boost investments in the renewables sector by deregulating the local electricity market, per EU commonmarket regulations, thus allowing investors to minimize transactions risks. Until this legislative change, all electricity transactions could be carried out solely on the centralized market in a transparent, public, competitive and non-discriminatory manner. This restriction on freely negotiated PPAs was seen as the main obstacle preventing investments in new generation capacities, especially in the renewable sector.

Moreover, a form of Contracts for Difference scheme is currently assessed at the Ministry of Energy level, with financial support from the EBRD, in order to support investors interested in developing clean energy projects in Romania. The New Electricity Law , where drafting process is currently ongoing and managed with support from EBRD, will include relevant provisions related to EU environmental legislation, system flexibility, increased interconnection and market liberalization that represent facilitators for the transition to a low-carbon economy.

Regulation Cases in the Republic of North Macedonia

The new Energy Strategy of North Macedonia plans the energy strategy of the country until 2040 in line with the European and international obligations in the area. It develops three scenarios – the first being the status quo (or baseline scenario), the second being the moderate scenario, and the last being the green scenario. The green scenario proposes a radical transition away from conventional fossil fuels with an increased focus on renewables. On one occasion the strategy refers to the Green Deal explicitly when mentioning the introduction of the CO2 pricing which at the moment is not in place in North Macedonia and is an obligation coming from the Green Deal (Government of Republic of North Macedonia, 2019). Energy Strategy until 2040 https://www.economy.gov.mk/doc/2759)

Furthermore, the Government of North Macedonia is equipped with external reviews and recommendations that can help achieve the goals and targets of the 2030 Agenda for Sustainable Development. Recommendation 1.6 of the Environmental Performance Review states that the Ministry of Environment and Physical Planning (MOEPP) should develop and implement policies for greening the activities of the Ministry, in particular concerning water and energy efficiency, waste management, and carbon neutrality. The measure includes actions such as:

- Establishing task force(s) for the development of the green policies in MOEPP (Green Deal),

- Approval and dissemination of the policy documents,

- Setting monitoring and evaluation mechanism to

follow-up the implementation of the newly endorsed policies,

and carry forward the existing integration of Turkey within the scope of the EU Customs Union.

The Green Deal Action Plan, which includes 32 objectives and 81 actions under nine headlines, aims to support Turkey's transition to a more sustainable and source-efficient economy in accordance with its development targets.

Main actions under the Action Plan to reach the related goals have been determined as (1) limiting carbon emissions, (2) a green and circular economy, (3) green financing, (4) a clean, economic and safe energy supply, (5) sustainable agriculture, (6) sustainable smart travels, (7) combatting against climate change (8) establishing diplomacy principles and (9) raising awareness regarding European Green Deal.

To complete the objectives and activities within the scope of the Action Plan effectively, a working group will be established with the involvement of both the public and the private sector. In order to adapt to the changes determined by the Action Plan, further specialized working groups can be formed. Universities, non-governmental organizations, professional associations, and private sector representatives will also be able to contribute to the relevant working groups.

Overview of the Main Methodologies for Evaluating and Certificating the Environmental Performances

Environmental protection serves to maintain or improve the basis of life for all living beings (also for future generations). The big challenge is to solve the global, man-made environmental problems in the areas of water, soil and air, to build up an environmentally friendly waste and energy management and to stop global warming. Targets are specified and controlled through national laws and international treaties (e.g. limit values,

global warming). The decisive factor here is sustainability, since the benefits of the measures must be permanent.

Some of the key words include resource efficiency, product stewardship and waste management, the energy transition and climate change. Quality management also serves the operational sustainability. Here the economic aspect is increasingly considered. Customer orientation and satisfaction, quality of products and services are also mentioned as key points.

Another central element is the management system for occupational health and safety. The social aspect of sustainability plays an important role here. Avoiding hazards, ensuring health and all issues relating to occupational safety are points to be dealt with accordingly.

The primary goal of an environmental management system is to improve the environmental performance of a company. Minimum requirements for this result from compliance with environmental regulations in the form of laws, ordinances, permits, etc. For this purpose, the environmental impact of all processes, activities, products and services must be analysed and assessed. Achieving good corporate environmental performance is facilitated by a systematic management of corporate environmental protection.

Environmental Management System (EMS) Advantages and Costs of an EMS

The introduction and application of an Environmental Management System (EMS) do not by themselves lead to a reduction in environmental pollution. Working on an environmental management system is often started with the intention of certification. However, a certification document only documents compliance with the formal requirements of the standard, while a statement on environmental performance is not made. The company's resources are therefore primarily directed towards passing the certification and maintaining the environmental management system and not towards improving environmental performance.

The goal and performance-oriented introduction and application of an environmental management system can be useful for the company as well as for other interested parties. A framework is created to keep economic, ecological and social concerns in balance. The potential benefits result, for example, from:

- Compliance with legal provisions and permits as a minimum standard,
- Development of strategic and operational environmental goals,
- Identification and implementation of measures to improve environmental performance,
- Reduction of events with liability consequences,
- Use of the best available technologies with higher efficiency and better product yield,
- Increase in added value by optimizing processes and increasing resource efficiency,
- Improved relationships with authorities and easier issuing of permits.

On the other hand, the main task of management systems is to achieve the goals of an organization through systematically controlled measures, organizational structures and processes. An environmental management system (EMS) should serve to create the necessary conditions to continuously improve the environmental performance of an organization or to reduce its environmental impact. For this purpose, environmental goals, organizational structures, responsibilities, practices, procedures, processes and resources are defined as part of an EMS.

An analysis of relevant internal and external issues should ensure that the EMS relates to the environment: from an external point of view, to the framework conditions of the value chain, i.e. the upstream and downstream processes, from an internal point of view, to the framework conditions of your own organization.

Internal context factors result from the company's products and services. Through the respective processes, they have an impact on the technologies (activities), employees (competencies), profitability (sales, profit) and thus on the competitiveness of the company.

External context factors can be of a global, regional (e.g. European Union), national (e.g. Germany) or local (e.g. city, district, municipality) nature. Through the cultural and socio-political context, they have an impact on the company through political (laws), financial (taxes), official (permits) or social (employment) aspects.

The relevant processes (including outsourced processes) must be identified and described in the environmental management system. The environmentally relevant process parameters and performance indicators must be recorded. The resources required for this must be made available. Suitable measurement methods are to be defined for the control of the environmentally relevant processes. The measurement results allow the processes to be assessed for compliance with the specified environmental parameters. For the continuous improvement of the process performance and the environmental management system, suitable measures must be selected and subjected to an opportunity-risk analysis. The respective process owner is to be named with his powers and responsibilities.

The environmental policy is a long-term strategic direction of the company in the environmental sector. It defines the framework for actions and measures to achieve environmental goals. It must be geared towards continuous improvement in environmental performance in all environmental aspects. These are to be determined and improved from an economic, social and ecological point of view.

In this context, in addition to the organizational and technological issues, the legal requirements and other obligations must be determined and complied with. Operational goals and measures for continuous improvement of the environmental management system are to be derived from the strategic objectives of the environmental policy.

The aspects addressed in environmental policy depend on the company and its processes, activities, products and services. In order to protect the environment and prevent negative environmental impacts, environmental policy can specifically relate to essential environmental aspects.

A senior management representative is often appointed for the environmental management system and is responsible for the application, further development, performance improvement and reporting in the environmental management system. The corresponding organizational structures and responsibilities do not release the management from their overall entrepreneurial responsibility.

For their own security and for reasons of being a role model, they should receive regular quarterly reports on the status of corporate environmental protection. On the basis of the respective environmentally relevant processes and activities, the responsibilities and competencies are to be documented through organizational plans, job descriptions, process instructions, etc. Regardless of the company organization, some basic responsibilities can be identified:

- Managing directors: they have overall responsibility for corporate environmental management, development of environmental policy and definition of strategic environmental goals, ensuring the responsibilities, competencies and authorities, regular management reviews (management reviews) in environmental protection,

- Environmental management officer: contact person for improving the environmental management system, continuous monitoring and development of the company's environmental performance,

- Managers and responsible persons: fulfilment of legal requirements in environmental protection, achievement of the operational environmental goals, implementation of measures from the environmental program, improvement of the environmental performance in the area of responsibility, regular success control in corporate environmental protection,

- Employees: compliance with and improvement of the established procedures in their work area.

With regard to its environmental aspects and effects as well as its environmental management system, the company must ensure internal communication processes between the individual departments and management levels. Relevant communications to external interested parties should be received, documented and replied to.

The company can decide for itself about the scope of internal and external reporting. Necessary contacts with authorities regarding compliance with requirements, permit applications, emergency planning, etc. are part of everyday company life. For both internal and external environmental reporting, it is important to support mutual communication and information. The information should be verifiable and give an accurate picture of the company's environmental performance.

The reporting should show the environmental aspects of the processes/activities and products/services. It should raise employees' awareness of ways to achieve the environmental goals and the corresponding implementation options for measures from the environmental program.

The effective handling of the diverse and complex amount of information is a key feature of an efficient environmental management system. A good environmental information system includes ways and means of labelling, collecting, registering and keeping data, information and reports. It must be ensured that the documents can be assigned to departments and activities.

Excessive documentation that goes beyond the legal requirements leads to negative environmental impacts and a misdirection of company resources due to the consumption of resources. The services of an internal/external auditor/certifier /environmental verifier are reflected in their content work, the setting of the right priorities and not in the rigid compliance with and checking of formalisms.

The fixation on documentation, the maintenance and control of documents leads to a planned economy management system. The main focus must therefore be on environmentally-oriented performance and not on an elaborate documentation system. To prove the functionality of an environmental management system, the improvement in environmental and corporate performance must be assessed.

Subject to claims against the authorities or third parties, the person responsible bears the costs of avoidance, damage limitation and remedial measures. For the implementation of this law by state authorities, the states issue the necessary cost regulations, such as regulations on cost exemptions and reimbursements. The authority is authorized to initiate a procedure for reimbursement of costs up to five years from the date of completion of the measure or the determination of the cost debtor, this period starting from the later date.

If the process parameters are not adhered to or if the product requirements deviate from the target specifications, this has an impact not only on quality management, but also on environmental management. Deviations from the process parameters must be compensated for by corrective measures, which are almost inevitably associated with higher material and energy costs. Additional costs and low material efficiency are the result.

It is important that the company can properly evaluate its environmental performance. The key figures should therefore reflect the environmental performance as precisely as possible and present all environmental aspects and environmental impacts in a balanced manner. If a company reduces its exhaust air and wastewater emissions, but thereby generates more solid landfill waste, it should address and report on the overall benefit for the environment. The financial implications must also be taken into account, because the landfill costs must also be taken into account in order to be able to correctly assess the costs and advantages of such measures.

Advantages and Costs of an EMS

For many years, legislators and companies have improved many things in terms of environmental protection. The industry has also recognized that reducing the environmental impact is an important corporate goal for the future in addition to securing the economic future. A large number of limit values for the release of substances into the environment have been stipulated more strictly or defined at all.

They should enable improved protection of the environment. Another strategy for reducing negative environmental impacts is to use legislation to strengthen the position of the injured party vis-à-vis the polluters. The aim of this policy is to establish more modern technologies in order to reduce further negative environmental impacts in the future. In connection with this, costs are to be reduced and the economic future secured. In the environmental management system, the process owner must therefore always keep an eye on the entire picture of the complex system and be able to think and act holistically. He must not be fooled at first sight, but must recognize the interlinking of the individual processes and be able to correctly assess the environmental impact. Only then can he manage the environmental aspects of the process and its potential opportunities and risks.

The company can thus independently determine the scope and depth of the environmental management system. It also determines statements about its environmental performance. In order to guarantee a high level of credibility here, in addition to the requirements placed on the company, particularly high requirements must be placed on external certifiers.

In order to effectively implement an environmental management system and to implement the necessary measures, the company must make the appropriate resources available. The introduction and ongoing development can only take place gradually. Legal requirements, environmental aspects, customer expectations, employees and the public, the benefits for the environment

and the company, and the availability of human and financial resources must be weighed against each other.

In the triangle of forces between economy-ecology workplaces, cost-benefit considerations and corresponding considerations are necessary. Therefore, there will always be certain restrictions on the potentially possible measures.

The energy aspects that have the highest energy consumption and the most significant effects can be identified from the survey. Taking into account the energy costs and the contribution of energy consumption to environmental pollution (e.g. greenhouse effect), the greatest potential for energy savings can be identified with the energy register. The recording of energy consumption via quantities and costs should, if possible, be carried out via cost centres or company areas.

In connection with utilization, system runtimes and operating hours, relative parameters are formed from the absolute energy consumption and costs. These energy indicators allow an assessment independent of the utilization or the production figures. If appropriate information is available, consumption and cost trends can be viewed and checked.

Compliance with legal requirements must be guaranteed in the environmental management system. This requires clear responsibilities and competencies. The legal provisions (including permits) must be clearly assigned to the cost centres (systems, processes). Since each cost centre has a cost centre manager, the clear assignment to responsible persons is ensured.

An annual compliance audit must be carried out based on a priority plan. Only then can legal compliance be guaranteed. Without compliance with laws, regulations, permits, etc., there can be no sustainable corporate development. So-called internal performance criteria or environmental indicators can serve as further assistance. They are always used when the external performance criteria (environmental laws) are insufficient or do not apply to the company. With the help of internal performance criteria, a company can effectively support compliance with the principles formulated in the environmental policy.

The ISO 14000 EMS

The International Standard Organization (ISO) has introduced a uniform basic structure for management system standards that makes this comparison easier. Overall, like any other management system standard, ISO 14000 only contains minimum requirements for the structure and design of an EMS. There are no specific requirements regarding the actual reduction of the environmental impact or for the environmentally-oriented organizational structure, processes or performance of the organization. Nor does it specify any instruments or methods for implementing the standard requirements in practice. The effectiveness and efficiency of the EMS therefore depends on the specific design of the requirements by the organization.

The scope for interpretation of this requirement is relatively large. The following perspectives can be distinguished:

- Effects of the environment on the organization: in times of increasingly complex market developments, entrepreneurial action must be both quick to react and foresighted. Strategic management decisions are therefore better not made without a precise analysis of the market environment and with current and future consideration of social framework conditions and their development as well as technological trends. This is about topics such as: globalization, Industry 4.0, climate change, resource crises, sustainability, energy transition, traffic transition/electro mobility or international trade sanctions. In the medium term, these developments often take the form of changes in the law.

- Effects of the activities of the organization on the environment: organizations are involved in global value chains. The way in which organizations operate and what resources they use to do so has an impact on the environment and society.

- Internal characteristics and conditions of an organization: there are certain routines and activities in organizations that prevent adaptation to external factors from taking place or that external effects are reduced. It is important to identify these internal conditions, which has a lot to do with the organizational

culture and the skills available (people and their awareness, knowledge, processes, incentive mechanisms).

Under these principles, the ISO 14000 EMS takes into account the following points: environmental regulations and other binding obligations, significant environmental aspects, risks in connection with opportunities and dangers, environmental goals, measures to achieve the environmental goals.

Environmental aspects are those components of processes / activities and products/services that can interact with the environment and show corresponding effects there. For the determination and evaluation of the environmental aspects, reference must be made to the environmental regulations to be complied with by the company. Therefore, the legal and other binding obligations (permits) must first be determined. After determining the legal obligations and the (significant) environmental aspects, these must be subjected to a risk assessment. This creates opportunities and dangers for the company and the environment. In accordance with the results of the risk assessment, measures with the associated priorities are to be defined as part of an environmental program.

The requirements (i.e. the needs, expectations) of the stakeholders must be determined in order to check whether the organization has to derive so-called binding obligations from them. Binding obligations are:

a. legal obligations that the organization must meet and

b. other, i.e. non-sovereign and non-legal, requirements that the organization must meet or that it decides to meet (industry standards, DIN standards, voluntary self-commitments).

This framework must be known and the resulting requirements must be implemented. Even if this standard requirement is kept very brief, it is very comprehensive due to the complexity of environmental law (see Table 5) and is of great importance with regard to possible legal consequences.

Table 5. Examples of legal areas and other requirements

Legal Areas	Examples of legislation
General law	Environmental Statistics Act Environmental Damage Act
Conservation law	State nature conservation laws
Soil / contaminated sites	Soil Protection Act Soil Protection and Contaminated Sites Ordinance
Emission control law	Emission Control Act State pollution control laws and regulations
Energy law	Renewable Energy Sources Act Electricity Tax Act Energy Tax Act
Waste law	Circular Economy Act State waste laws Municipal waste management statutes
Water protection law	Water Resources Act State water laws
Hazardous substances law	Chemicals Act Ordinance on Hazardous Substances

Investment law	Industrial safety regulations
Work-and Health protection	Occupational Safety and Health Act Occupational Safety Act
Other requirements	**Examples**
Agreements with authorities	Reduced test cycles and regulations for wastewater through the use of wells
Agreements with customers	Individual, customer-specific packaging, return of circulating materials
Voluntary principles or rules of procedure	Company commitments for the use of hazardous substances, auxiliary materials, replacement of hazardous substances
Voluntary environmental labelling or self-commitment with regard to product stewardship	Declarations of conformity for products and services
Agreements with community groups and non-governmental organizations	Agreements on production processes and times
Public obligations of the organization or parent organization	Participation in the country-specific environmental alliances

The stakeholder analysis is intended to identify both the requirements/expectations that are based on legal principles and the requirements placed on an organization, which it can or must undertake to adhere to.

The management has a key role in employee motivation in environmental management. It must explain the environmental goals and values and the importance of the environmental policy. It is the obligation of the individual employees to implement the requirements of the environmental management system in an effective improvement process. All employees of a company should understand and be able to implement the environmental goals for which they are responsible. Employees whose activities have a significant impact on the environment are particularly challenged here.

The knowledge required for environmentally relevant workplaces must be taken into account when selecting, training and developing personnel. Employees must become aware of how improved personal performance can reduce the environmental impact of their activities and increase the benefits for the environment. They must have appropriate training (knowledge), professional experience (ability) and competencies in order to be able to fulfil their tasks and responsibilities to achieve the environmental goals and to implement the measures of the environmental program.

For the scope of the EMS, the top management must formulate the principles of its environmental commitment - the environmental policy. The environmental policy must:

- be appropriate to the purpose, context, nature, scope, environmental impact of the organization,
- form the framework for the environmental objectives and
- include at least the following obligations: protection of the environment and the prevention of environmental pollution, fulfilment of binding obligations, commitment to continuous improvement, in particular environmental performance.

So, the environmental policy must be made known internally to the employees so that they can understand the overarching strategy of the organization and its top management with regard to environmental management know. It must also be made available to interested parties.

Environmental regulations, contractual relationships and agreements with stakeholder groups provide the framework within which an organization can carry out its activities.

As part of the EMS, the top management must assign responsibilities and authorities for relevant roles in order to ensure that the EMS of the organization complies with the requirements of ISO 14000 and that the results of the EMS are reported to the top management. The defined responsibilities and authorities are to be made known within the organization.

Even if ISO 14000 no longer explicitly requires, it is advisable for every organization to appoint an officer from the top management who coordinates the EMS and the associated tasks, processes and people, because this is a relevant role. In addition, depending on the size, the organizational structure and the existing processes, the top management must consider which other relevant roles are to be defined for the EMS (see Table 6).

Table 6. Roles and Responsibilities in EMS

Typical roles / responsible persons in EMS	EMS responsibilities
Top management	Strategic direction Development of environmental policy Overall responsibility for the fulfilment of the binding obligations Checking the functionality of the EMS
Executives	Development of environmental goals and processes Ensuring the fulfilment of the binding obligation
Product and service developer	Consideration of environmental aspects during the development process
Sales and distribution staff	Identify customer expectations
Client, buyer	Determination of the requirements for the suppliers and the criteria for procurement
All employees	Conduct in accordance with the requirements of the EMS
EMS	Monitoring the overall performance of the EMS

Organizations that operate in dynamic markets must be flexible enough to adapt to changing framework conditions. The risk and opportunity analysis should make a contribution by promoting forward-looking, preventive thinking in relation to possible negative or positive (environmental) developments. Dealing with risks and opportunities enables the mental preparation of reactions. It sharpens the understanding of internal processes and structures and the external driving forces of the organization. The risk and opportunity analysis brings together findings from various standard requirements (internal and external issues, interested parties, environmental aspects, binding obligations, emergency situations).

The identified significant environmental aspects are the starting point for the derivation of environmental goals and measures as well as for all control and monitoring processes in the EMS. They are therefore the starting point for improving the environmental performance of an organization.

The focus on the life path is not new, but was formulated more explicitly in ISO 14000. This is intended to ensure that the environmental orientation of an organization is promoted not only within the framework of its own company premises, but also - if possible - on the upstream and downstream production stages.

So far there is no uniform methodology for analysing and evaluating environmental aspects. There are no specifications in ISO 14000 either, except that the process of analysis and evaluation must be plausible and comprehensible. Thus, every organization has to develop its own methodical approach that is on the one hand specific enough and on the other hand practical.

Environmental aspects should be determined in relation to processes, products or services and taking into account the life cycle. This is to avoid an unintended shift of environmental impacts within the life cycle of products or to other organizations ("outsourcing").

It is advisable to differentiate the cadastre according to legal areas such as emission control law, water protection law, hazardous substances law or according to departments. For each legal area (or department), the relevant laws, ordinances and guidelines at EU, state and municipal level are recorded and the requirements (paragraphs) relevant to the organization are extracted from them. In a further step, the duties, responsibilities and deadlines that are relevant for the organization are to be determined. The naming of responsibilities for the implementation of the determined duties to act requires that they are informed about their area of responsibility and, above all, trained.

Life Cycle Assessment LCA

From the cradle to the grave - a life cycle assessment can provide insight into the environmental effects of a product throughout its entire life cycle. Resources are taken from the ecosphere, emissions are released into the air and water and waste are being produced.

All processes in the life cycle of a product are considered, from the extraction of raw materials to the production of the materials, the manufacture of the product, the usage phase and all processes at the end of the product life cycle. A great deal of data on the product system has to be collected and the methodology follows rules that are described in the standards (ISO 14040 and ISO 14044).

Life cycle assessments provide detailed and transparent data on building products and their environmental impact. Among other things, this data forms the basis for environmental product declarations, which in turn are an important component for the well-founded sustainability assessment of buildings.

The methodology of the life cycle assessment according to ISO 14040 or ISO 14044 distinguishes between four phases: target definition and investigation framework, life cycle inventory, impact assessment and evaluation. Our main competence in preparing life cycle assessments is the networking of environmental, cost and technology areas. Economic and

technical aspects should not be overlooked, but rather should be included in life cycle assessments. The most important result of this standardization process is the description of the life cycle assessment as an instrument with successive phases. According to the internationally valid ISO standards, a complete life cycle assessment comprises the following four areas:

- definition of the goal and the scope of investigation (ISO 14040),
- life cycle inventory analysis (ISO 14041),
- impact assessment (ISO 14042).

It is important to note that life cycle assessments must continue to be carried out in accordance with international standards, to the extent necessary for purposes such as marketing, advertising, public relations, environmental statements, ISO certification and important internal purposes, such as be new product systems. For an external report, a complete, detailed and standardized assessment must be prepared and verified by an expert who is not involved in the life cycle assessment study.

The life cycle assessment is an environmental management method. The systematic analysis of all input and output flows over the entire life cycle of a product and presents its potential environmental impacts transparently and in detail. The entire life cycle of a product is assessed in a life cycle assessment, i.e. all stages from raw material extraction through production, application and waste treatment, recycling through to final disposal - that is, “from the cradle to the grave”.

Not only the environmental impact of the manufacturing process of a product itself, but also of its preliminary products are taken into account. Even used auxiliary or operating materials such as adhesives or coolants are included in the analysis, as well as the processes of energy generation, the conveyance and provision of the required raw materials and all transports. The disposal or recycling of the product and its components is also part of the life cycle assessment. Thus, a life cycle assessment is a kind of

environmental protocol of a product that helps the manufacturer or supplier to show potential for improving raw material and/or energy efficiency and to keep the environmental impact and pollution of the product as low as possible.

A life cycle assessment can be divided into four stages. In the first step, the objective and scope of the investigation or the limits of the system are defined. Then, all material and energy flows are recorded in the inventory. The results of this life cycle inventory analysis are then analysed and evaluated for their impact on the environment, as part of the impact analysis. Evaluation and interpretation of results is the final part of a life cycle assessment.

In the first stage, it must be established what the life cycle assessment must be used for and what must be taken into account: Is it a product, the whole company or is it just one process? An important point in a life cycle assessment is to define the boundary of the system or the investigation framework. It defines exactly which factors are taken into account in the investigation and which are not. Depending on how the boundaries are drawn, the outcome of the life cycle assessment may vary accordingly.

In the second stage, the life cycle inventory, material and energy flows are determined. The inventory analysis includes all relevant consumption of raw materials and energy, the type and amount of pollutants that are released into the air, water and soil, and the amount of waste generated. Collecting this data is often the most complex part of a life cycle assessment. The required data is either collected directly or generic data is used. Direct data is usually available for production and preliminary products, while generic data is used for energy supply or transport. These generic values are often mean values for a specific economic area or representative individual values that are taken from data collections. The energy values are evaluated in terms of primary energy and aggregated to the cumulative energy expenditure.

By linking all sub-processes, the relationships between the proportions and the environment are mapped and the inventory

becomes an inventory of the overall system. Therefore, the evaluation of the results of the inventory analysis alone cannot be the basis for drawing conclusions about relative environmental impacts. The results of the inventory analysis provide the starting point for the subsequent impact assessment. The flows that exceed the system boundaries are also taken into account in the inventory analysis. However, these are not included in the calculation of the impact assessment profile included. After the inventory has been calculated, it must be checked iteratively to improve the system boundaries to determine whether additional data or modules are required.

Once material and energy flows have been recorded, they must be evaluated. In the impact analysis, the step from the causes of environmental pollution to its impact on the environment is done with an assessment. The so-called impact categories are defined for this purpose. Important impact categories include the greenhouse effect, ozone formation, soil and water acidification (acid rain), over-fertilization, noise and toxicity to humans and the ecosystem. There are various evaluation methods but the different types of environmental pollution can be reduced to a common denominator and comparisons can be made.

For the steps of standardization and order, the Federal Environment Agency developed its own approach as part of the assessment in life cycle assessments. This is based on the overriding protected assets of environmental policy, such as human health and the structure and function of ecosystems, natural resources and the existing and desired environmental status. As a result, an impact category or an impact indicator result is classified as more harmful, the more serious the threat to the ecological assets in the impact category is. An impact category continues to be assessed as more environmentally harmful the further the environmental status in this impact category is from a state of ecological sustainability.

The last stage of the life cycle assessment is the assessment, through which the results of the life cycle assessment and the impact assessment are assessed in terms of the objective and

scope of the survey. If a product life cycle assessment has been carried out, the results of the life cycle assessment show at what stage of the product life the greatest environmental pollution takes place. In these phases, measures to reduce the negative impact on the environment are particularly effective.

The evaluation of the life cycle assessment is concluded with the derivation of conclusions, the making of recommendations and the creation of a transparent report. The graphical representation of the life cycle inventory results that cannot be assigned to any impact category, the consolidation of the results from standardization and order for ecological priority, the comparison of the hierarchized indicator results as well as the sensitivity analyses, the significance analyses and the overall assessments are elementary components of this process.

Equally, the limitations of the life cycle assessment system describe the interfaces with the environment and other product systems. It is determined which processes are included in the investigation and which are excluded. Other assumptions to be made when establishing the equilibrium area are the definition of cutting criteria and allocation procedures for co-products (i.e. other products in addition to the desired product) for the processes considered in the balance sheet.

In order to reduce the scope and complexity of the examination area to a manageable level, sensitivity analyses and cut-off criteria are used to determine whether a material flow can be cut off. Among other things, criteria such as the mass criterion can be used. The production of the material may only be cut off if the mass fraction of the material flow in the total input in the total output falls below a specified insignificance threshold. Further cut-off criteria can be the energy criterion or also the environmental relevance. With regard to the allocation process, it should be noted that allocations must be used if joint productions arise in the respective product system. The environmental impacts are to be allocated proportionally to all co-products.

Life cycle assessment results are important data for the ecological assessment of buildings. The extent to which a building affects the environment can be described by energy and material flows that arise over the entire life cycle of the building and the products installed in it. The basis for the ecological analysis of a building is the life cycle assessment data of the individual building products it contains. EPDs are an established communication tool for the entire construction industry that convey this data - prepared for analysis at the building level - in a well-founded and transparent manner.

Ecolabel

The European eco-label, the so-called EU environmental flower, guarantees independent, credible and reliable criteria for the award criteria and information about the labelled products. It promotes sustainable and resource-efficient consumption because individual quality and environmental impact assessments are no longer necessary for the products (it is a so-called Type I environmental label in accordance with ISO 14024). This applies both to private consumers and to procurement by companies or the public sector.

An independent award body, the European Ecolabel Council, which develops and updates the award criteria, makes the environmental label a success. The members of the Committee shall be composed of representatives of the Member States, Norway, Iceland and Liechtenstein, as well as civil society organizations and business associations. Together they have the power to comment on any change or introduction of the label. As with any environmental label, this principle strengthens its credibility, acceptance and quality.

The environmental criteria for a product group must go through qualified majority of the Member States before they are adopted by the European Commission and published in the Official Journal of the Community. After the eco-label criteria have been adopted and published in the Official Journal of the EU, manufacturers or importers can apply for the eco-label to the

competent national authorities, where they have to prove that their product meets all environmental and usability criteria. Once awarded, the products with the eco-label can be marketed in all member states and the associated EEA states.

Therefore, the EU eco-label focuses on respecting the environment of products and services. As a voluntary label, it far exceeds the legal requirements. For example, in the case of chemicals, the requirements for the EU Eco-label are much stricter than the corresponding legal regulations. The basis for developing the criteria is Article 6 of the EU Regulation. The criteria must be established on a scientific basis, taking into account the whole life cycle. The following must be taken into account:

- the most important environmental impacts, in particular impacts on climate change, impacts on nature and biodiversity, energy and resource consumption, waste generation, emissions into all environmental media, pollution from physical effects and the use and release of hazardous substances,
- the possibility of substituting hazardous substances with less hazardous substances, either by simple substitution or, where possible, by alternative material use or design,
- the possibility of reducing the environmental impact of products by improving their longevity and reusability,
- other aspects for various criteria are the social and ethical aspects, references to relevant international agreements and conventions and codes of conduct of the international labour organization.

Transparency and broad public participation are ensured through the involvement of representatives from industry, trade, environmental and consumer organizations, trade unions and other interested parties in the development of the environmental criteria vby the Ecolabel Committee of the European Union. In addition, the opinions of manufacturers from third countries are also taken into account.

The application for the award of the eco-label is checked by an independent body, the competent national body for the European eco-label. This ensures that the product actually meets the high environmental requirements. All products that have received the eco-label bear a uniform logo, regardless of the place of manufacture and the type of product. The logo contains information on the most important environmental characteristics of the product. This enables the more than 370 million consumers in Europe to easily identify environmentally friendly products. As a rule, the criteria should be reviewed every four years to reflect current technical progress. This is to ensure that current technical developments can be taken into account.

THE BEST AVAILABLE TECHNIQUES

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The Best Available Techniques (BAT) concept first emerged in the 1960s. It primarily serves as a tool for preventing industrial pollution and setting conditions for Integrated Environmental Permits for larger industrial installations. BAT include technological, technical and managerial solutions aimed to prevent or control pollution and provide for high resource and energy efficiency (EE) of production processes and minimisation of waste. Lessons learnt by various countries prove that the BAT concept has potential for a much wider application, going beyond pollution prevention and control.

Directive 2010/75/EU on industrial emissions (integrated prevention and reduction of environmental pollution) led to a new version which not only adopted the concept of BAT (best available techniques), but further developed it. Annex III of the Directive sets out criteria for determining the best available techniques. These include, for example:

- the use of low-waste technology,
- the use of less dangerous substances,
- promoting the recovery and recycling the substances generated and used in the individual processes and, if applicable, of the waste,

- comparable processes, devices and operating methods which have been successfully tried on an industrial scale,
- advances in technology and scientific knowledge,
- type, impact and amount of the respective emissions,
- times of commissioning of the new or existing systems,
- the time required to introduce better available technology,
- consumption of raw materials and type of raw materials used in the individual processes (including water) as well as energy efficiency,
- the need to avoid or reduce as much as possible the overall impact of emissions and environmental hazards,
- the need to prevent accidents and reduce their impact on the environment,
- information published by international organizations.

The creation of the BAT conclusion should be based on the BAT data sheets, which at least to some extent characterize their content in advance. The involvement of Member States in the context of the comitology procedure must be understood as strengthening the involvement of the State. For this reason, the process is transparent only to a limited extent. Finally, it should be emphasized that the European Parliament was not involved in drawing up the BAT conclusions.

BAT data sheets serve as a guide for the economy and the public in terms of emission and consumption values that can be achieved through the use of special technologies in this field.

As reference documents, they do not set legally binding standards or emission and consumption limit values, but rather support licensing authorities in making decisions about the best available technology in this industry, on the basis of which they are licensed and determine the licensing requirements. They show the status at the time of writing and are reviewed every three years. In some cases, it may be technically possible to

achieve better emissions or consumption values, but due to the costs involved or media considerations, they are not considered appropriate BAT for the whole industry.

Environmental Management System

Circular economy entails gradually decoupling economic activity from the consumption of finite resources, and designing waste out of the system. BAT require minimisation of waste in all technological processes and provides advice for replacing raw materials by waste in many industrial sectors. However, it remains unclear whether ecology or the economy will become the main driver of development and to what extent the overall environmental quality objectives influence this weighing process. Hesitant processing would not only have consequences for a uniform implementation, but could also jeopardize the remarkable position of thermal waste treatment in the context of waste management.

If the overall legal situation regarding the environmental management system is assessed, the following image appears: the EU has increased the requirements for Member States through regular environmental inspections and calls on the Member States to make a proper effort in terms of staff and money. And with good reason: enforcing emission limit values is a central goal of environmental policy. The effects of increased emissions on the world are not only one of the greatest environmental risks, but also associated with environmental damage, the financial magnitude of which is enormous.

On the other hand, according to European Integrated Pollution Prevention and Control Bureau (EIPPCB) at the European Commission's Joint Research Centre, "an environmental management system (EMS) is a technique allowing operators of installations to address environmental issues in a systematic and demonstrable way. EMSs are most effective and efficient where they form an inherent part of the overall management and operation of an installation. Also, it focuses the attention of the operator on the environmental performance of the installation; in

particular, through the application of clear operating procedures for both normal and other than normal operating conditions, and by setting out the associated lines of responsibility. All effective EMSs incorporate the concept of continuous improvement, meaning that environmental management is an ongoing process, not a project which eventually comes to an end. There are various process designs, but most EMSs are based on the plan-do-check-act cycle (which is widely used in other company management contexts)".

Also, BATs are completed to implement and adhere to an environmental management system (EMS), and the implementation of procedures involves paying special attention to the following aspects: structure and responsibility; training, awareness and competence; communication; employee involvement; documentation; efficient process control; maintenance programs; emergency preparedness and response; protecting compliance with environmental legislation; checking performance and taking corrective action.

At the same time, in finalizing the BAT it is important to take into account the requirements of implementing an environmental management system, namely:

- establishing an appropriate environmental policy,
- identifying the environmental aspects resulting from the activities, products or services (existing, previous or planned), in order to determine their significant impact on the environment,
- the identification of the relevant legislative provisions,
- identifying priorities and setting appropriate environmental objectives,
- establishing the structure and programs for the implementation and for the achievement of the set objectives and targets,
- facilitating the activities of planning, control, monitoring, audit and analysis, in order to ensure that the environmental

policy is respected and the environmental management system is appropriate,

- EMS ability to adapt to any type of change.

Environmental policy is considered to be the driving force behind the implementation and improvement of an organization's environmental management system, an aspect encountered in BAT. It must reflect the commitment of the organization's management to comply with applicable law and to pursue continuous performance and improvement. Environmental policy is the basis on which the organization relies to set its environmental goals and targets. Therefore, it is necessary that the environmental policy is clear enough to be understood by stakeholders (both within the organization and outside), reviewed and reviewed periodically to reflect changing conditions and information. It is also recommended that its scope be clearly identified as well as at the BAT level.

In order to highlight environmental issues, the organization must establish and apply procedures to identify them in relation to activities and products or services that can be controlled and influenced by the organization. The application of such procedures aims at identifying and updating those environmental aspects that have a significant impact. Aspects related to the process of identifying significant environmental issues that should be considered as a matter of priority by an organization's environmental management system are:

- the cost and time necessary to perform the analyzes,
- the effective degree of control over the environmental aspects taken into account,
- determining the environmental aspects according to the inputs and outputs associated with their relevant activities, products and/or services (current and previous),
- a preliminary environmental analysis, to take into account all environmental aspects of the organization.

Therefore, the process of identifying significant environmental

issues associated with the activities of the operational units of the organization, must take into account, if necessary, the following factors: air emissions, water discharges, waste management, soil contamination, other issues related to organizations and the local environment. Organizations may select categories of activities, products or services to identify those aspects that are likely to have a significant impact, or may evaluate each product entry and exit.

Therefore, in order to establish and analyze its objectives, an organization must take into account both the legal provisions and the significant environmental aspects, the technological options, its financial, operational, commercial requirements, as well as the points of view of the interested parties. All environmental objectives and targets must be in line with environmental policy. The basic principles are the following:

- environmental commitment and policy,
- environmental policy planning,
- the transposition into practice of environmental policies and targets,
- measuring and evaluating environmental performance,
- the analysis and continuous improvement of EMS.

It is considered that the responsibility for establishing the environmental policy lies with the management of the organization, which is responsible for the application of the environmental policy and at the same time for the provision of data and information that will allow its formulation or modification. This involves an ongoing process that determines the past, present and future impact on the environment of all activities of an organization and includes identifying the conditions imposed by regulations, legislation and business that influence the organization, and identifying the impact on human health and safety, simultaneously with the environmental risk assessment.

It is necessary to have a system for measuring and monitoring the actual performance against the environmental objectives and targets of the organization in the areas of management system and operational processes, which includes assessing compliance with existing environmental legislation and regulations. The main advantages of introducing an EMS are the following: achieving increased competitiveness in a competitive market; the existence of an obvious commitment of the organization's management in the direction of fulfilling its own environmental policy and objectives; proof of the organization's compliance with laws and regulations; a process of continuous improvement.

Among the most important disadvantages are those related to costs, because they require significant resources for implementation: time, money, human resources, logistics; the amortization of this investment is not always made in quantifiable terms; requires operating costs, maintenance, overhaul, renewal of certification, etc. Other disadvantages: it can generate a resistance to change from the operational staff, it can lead to staff reshuffles, it forces the withdrawal from production, for certain periods, of those who participate in training programs, it generates in the first phase possible confusions, difficulties in use of equipment, processing and misinterpretation.

In conclusion, it can be said that the European Parliament is aware of its responsibility to make a positive contribution to long-term sustainable development. The Parliament assumes this responsibility not only in its political and legislative role, but also in its way of functioning and in the decisions it makes on a daily basis.

The European Parliament has therefore decided that its administration will undertake to apply the EMAS (Community environmental management and audit system) standard in order to continuously improve its environmental performance, in accordance with Regulation (EC) No 882/2004. 1221/2009 on EMAS and the ISO 14001: 2015 standard.

Another important element is the degree of generality of the presented system, applicable to all organizations (of any type and with any size), adaptable to various geographical, cultural and social conditions. The success of an environmental management system consists in assuming responsibilities at all existing levels and functions within the organization. Thus, from energy consumption to carbon dioxide, mobility, water and waste, we have established best practices to reduce our impact on the environment and contribute to a more sustainable future.

Energy Management

Global energy consumption is on the rise. It has doubled in the last 40 years and is projected to grow by up to 30% by 2030. Energy production and use generate about 60% of greenhouse gas emissions, which is the predominant cause of climate change. At the same time, more than a billion people still do not have access to electricity and many rely on harmful and polluting energy sources. It is therefore not surprising that addressing the challenges of energy efficiency and climate change is a key part of the 2030 EU Sustainable Development Goals.

At the same time, reducing energy costs systematically and continuously, promoting energy-efficient production, reducing emissions and cultivating an image of concern for environmental protection through the application of BAT are major priorities for all Member States.

In addition, the correct application of energy management procedures involves in-depth knowledge of the specifics of the activity carried out in the given contour, monitoring each of the flows of energy carriers entering and leaving the contour and establishing the links between them. Finally, it leads to the establishment of measures and actions aimed at improving the efficiency of energy use within the respective contour.

The main purpose of an energy management system is to improve energy efficiency and performance in the company. In addition, there are at least requirements that must be met for compliance with legal provisions and for economic reasons.

Energy-consuming processes, systems, activities, products and services need to be analyzed and evaluated. When an energy management system is introduced, it depends on the content aspects and continuous improvements. The energy performance of a company can only be proven if it is made measurable and transparent.

The calculation of energy performance indicators, performed both globally and at the level of energy consumption centers, allows the evaluation of the energy efficiency of each subsystem and the system as a whole by comparing the value of the indicators achieved with a reference value. This time, the evaluation covers both the whole and its component parts, because the degree of detail of the energy audit itself allows the analysis of each consumption center.

Setting up an energy management system is a demanding task that can be easily linked to the design of the environmental management system. There are four structural elements in both management systems. In the environmental management system, they are: leadership, environmental aspects, environmental control and processes, and in the energy management system they are: leadership, infrastructure/technologies, energy sources and processes.

In BATs completed in structural management, the individual work packages between an environmental management system and an energy management system are comparable. Work package management describes the general tasks of company management. The scope work package describes the scope of the energy management system, taking into account stakeholders. Like environmental policy, energy policy pursues long-term strategic objectives that are to be translated into operational energy objectives. The legal provisions applicable in the energy sector must be implemented and complied with by the responsible managers. A second structural element includes infrastructure and technologies, such as buildings, heating, air conditioning, lighting, hot water and compressed air, with their energy consumption and potential savings. The third structural

element, energy carriers, refers to the type and quantity of energy carriers used and how they can be replaced. Principles and essential elements through renewable energy carriers.

Process-related instructions in the Structures Element Processes specify the general environmental and energy-related requirements for the corresponding activities.

On the other hand, management has a model function in the energy management system. It defines the strategic objectives in the form of the company's internal energy policy and provides the necessary resources. As part of a regular management review (management review), it evaluates the achievement of the company's objectives and energy efficiency.

Derived from corporate energy policy and strategic energy objectives, the operational energy objectives provide a benchmark for the company's energy efficiency (energy performance). Energy targets should be as quantifiable as possible and can be determined using energy performance indicators. Where this is not possible, qualitative descriptions should be used. The comparison between the energy inventory and the desired operational energy targets leaves a gap. To close this, the alternatives must be evaluated, followed by an implementation of the necessary measures. The assessments are carried out in economic, environmental and technological terms, and individual measures must be prioritized.

The measures are to be implemented in accordance with the project management rules. In the process of continuous improvement, the implemented measure is to be subject to a conscious control of success. Only then can it be determined whether the operational and strategic energy objectives have been achieved. An internal energy audit underlies this systematic procedure outlined and shows whether the energy efficiency of the building/process/company has improved.

It is worth noting that the scope of the energy management system should take into account the entire life cycle of a product of a service. Energy consumption must be taken into account

throughout the life cycle. Therefore, it is not enough to just look at the company or individual locations. The use of products/ services can be integrated into the energy management system as an outsourced process. As such, the following aspects need to be considered:

- the energy relevance of products and services,
- the relevance of the individual stages and systems of the process,
- the importance of outsourced processes,
- requirements for providers and service providers,
- customer requirements and satisfaction,
- requests from stakeholders.

As in any management system, relevant processes must be identified and described. Relevant process parameters and performance indicators must be recorded. Appropriate measurement methods and equipment must be specified for process control. The results of the measurements allow an evaluation of the processes in terms of their energy efficiency. For continuous improvement, appropriate measures must be selected and, once implemented, must be verified for success. The owner of the process and his powers, authorities and responsibilities must be appointed.

In terms of standardization, ISO 50001 has transformed the energy performance of organizations around the world when it was first published in 2011, giving them a strategic tool to use their energy more effectively and efficiently. It provides organizations with a new framework for developing an effective energy management system. Like other standards for management systems, it follows the "Plan-Do-Check-Act" process for continuous improvement. Based on legal requirements, identifying and analyzing all energy-related considerations creates transparency of energy flows, saves costs, and reduces greenhouse gas emissions. ISO 50001

assists organizations in their search for energy-related goals in a systematic, comprehensive, goal-oriented and sustainable manner.

Summarizing the presented, it can be stated that energy policy is a strategic direction of the company in the field of energy as a resource. This strategy defines the framework for actions and measures to achieve energy goals. It must aim to improve the energy performance of all energy aspects. They are to be determined and continuously improved from an economic and environmental point of view.

In this context, in addition to organizational and technological issues, legal requirements must also be determined and complied with. Operational objectives and measures must be derived from strategic energy objectives. Thus, the management provides the economic, technological and human resources necessary to achieve this goal. With the help of an energy register, energy performance indicators can be determined and priorities can be set. As part of an energy program, the company periodically reviews its energy objectives and verifies the effectiveness of the measures taken. To enable multiplier effects, goals, measures and successes are presented to employees, customers, suppliers and business partners.

Material Management

The specialized literature of recent years records numerous studies dedicated to the recycling of electrical and electronic waste equipment (WEEE) for the recovery of metals from them.

Waste management and recovery is particularly important, both from the point of view of environmental protection and for the conservation of natural resources, and national and international regulations are increasingly restrictive in relation to WEEE.

WEEE contains 60% metal (platinum, gold, silver, palladium, copper, ruthenium, tin, zinc, nickel, indium, gallium, etc.), and is also found in metal components in printed circuit boards - PCI (2 %), equipment with liquid crystal displays - LCD

(12%), cables and metal-plastic mixtures (7%), along with plastic (15%), and other waste (4%) containing also glass or materials ceramics. Consequently, recycling has a high potential to increase the amount of metals available to society, provided that there are also appropriate recycling technologies.

Waste from LCD is a category of WEEE of great interest due to its:

- high accumulation speed, which is directly proportional to the evolution of modern technologies in the field of televisions and monitors,
- high content of toxic and harmful substances,
- inadequate storage and large volume,
- lack of available data on the construction and material content of this equipment,
- lack of a complex recycling technology which, in turn, does not pollute the environment.

For the recovery of valuable metals from WEEE, different processes were investigated: physical-mechanical, uncontrolled open incineration, pyrometallurgy, pyrolysis, biometallurgy and hydrometallurgy, which are in different stages of implementation.

The latest European environmental regulations and energy policies stimulate research on the development of environmentally friendly and energy efficient recycling processes. These requirements are met by hydrometallurgical processes, which are part of the category of less clean processes, they lead to higher performance than pyrometallurgical, because they can be achieved with lower energy consumption, are flexible, with a high degree of selectivity and economical.

The development of efficient recovery technologies requires the development of appropriate mathematical models to describe as a whole the processes and phenomena that can take place in the dissolution of metals contained in WEEE. The models developed in the literature for the recovery of metals from WEEE cover only certain aspects of the dissolution process.

Today, with the development of computer capacity as well as chemical engineering-specific programs, more and more resources are available to researchers, providing the necessary support for the global approach to various engineering issues. One such tool is that of numerical methods, applied in kinetic modeling and experimental design methods. Through their use it becomes possible to know more and identify the parameters involved in the process, and the information thus obtained can help solve engineering problems in the field of design, technology development or process operation.

The development of detailed kinetic models is necessary for the design and optimization of complex chemical systems. These models are also used to determine the rate-determining step in a complex reaction mechanism. In addition, most papers have relied on global kinetic expressions, rather than expressions that highlight the specific influence of operating conditions, which are very useful for the design of complex chemical systems. In addition, to date, no kinetic models have been reported in the literature to describe the process of dissolving metals from LCD plates, cables, batteries, etc., using persulfate as an oxidant.

The first step is to individually test the efficiency of Na2S2O8 in the dissolution process of copper, zinc and brass. Based on the experimental data, three kinetic models with different complexities are used, which adequately describe the output process of the investigated materials. For an accurate description of the geometry changes that occur in the process, a mathematical model of the shrinking/shrinking core (SCM) was created and which, based on the model hypotheses, describes changes, over time, in the diameter and length of the sample to be dissolved.

Chemical leaching experiments were performed in an isothermal reactor with a 150 ml stirring. The reaction vessel was connected to a water recirculation system controlled by a thermostat (Thermostat U1 - Rheotest MLW) with a temperature accuracy of ± 0.1 ° C. Stirring was provided by a magnetic stirrer (Heating Magnetic Stirred FB 15001 - Fisher Scientific). For each experiment, 100 mL of Na2S2O8 solution was introduced

into the reactor, and when the desired stirring rate and reaction temperature was reached, the solid sample was also added to the reactor. Samples of 1 mL of solution were taken at predetermined time intervals (every 5 minutes for 60 minutes and every 10 minutes for the second hour), and the metal concentration in the solution was analyzed using a AAS. Samples of Cu, Zn and brass resulting from the solubilization process were dried and weighed after each experiment.

The common starting point of all metal recycling methods and new mathematical models described during this paper was correlated with the need to develop environmentally friendly and energy efficient recycling processes, but also the development of appropriate mathematical models to describe the processes as a whole. and the phenomena that can occur in the dissolution of metals contained in WEEE.

Air Emissions Management

Air pollution is not always visible, but its effects are very real. When air quality is poor, we pay dearly: human lives are lost, medical costs are high and working days are wasted due to disease. Pollutants emitted into the atmosphere are the cause of serious and current environmental problems, such as acidification, acid rain, the greenhouse effect, the destruction of the ozone layer and climate change. These emitted in one country can be transported into the atmosphere, contributing to or leading to low air quality in other areas.

The analyzes performed at EU level among the causes of air pollution include a series of activities that must be taken into account when evaluating air emissions management such as:

- combustion of fossil fuels: sulfur dioxide emitted from the combustion of fossil fuels (such as coal or oil) is one of the main causes of air pollution; at the same time, cars with internal combustion engines, the ones we use every day, are major sources of pollutants with harmful effects on air quality because they release tens of thousands of tons of harmful gases into the atmosphere every day,

- agricultural activities: ammonia, for example, is a product often used in activities specific to the agricultural sector, while being one of the most dangerous gases in the atmosphere. Moreover, the widespread use of insecticides and pesticides contributes to the pollution of the environment, including the atmosphere,

- mining activities: during the process, dust and chemicals are released into the air causing massive air pollution. This is one of the reasons why this activity is responsible for the deterioration of the health of workers and residents near mining operations,

- household activities: household cleaning products or paint products emit toxic substances into the air that cause environmental pollution.

Because standardized methods of accurate measurement and common location criteria for measuring stations are an important element in assessing ambient air quality in order to obtain comparable information throughout the European Community and whereas up-to-date information on ambient air pollutant concentrations needs to be updated. promptly available to the public.

The Air Monitoring Directive (2008/50/EC) refers to the monitoring of sources of air pollution, stipulating the values of the parameters of the most important air pollution, the measurement method and the limits at source (emissions). The directive was issued to unify the permissible emission limit values for most sources of pollutants. Rules are also issued for continuous (real-time) monitoring, which means once every 30 s. For certain substances or spaces where continuous monitoring cannot be performed, sampling methods must be stipulated. Also, depending on the toxicity, the measurement details for each pollutant and the maximum average values are given (if these values are exceeded the competent forum must be notified. It should be emphasized that the directive stipulates measurements of wind speed, topographic parameters, water data and soil, in order to be able to estimate the pollution that the respective source (factory, traffic) has on the air pollutants.

According to JRC Science for Policy Report (2018) "emission levels associated with the best available techniques for emissions to air refer to concentrations (mass of emitted substances per volume of waste gas) under the following standard conditions: dry gas at a temperature of 273.15 K and a pressure of 101.3 kPa, without correction for oxygen content, and expressed in g/Nm3 or mg/Nm3".

Water and Wastewater Management

Waters within the European Community are under increasing pressure, given the continuous increase in the demand for good quality water in sufficient quantities for all types of uses. It is necessary to develop common definitions for the state of water in terms of quality and, if relevant for environmental protection, in terms of quantity. Ecological targets must be set in such a way as to ensure the achievement of good surface water and groundwater status throughout the European Community and to avoid deterioration of water status at Community level. The objective of achieving good water status for each river basin must be pursued, so that the measures taken with regard to surface waters and groundwater belonging to the same ecological, hydrological and hydrogeological system are coordinated.

In this sense, the Water Framework Directive, no. 60, adopted in September 2000 (EC Directive). Integrated river basin management is required in all Member States of the European Union in order to restore and maintain surface water quality at Community level.

In order to provide an assessment of the general state of surface water in each catchment area or catchment sub-area of the respective river basin, a sufficient number of surface water bodies shall be monitored. When selecting these bodies, Member States shall ensure that, where appropriate, monitoring is carried out at points where:

- the flow rate is representative of the river basin district as a whole, including points on large rivers where the catchment area exceeds 2 500 km2,

- the volume of water present is representative of the river basin district, including in the case of lakes or large reservoirs,

- significant bodies of water cross the border of the Member State,

- sites are identified in accordance with Decision 77/795/EEC on the exchange of information and at other sites necessary to estimate the amount of pollutants transferred across the borders of the Member State and entering the marine environment.

It is important to note that the monitoring control is performed for each monitoring site for a period of one year, during the period covered by the river basin management plan for: the indicator parameters for all biological quality elements; indicator parameters for all hydromorphological qualitative elements; indicator parameters for all physico-chemical qualitative elements; pollutants included in the list of priority substances that are discharged into the river basin; other pollutants discharged in significant quantities into the basin, unless the previous monitoring control exercise demonstrated that the body of water was in good condition and that the study of the impact of human activity does not in any way indicate a change in the impacts on the body. the water. In these cases, the surveillance check shall be carried out once every three river basin management plans.

At the same time, the protection of surface waters (inland surface waters, territorial seas, inland coastal waters) - (Directive 11/2006/EC) requires Member States to adopt limits for concentrations of the following substances: organohalogen compounds and substances which may form such compounds in the environment. aquatic; organophosphorus compounds; organotin compounds; substances that have been shown to have carcinogenic properties in or via the aquatic environment; mercury and its compounds. cadmium and its compounds; persistent mineral oils and petroleum hydrocarbons; persistent synthetic substances that may interfere with any use of water.

In addition, in accordance with European directives unless stated otherwise "emission levels associated with the best available techniques for emissions to water given in these BAT conclusions refer to concentrations (mass of emitted substances per volume of water), expressed in μg/l or mg/l. Moreover, averaging periods associated with the BAT refers to either of the following two cases: in the case of continuous discharge, daily average values, i.e. 24-hour flow-proportional composite samples; in the case of batch discharge, average values over the release duration taken as flowproportional composite samples, or, provided that the effluent is appropriately mixed and homogeneous, a spot sample taken before discharge".

Waste and By-Products Management

The European Commission presented on the 3rd of December 2015 a revised package of measures on the circular economy, including the so-called package of measures on waste, which includes four legislative proposals. It addresses environmental issues with transnational implications, including the effects of inadequate waste management on greenhouse gas emissions, air pollution and waste disposal, including in the marine environment. The package requires that valuable waste materials be effectively reused, recycled and reintroduced into the European economy and therefore contributes to the transition to a circular economy and to reducing the EU's dependence on the import of raw materials by promoting prudent use, efficient and rational management of natural resources.

The legislation contains a target for reducing landfilling and sets minimum requirements for all extended producer responsibility schemes. Producers of products covered by these schemes must assume responsibility for managing the waste status of their products and will be called upon to contribute financially. Mandatory extended producer responsibility schemes have also been established for all packaging. Member States will endeavor to ensure that, from 2030 onwards, none of the waste that can be recycled or subjected to any other form of recovery, in particular municipal waste, will be accepted in landfills.

Preventing waste generation not only reduces waste management costs for the companies involved, but also saves resources and energy, which leads to reduced production costs. In particular, taking environmental protection measures for small and medium-sized enterprises is considered to be an important strategy. It is possible to make some improvements and changes and changes in the use of raw materials, facilities and processes without further investment: indeed, it is possible to reduce real investment costs.

It goes without saying that the spread and development of technology for "cleaner production" is important, as a concrete means of preventing the production and recycling of hazardous waste. However, this does not necessarily mean that it is a success in many member countries. In addition to the legal administrative measures to enforce and promote "cleaner production", it is essential to increase the awareness of hazardous waste producers about the management of the environment.

In order to promote the proper management of hazardous waste on site, it is necessary to include hazardous waste as part of environmental management systems. The introduction of hazardous waste audits would be an effective part of hazardous waste management.

With regard to waste disposal, the following objectives are set at Member State level:

- reducing the quantities of waste to be stored (by avoiding the occurrence, material and energy recovery),
- reducing the quantities of biodegradable waste to be deposited (by introducing selective collection and recovery of certain types of municipal waste and by mechano-biological treatment of municipal waste stored),
- ensuring the conditions for the storage of hazardous waste treated for the purpose of detoxification,
- implementing waste management plans.

At EU level, special attention is paid to municipal waste. These are a topical issue, taking into account the potential danger to health and the environment, as well as the fact that they contain a number of recyclable materials whose capitalization results in saving natural resources and reducing material and energy consumption.

Quantities of waste destined for disposal by storage or incineration represent losses of matter and energy that contradict the principles of sustainable development. Organizational deficiencies (lack or rudimentary organization of sanitation services in rural areas), as well as the use of facilities/technologies for inadequate disposal of ecological management, make this activity have a negative impact on the environment and pose a risk to public health. Municipal waste management involves their collection, transport, recovery and disposal, including monitoring of landfills after closure.

If there is a collection and transport system, good quality waste can be relatively recycled under working conditions. The problem is in the case of waste with a low content of usable components. Barriers to the recycling of waste with a low content of useful substances such as galvanizing sludge are as follows:

- high water content → the need to dry the sludge → high cost,
- the quantity generated by each factory is very small → waste collection and transportation takes a long time,
- the difficulty of the constant operation of the recycling and smelting installation,
- the need to analyze, mix and harmonize the composition,
- reduced awareness of the natural resources crisis.

From an environmental point of view, promoting the recycling of waste with a low content of heavy metals such as sludge is important. To this end, the collection system will need to be established, and improved awareness and collaboration with

generators, collectors, recyclers and non-ferrous metal smelting facilities is needed.

According to JRC Science for Policy Report (2018), BAT conclusions for waste treatment concern "the following activities specified in Annex I to Directive 2010/75/EU, namely:

- the disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities: biological treatment; physico-chemical treatment; solvent reclamation/regeneration; recycling/reclamation of inorganic materials other than metals or metal compounds; regeneration of acids or bases; recovery of components used for pollution abatement; recovery of components from catalysts; oil re-refining or other reuses of oil,

- the disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities and excluding activities covered by Council Directive 91/271/EEC of the 21st of May 1991 on urban waste water treatment: biological treatment; physico-chemical treatment; pre-treatment of waste for incineration or co-incineration; ash treatment; treatment in shredding of scrap metal, including waste electrical and electronic equipment and end-of-life vehicles and their components,

- the recovery or a mixture of the recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities and excluding activities covered by Directive 91/271/EEC: biological treatment; pre-treatment of waste for incineration or co-incineration; ash treatment; treatment in shredding of scrap metal, including waste electrical and electronic equipment and end-of-life vehicles and their components".

Therefore, the component on waste management - considers measures related to the development of efficient waste management by modernizing and complementing the integrated municipal waste management systems by developing "green islands", digitized for selective waste collection at the local level,

by including in the economic circuit secondary raw materials from materials recovered from the population in the form of waste, and stimulating the circular economy. The measures are also supported by increased monitoring and control capacity for waste shipments.

In addition, waste management must be based on certain principles and priorities: the principle of protection of primary resources establishes the need to minimize and streamline the use of primary resources, especially non-renewable ones, focusing on the use of secondary resources, prevention, preparation for reuse, recycling, other recovery operations, for example energy recovery and last but not least disposal.

The economic and social evolution, the increase of the living standard and the consumption possibilities of the population, have as a consequence the alarming increase of the quantity of waste produced and stored. The diversification of waste composition and quantitative accumulations produces a negative impact on environmental factors, which tends to exceed the self-regulatory capacity of ecosystems.

Monitoring Management

Consumption and emission levels are very location-specific and fluctuate widely, as far as quantification and monitoring are possible. According to the philosophy of an integrated BAT concept, media effects must be taken into account when assessing each environmental aspect and associated emission reduction measures.

Access to the environmental inspection chosen by some Member States does not seem to focus on the state's responsibility for environmental protection objectives and the implementation of the guidelines through the chosen "pragmatic" approach. The consequence of this basic decision is the transfer of monitoring tasks to the private sector and, in this respect - to a not negligible part - to the facility owners themselves. This development is problematic in itself, as there is very limited monitoring and potential dissatisfaction with the reduction of emission limit values cannot be detected.

In national implementation (monitoring management), which is designed to be strong and intensive under European law, is put into perspective in the form of environmental inspections. Instead of formalized state administrative controls, which would mean costs for achieving the central objectives of environmental protection, monitoring management involves a "pragmatic" approach to environmental inspections.

Instead of compensating for the lack of control at least through a stricter administrative criminal sanctions regime, impunity has been developed as an "incentive" for critical self-control achieved through monitoring management.

We further present the management of monitoring in order to minimize the indirect effects, as well as the direct ones of the operation of a cooling system. In this case the integrated BAT concept takes into account the environmental performance of the cooling system in the context of the overall ecological performance of an industrial process.

In the case of existing cooling systems, there are fewer short-term options to avoid emissions through technological measures; Here the emphasis is on reducing emissions through optimized operation and optimized system control. Many parameters, such as available space, useful resources and legal requirements, can be fixed in existing systems and leave only a few degrees of freedom for change. However, the general concept of BAT can be seen as a long-term goal that can be reconciled with the replacement cycles of parts of existing installations. Thus, specific direct and indirect energy consumption is an important environmental aspect in all cooling systems. The specific indirect energy consumption is the energy consumption of the process to be cooled. If the cooling configuration used is not optimally cooled, this indirect energy consumption may increase, which may lead to an increase in process temperature (ΔK) and is specified in kWe/MWth/K.

In the energy industry, for example, it is necessary to monitor the transition from single cooling to circulating cooling, which leads to an increase in energy consumption for ancillary equipment

and a decrease in the efficiency of the thermal cycle. Higher efficiency pumps and fans are available to reduce specific energy consumption directly. Resistances and pressure drops in the process can be reduced by designing the cooling system and by using drip removers and low-strength internal cooling towers. Proper mechanical or chemical cleaning of surfaces ensures a low resistance of the process during operation. In the case of single passage systems, an appropriate design consists of avoiding dam areas and turbulence and ensuring a minimum water flow (0.8 [m/s] for heat exchangers; 1.5 [m/s] for capacitors).

For unique systems with an extremely corrosive environment, BAT is the choice of materials with high quality stainless steel content or other materials with similar functional behavior. In the case of circulation systems, BAT involves monitoring the concentration cycles used and the aggressiveness of the process substance to allow the selection of materials with adequate corrosion resistance.

In the case of cooling towers, BAT is the use of appropriate facilities, taking into account water quality (solid content), the expected increase, temperatures and erosion resistance, as well as the choice of construction materials that do not require chemical preservation.

Therefore, where BAT focuses on monitoring and reducing environmental impact by improving the functioning of the system it refers to:

- optimizing the treatment of cooling water by controlled dosing and choosing additives for cooling water in order to reduce environmental pollution,
- regular maintenance of the system,
- monitoring the operating parameters, such as the corrosion rate of the heat exchanger surface, the chemistry of the cooling water and the degree of increase and leakage.

From the above it appears that all BAT key conclusions apply to the new systems. When it comes to technological changes,

the use of existing cooling systems may be limited. In the case of small, mass-produced cooling towers, a change in technology is considered technically and economically feasible. With large systems, monitoring technological change is usually expensive and requires extensive techniques, and economic evaluation takes many factors into account. In some cases, relatively small modifications to these large systems by partially replacing the device may prove practical. For wider technological changes, a detailed analysis and assessment of environmental impact and costs may be required.

Noise Management

The purpose of Directive 2002/49/EC on the assessment and management of environmental noise is, on the one hand, to establish a common approach of Member States to avoid, prevent or reduce harmful effects on the population (including discomfort) caused by environmental noise, and, on the other hand, the development within the EU of measures to reduce the noise emitted by major noise sources. According to the directive, the urban administration of ambient noise is achieved by:

- Monitoring environmental issues by requesting the competent authorities of the Member States to make strategic noise maps for main roads, main railways, major airports and urban agglomerations, industrial areas and ports using harmonized noise indicators such as: Lzsn and Lnoapte. These maps will be used both to assess the number of people affected by noise across the EU and to draw up action plans for managing noise and its effects.

- Informing and consulting the public about the exposure of the population to noise, its effects on the population, and the measures that can be taken to limit the noise level, Elaborating action plans for the management of ambient noise and its effects, taking into account the strategic noise maps.

- The main advantages offered by the creation of strategic noise maps inside the agglomerations are; the development of new residential areas - when establishing the new locations, it

will be possible to take into account the noise level of the existing neighboring areas, by simulating prior to the construction steps, the effect of the new area (with estimated associated road traffic) in terms of zonal noise.

• for already existing urban areas - the creation of the strategic noise map allows informing the population (of all those interested) on the noise levels in the areas of interest (via Internet, local electronic panels, periodicals, etc.), which is in fact one of the requirements of European legislation.

• quiet areas - their detection can be done taking into account the data provided by strategic noise maps (possibly through global noise maps that highlight these quiet areas), so as to fulfill a dual purpose and to keep the areas as the Quiet Areas, in case there are no quiet areas, measures should be taken to become quiet areas (i.e. regarding public parks and gardens by making difference maps showing the expected effect of the chosen measure to reduce noise).

• traffic - knowing the strategic noise map for road and tram and train traffic, as well as for airport traffic, based on traffic studies or real traffic data, can allow conclusions to be drawn on areas where noise is high, as well as the simulation of the effects of the different methods of reducing the noise level that can be implemented, choosing the optimal method (through difference maps that highlight the reduction of noise).

The directive does not set limits on noise indicators or on the measures to be taken by action plans. The threshold values and the measures that may be taken in the framework of the action plans shall be determined by each Member State.

Decommissioning Management

In accordance with the procedures applicable at EU level, each Member State concerned shall designate a program coordinator responsible for the programming, coordination and monitoring of the decommissioning program at national level. The program coordinators shall present the annual work programs and the

Commission shall adopt them together with the financing decisions, in accordance with the examination procedure defined in Article 5 of Regulation No. 182/2011 on the mechanisms for control by Member States of the Commission's exercise of implementing powers.

Decommissioning involves both routine industrial decommissioning works, such as the demolition of the turbine room, as well as highly specialized activities involving existing radioactive materials on site. Planning the correct order of activities and identifying the procedures and methodologies to be applied is of particular importance.

One of the requirements for decommissioning management is the implementation of an integrated decommissioning management system. It must integrate the organization's structures, resources and processes to achieve the objectives of radiological safety, health, environment, safety, quality, economic elements and other considerations. The activities carried out in each process must be carried out under controlled conditions, using current procedures, instructions, drawings and other appropriate means that must be approved and periodically reviewed to ensure their adequacy and effectiveness.

The main goal of the management system must be to achieve and improve security by:

- sharing, in a coherent manner, all the requirements for the management of the organization,
- a description of the planned and systematic actions required to ensure adequate confidence that all these requirements are met.

Also, the integrated management system must allow the planning and implementation of decommissioning activities, with the main purpose of ensuring that decommissioning is carried out in radiological safety conditions. In order to fulfill the responsibility for radiological safety during decommissioning activity, the authorization holder must establish and implement

radiological safety policies and must ensure that radiological safety aspects take precedence.

It should be specified that the authorization holder must take into account decommissioning in the phases of location, design, construction, commissioning, operation and any major modification of the installation, so as to facilitate decommissioning activities, to ensure the maintenance of installation records, to limit contamination and activation and to avoid the accumulation of waste. A final decommissioning plan must:

- to be in agreement with the decommissioning strategy proposed for the installation,
- be consistent with the documentation for demonstrating safety for decommissioning,
- be supported by a radiological safety assessment,
- describe the decommissioning activities, the duration and the final state of the installation after the completion of the decommissioning activity, the works to be performed in each decommissioning stage - if a phased decommissioning approach is applied - to describe the installations, systems and equipment necessary for carrying out decommissioning activities,
- describe the human resources necessary for the safe conduct of decommissioning activities,
- describe the management of residual materials and waste,
- describe the principles of the management system,
- describe the final radiological characterization program after the completion of the decommissioning activity.

Decommissioning management also aims at nuclear decommissioning, which involves a series of specific processes, some of which take place in parallel. The process is completed when the site has been completely cleared to the level where the land can be reused or redeveloped, without any restrictions (enjoys the status of "regenerated site") or subject to certain

restrictions (has the status of "disused site"), in accordance with the national law.

In accordance with the relevant legal provisions, the European Commission has opted for the management of nuclear decommissioning assistance programs through the indirect management mechanism. Under this management method, the Commission entrusts implementing bodies with budget implementation tasks, but overall responsibility and accountability for the act of managing the EU budget rests with the Commission. Therefore, it must ensure that implementing bodies have adequate control and monitoring structures.

Operators of nuclear installations must draw up and update a final decommissioning plan including a financing plan and specifying all the activities required, as well as their timing and estimated costs. EU support must be implemented in accordance with these plans, while maintaining the highest level of security at all times.

In conclusion, BAT documents are increasingly being developed into a central tool for the technical protection of the environment in Europe. This goal, which the European Commission has been pursuing for years, is clearly reflected in the European Industrial Emissions Directive (FDI) of the 24th of November 2010. The central point is, above all, the higher level of binding leaflets. BAT associated with FDI.

Furthermore, the directives formalize and support in its specifications the regular updating of leaflets in the BAT process, as well as their implementation and subsequent monitoring at national level. For example, if the incineration of waste is taken into account, it remains to be noted for the time being that, as for many other sectors, there are no BAT conclusions for FDI for this scope, as the existing BAT prospectus has been prepared in accordance with the old IPPC directive and without going through the comitology procedure does not become more mandatory. The current discussion suggests, however, that the content of the BAT conclusions in the sense of FDI will not

differ significantly from the BREF conclusions. However, it is not clear whether, in addition to the quantitative BAT conclusions associated with emission values, all qualitative BAT conclusions on structural, organizational and operational measures can be converted into BAT conclusions in the sense of FDI. The concept of prior art in relation to BAT documents and their mandatory nature is the central element of the changes if the above-mentioned directive provisions are taken into account. It is therefore logical to address the considerations and shed more light on the consequences of the development of the BREF factsheet on waste incineration and its application.

In order to identify the best available techniques and to limit emission imbalances in industrial activities in the European Union, fact sheets (reference documents) on best available techniques (hereinafter referred to as BREF) should be prepared, revised by the exchange of information with stakeholders, while the key elements of BREFs (hereinafter referred to as BAT conclusions) are determined by the committee procedure. To this end, the Commission should use the comitology procedure to establish guidelines for data collection and for the preparation of BAT reference documents and appropriate quality assurance measures. The BAT conclusions should be used as a reference for setting the conditions for authorization.

The stated purpose is for the authorization requirements to be based on the best available techniques. The permit must contain all the measures necessary for a high level of protection of the environment as a whole and to ensure that the installation is operated in accordance with the general principles of the basic obligations of the operator. The permit must also contain emission limit values for pollutants or equivalent parameters, equivalent technical measures, appropriate regulations for the protection of soil and groundwater and monitoring regulations.

To this end, the competent authority may set emission limit values that deviate from the emission values associated with the best available techniques in terms of values, deadlines and reference conditions used, provided that the results of the

emission monitoring can demonstrate that emissions do not correspond to the emission values associated with the best available techniques have been exceeded. Here, competent authorities should be able to set emission limit values that deviate from these values. Such deviations should be based on an assessment based on clearly defined criteria. The emission limit values of this Directive shall not be exceeded.

On the other hand, if, in special cases, when reviewing and updating the conditions of authorization, it is found that it may take more than four years from the publication of a decision on BAT conclusions to introduce the best available new techniques, the competent authorities may specify a longer period under the terms of the authorization, if justified on the basis of the criteria set out in this Directive.

The BVT Prospectus is an opportunity to give adequate impetus to the challenges of the European Framework Directive on Waste and Resource Protection and also to revitalize issues of climate protection and pollutant removal to improve the circular economy. Internationally, the BAT concept is becoming an effective environmental policy instrument, and is gradually strengthening its position in the development of industrial policy. Stringent BAT requirements do not jeopardise industrial development and economic growth, but instead help harmonising progress towards achieving a Sustainable Economic Growth.

SUMMARY OF GREEN ECONOMY, GREEN SKILLS, GREEN ENTREPRENEURSHIP

Ana-Maria STANCU

Green economy

The concept of Green economy is widely debated but, in a nutshell, it refers to an economy that generates increasing prosperity while maintaining the natural systems that sustain us.

The Inclusive Green Economy in EU Development Cooperation is a reference document outlining the EU's vision and approach towards a green economic transition. According to this document:

"The green economy is a pathway to sustainable development. It is based on an economic model that differs from traditional ones in that it takes due consideration of environmental and social externalities, and does not focus on GDP growth as the ultimate goal. Instead it focuses on resource efficiency and natural capital as the building blocks of the economy, recognizing that environmental degradation undermines long-term economic growth and human development.

An inclusive green economy is associated with a wealth of opportunities, for both people — to improve their living environments and have decent jobs — and businesses — to increase

benefits through more efficient production practices that generate savings, taking advantage of the growing market for environmental goods and services, etc."

There are three main aspects of the Green economy:

- Economic aspects that refer to the way we produce, the way we consume and the way we use our resources efficiently,
- Environmental aspects that refer to the protection of the biodiversity and reduction of pollution,
- Social aspects that refer to providing decent living standards.

A very important part of the Green economy is represented by circular economy. Circular economy means that we should use for as long as possible products, materials and resources, so that we don't produce new ones. This means repairing, recycling and care not to waste anything.

Green skills

According to the document Green Skills, elaborated by the National Bureau of Economic Research which identifies in a very scientifically manner what will be the future green skills, there will be four groups of work tasks that are especially important for green occupations:

- Engineering and technical skills: hard skills encompassing competences involved with the design, construction and assessment of technology usually mastered by engineers and technicians. This know-how is needed for eco-buildings, renewable energy design and energy-saving research and development (R&D) projects.
- Science skills: competences stemming from bodies of knowledge broad in scope and essential to innovation activities, for example physics and biology. These skills are especially in high demand in each stage of value chains and in the utility sector, which provides basic amenities such as water, sewage services and electricity.

- Operation management skills: know-how related to change in organizational structure required to support green activities and an integrated view of the firm through life-cycle management, lean production and cooperation with external actors, including customers. Such skills are important, for example, for sales engineers, climate change analysts, sustainability specialists, chief sustainability officers and transportation planners.

- Monitoring skills: technical and legal aspects of business activities that are fundamentally different way from the remit of engineering or of science. They refer to skills required to assess the observance of technical criteria and legal standards. Examples are environmental compliance inspectors, nuclear monitoring technicians, emergency management directors and legal assistants.

But soft skills such as skills related to design thinking, creativity, adaptability, resilience, and even empathy are also regarded as critical for the new arising type of Green economy.

Green entrepreneurship

Of course, as industries will change, new entrepreneurship opportunities will arise. In order to take advantage of the new developing context, an entrepreneur should know subjects such as environmental protection, connection to ecology or redesign of existing business processes are addressed in order to get closer to this topic and also to understand it.

Green entrepreneurship refers mostly to the activity of consciously addressing environmental and social problems and need, and coming up with brilliant innovative entrepreneurial ideas that will bring a solution to them. These ideas have a high level of risk which has a positive effect on the natural environment while at the same time it helps maintain financial sustainability.

Basically, a green entrepreneur is the one who develops a product or a service that is green by design and all the products and processes that come out of that business idea are also green from the moment the venture is set up.

Green mentoring

The emerging new phenomenon of Green Entrepreneurship, like we expect, is generating a growing demand of new professionals equipped with the skills necessary to support the entrepreneurial activities combined with the specific domain of the environmental areas, green skills.

Green mentoring refers to the support and to encourage the new professional profile for Green Entrepreneurs.

Green mentoring means:

- To support the creation of or the transition to "green companies" by means of measures such as waste prevention, ecodesign, recycling or efficiency,
- Provide technical knowledge to help entrepreneurs to identify green gaps in the market and to find corresponding solutions,
- Increase the employability of unemployed workers, women and young people providing support and guide to start a career as entrepreneurs in the field of green economy.

Green technologies

Green technologies, also known as clean technologies, refer to devices that monitor, model and conserve the natural environment and resources and decrease the negative impacts of human involvement.

Green technologies can be used in several areas:

- Purification and waste management: water purification, air purification, sewage treatment, solid waste management – all with the purpose of recycling the resources and prolonging their life, without wasting anything,
- Sustainable energy: technologies that have been in usage which include wind power, hydropower, solar energy, geothermal energy, and biomass/bioenergy and energy conservation,
- Agriculture: sensors to detect and spray less treatment, to give less water, to have less pesticides.

THE ROLE OF TRADE UNIONS AND RELATED CSOs ON ENVIRONMENTAL ISSUES

Agim SELAMI

Trade Unions

When discussing environmental issues, it is important to acknowledge that it is a problem that affects every person in the world. Regarding this specific topic, we will focus on the part of the world population that is economically active, or employed. As of 2019, the global economically active population consisted of around 5.7 billion people, of which 3.3 billion (57%) were employed, making this group a crucial element in the fight against climate change. Working for the common interest of this group of people, are organizations established by workers from similar areas known as trade or labour unions. As affected actors that can address both safe working conditions and the well-being of the workers, trade unions are very much involved when it comes to the labour force. Operating with a verified trade union can create numerous advantages for both the company and the employees. Workers and employers can communicate through unions, which helps to establish trust and commitment among the workforce and guarantees that problems are detected and treated quickly and fairly. The

union represents workers' best interests while dealing with employers, stands against any kind of mistreatment of workers, and encourages fair work opportunities. Employees who work outside and employees with few or no breaks to rest, as well as workers with limited access to water are especially vulnerable to extreme weather condition and other environmental issues.

European Trade Union Confederation (ETUC)

One such organization that highlights the concerns of workers is the European Trade Union Confederation (ETUC). Founded in 1973, the ETUC now has 89 member organizations from 39 European countries. Among its many objectives, the organization also stands for efforts to combat climate change while promoting a Just Transition for workers. During the 2019 Congress of the Confederation, the ETUC has unveiled its Action Plan for a Renewed Social Contract for Europe, which includes projects calling for immediate intervention on the climate crisis using EU regulations, policy initiatives, and specialized finances.

Not only does the guide provide valuable information on the importance of trade unions in climate change, it also offers insight on what actions are national trade unions taking in addressing the grave threat. There are several levels on which trade unions can act on.

European Level

Trade unions must petition the European Commission to carefully observe the creation and execution of national adaptation policies, particularly with regard to the evaluation of climate change's socioeconomic consequences and ensuring trade union participation. Trade unions must adopt steps to safeguard workers against the harmful impacts of climate change and demand that employer's associations build a strong and sustainable societal conversation on the effects of climate change on worker health and safety in order to provide advice to businesses on how to protect their employees. During the 2019 Congress of the Confederation, the ETUC has unveiled its Action Plan for a Renewed Social Contract for Europe, which includes projects calling for immediate intervention on the

climate crisis, among other areas. Moreover, unions to demand for European institutions to develop regulatory tools that reflect the heightened danger that employees experience and establish protective measures for them, since weather does not respect geographic borders, thus making European intervention is essential.

State Level

It is essential that labor unions engage in the creation of state climate change adaptation plans. The Confederation recommends that trade unions advocate the establishment of comprehensive and effective action that help detect and reduce the negative consequences of climate change at the national scale. Trade unions should demand that governments enact legislation that recognizes the greater danger that employees endure and protects them from the effects of global climate change. Trade unions must demand that governments provide consistent and structured public funding for adaptation measures and welfare programs, particularly for those that would be most impacted, public workers, workers in the medical field, etc.

Company Level

As previously stated, climate change will have a great effect on businesses, with many industries being especially hard impacted. Among the consequences are health and safety issues, as well as potential job losses. To prevent or mitigate the negative effects on workers, trade unions must request for public authorities and employers to engage in discussion aimed at tracking and evaluate the dangers and advantages associated with climate change at the sectoral level, regarding employment, knowledge and skills required, as well as health and safety risks. Workers will benefit from education on the dangers of global warming to their health and the possible ramifications for their industry and working circumstances. Additional beneficiary action includes creating educational booklets or other means of instructions that will include best practices and relevant safety steps for workers and employees. Workers and the parties that advocate for them should use all available instruments they

possess at the corporate level to assist workers in reducing the risks associated with climate hazards. Employers should be urged to create and sign company collective agreements that adjust working conditions and health and safety procedures to reduce worker dangers. Such arrangements are unquestionably one of the most effective strategies to assure worker protection. Companies should collect information, conduct assessments, and change firm policy using the information and consultation methods of trade unions and other work councils. These situations may also enable employees to have a say in the company's environmental strategy and footprint. The works council should also analyze the training requirements for workers to ensure that they have the necessary skills and competencies to adapt to climate change, as well as provide guidance on future investments to ensure that they can keep their jobs and adjust to potential climate change repercussions.

Collaboration

The best way to achieve sustainability is through collaboration. Organizations and sectors in general require other necessary expertise and assets that will help them navigate the environmental challenges. Leaders from all sorts of backgrounds believe that addressing sustainability issues like climate change would demand unprecedented collaboration. Establishing partnerships with other trade unions, businesses, NGOs, civil society organizations, and state and local government establishments can vocalize workers' opinions, recognize the effects of climate change, encourage the implementation of adaptation policies, and expand the trade union perspective. Established in 2008, the Climate Coalition is one such example. This alliance on climate justice is formed by more than eighty organizations (environmental, trade unions, youth councils, and citizen organizations. "Sing for the climate," "Bankroute," and "Claim the Climate" are just a few of the organization's prominent campaigns. Another organization with similar goals and actions is the Belgian Alliance for Climate Action. Formed jointly by The Shift and WWF, the alliance represents a podium for Belgian organizations that want to reduce GHG

emissions, demonstrate greater climate aspiration, and reach their sustainability targets using Science Based Targets.

CIVIL SOCIETY ORGANIZATIONS (CSOs)

As one of the principal societal actors connecting the citizens with the government and legislative areas in a nation, civil society organizations play a key role when it comes to environmental issues. It is critical in proposing new climate change laws, initiatives, regulations, and practices, as well as ensuring governments are held responsible for their obligations, highlighting the lack of coordinated government action to address environmental issues, and helping to ensure that national lawmaking does not overlook the vulnerable citizens in society. The provision of the latest information on vital issues is one of the most essential responsibilities that civil society organizations may offer in global environmental governance. Governments frequently resort to non-governmental organizations to cover research gaps that can obstruct successful decision. Many civil society organizations are also committed to producing reliable, latest research and data on the most critical environmental challenges. Moreover, civil society organizations can be the driving force for creating political will for innovation that will combine both environmental and social aspects. Non-governmental organizations can act as platforms for more diverse debates and as gateways for sharing knowledge about worldwide actions and issues that can help the governments. Numerous CSOs across the world are working on developing solutions for environmental issues. The following initiatives are part of the long list of organizations that take action by involving community leaders, everyday citizens, legislators, and others.

Climate Action Network (CAN)

This worldwide network consists of over a thousand CSOs from numerous countries across the world and its focus lies in taking action to fight climate crisis. CAN is working to develop a political action plan to ensure equity and justice. In addition, the network strives to ensure that governments are held accountable

for their responsibilities towards the Paris Agreement and that they include ambition climate goals into all of their short- and long-term social and economic policies in order to keep global warming below 1.5°C. The network works to guarantee that optimal results come from the United Nation climate change discussions. It pins down, analyze, and impacts the direction of climate discussions thus guaranteeing that governments concur on the most comprehensive result from the discussions with clear solutions to overcome the climate emergency. It focuses on ending the use of fossil fuels by stopping the flow of public money into fossil fuel projects.

Citizens' Climate Lobby (CCL)

The organizations' strategy to climate education aims to build a broad, long-term basis for climate action that cuts across all geographic regions and political ideologies. Its efforts are concentrated toward the adoption of fair, efficient, and sustainable climate change solutions by focusing on shared values and motivating followers to work in accordance with the concerns of their local communities. The core values of the organizations are focusing on a national carbon fee and dividend, working together as a community in search of solutions, establishing relationships and good communication with citizens, other organizations, elected officials. Meanwhile, the many volunteers of the organization can be found in numerous local divisions across the world. These divisions use a range of strategies to gain political backing for climate action, all of which are tailored to their local politics and history.

350.org

Established in 2008, the organization is striving to end the use of fossil fuels and create a society where everyone can benefit from sustainable energy. Among its values are one that embraces novel solutions for this global environmental crisis that affects everyone. The organization takes part in many initiatives across the world, including protesting coal plants, advocating for renewable energy and reducing funds to fossil fuels. Their achievements include their involvement against the Keystone

XL and Dakota Access pipelines, as well as banning fracking in cities in South America. The organization has also been a part of major campaigns like the People's Climate March and has prompted over a thousand schools, organizations, and cities to withdraw trillions of dollars from fossil fuels.

C40

It is a global organization that encourages city-level action and is addressing environmental issues by formulating and applying policies and initiatives that reduce greenhouse gas emissions and climate risks. One of the aims of the organization is to reduce its member cities' collective carbon emissions within the next ten years. The association assists communities in working efficiently, exchanging ideas, and taking effective and long-term climate action. The latest business plan of the organization highlights how its team will help the cities involved and their mayors in reaching their objectives. One of the goals of C40 is to support its member cities in implementing robust, scientific strategy that is aligned with the Paris Agreement's 1.5°C. Any city looking to become a part of the C40 must achieve specific performance criteria.

Conclusion

Both trade unions and civil society organizations have an important role to play when dealing with environmental issues. While trade unions deal with aspects affecting employees, companies and all the rules and regulations in the work place, civil society organizations deal with aspects on a legislative and at times more personal level, which is why both roles are equally important to every society. Both roles can affect the dealing with the climate crisis, on a legislative, corporate, and national level, and partnerships between civil society organizations and trade unions are also encouraged, as seen from the examples in this chapter, to help unify the approach to fighting this environmental issue.

SOCIAL GENDER EQUALITY IN ENVIRONMENTAL ASPECT

Agim SELAMI

Socially Just Energy Transition

By setting up the Green Deal, the EU has opened a new chapter in adding socially just quality to the ongoing energy transition. The previous strategy Energy Union, on the contrary, was mostly focused on ensuring energy security in the EU by reducing the dependency on Russian gas. One of the key components of the Green Deal is to "leave no place or person behind" which signals the attempt to be supportive of an inclusive process.

Some key aspects of the Green Deal about its socially just aim include:

- it is a growth strategy leading to a fair and prosperous society,
- it protects the health and well-being of citizens from environment-related risks and impacts,
- it must put people first,
- it pays attention to the regions, industries, and workers who will face the greatest challenges,

- it brings together citizens in all their diversity, with national, regional, local authorities, civil society, and industry working closely with the EU,
- it puts sustainability and the well-being of citizens at the center of economic policy,
- the risk of energy poverty must be addressed,
- the transition is an opportunity to expand sustainable and job-intensive economic activity; and
- the circular economy offers great potential for new activities and jobs.

This shows that the citizens' consumer, job-related, and well-being agencies matter, and that this is to be achieved in broad cooperation with all concerned parties in a fair and just manner. Additionally, there is an increased attempt to align social, climate, and energy policies of the EU. As part of the Clean Energy Package, member states are required to produce National Energy and Climate Plans (NECPs) to report on the five dimensions of the Energy Union – namely energy security, the internal energy market, energy efficiency, decarbonization of the economy, and research, innovation, and competitiveness. Even in these climate and energy plans, member states have to define and propose measures to address energy poverty or the inability to satisfy the necessary household needs, under the section on the internal energy market.

The socially just principles of the Green Deal originate from the environmental, climate, and energy justice concepts. Environmental justice is about sharing environmental risks; including the diversity of communities, and; participation in political processes which create environmental policies. Climate justice is about sharing burdens and benefits between countries or individuals and enhancing legitimacy in decision-making. Energy justice by definition aims to provide all individuals with safe, affordable, sustainable, and secure energy sources, whereas both the benefits and burdens involved in the

production and consumption of energy services are shared, and communities are treated fairly in the energy decision-making. These similar concepts pave the way for projecting a future in which democratic and good governance principles, as well as the agency of consumers and citizens, are enhanced. This refers to especially the dignity of consumers and recognizing their various vulnerable features, such as material deprivation, gender, background, access to fuels and infrastructure, the social systems, and the energy markets. Research on the just transition tends to emphasize the human dimension of the energy transition, referring to workers, communities, consumers, and citizens (Figure 7).

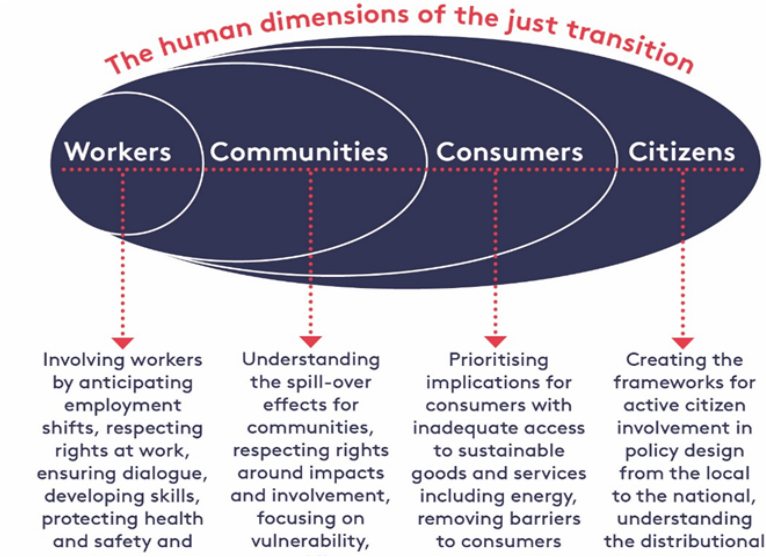

Figure 7: *Human dimensions of the just transition. Source: Robins & Rydge (n.d.)*

GENDER EQUALITY

Gender as a horizontal topic has been more frequently integrated into climate, environmental, and energy topics. There is an increasing body of literature exploring the links between gender quality and environmental questions. However, there are still many levels in which gender inequality prevails. The role of women as consumers, citizens, and job market participants is highlighted.

Energy poverty is recognized within the EU in the Third Energy Package through the mention of vulnerable groups. However, these are language-wise are gender-neutral e.g. 'consumer'. There are attempts to collect sex-disaggregated data and differentiate the consumer behavior and energy consumption between men and women. Gender is linked to energy use through economic, biological/ physiological, and socio-cultural dimensions. Regarding the first, women with low incomes are disproportionately found as heads of households either as single-parent families or, due to their greater longevity than men, living alone at pensionable age. The biological/ physiological dimensions are for example that age is a significant factor in dealing with heat and cold stress, with young children and older people being particularly vulnerable. The socio-cultural aspect is that women's energy needs and consumption patterns differ compare to men but also among women, factors like marital status and employment influence energy consumption.

Research on exploring the links between gender and energy use concludes:

- There is a need for awareness about disregarding the gender dimensions in outreach materials to appeal to an 'average' citizen.
- Gender should also be considered when studying technologies intended for decreasing emissions because 'smart' technologies are built on earlier culturally held assumptions which also include gender.

- Energy projects should take into account not only gender balance but also employ gender-reflexive research.

Women are more often linked to energy poverty through their economic situation, such as single-mother households who do not have enough monetary resources to live with their child; women have lower wages than men; women have associated child-care tasks that make them more vulnerable in terms of lower net income and fewer hours to work; and women live longer than men, so many single-person households are female pensioners on a small pension. Female-headed households are more affected by the high energy prices. Overcoming difficulties and helping others to overcome them; exclusion from a productive economy; vulnerability to negative mental health impacts; lack of social protection throughout the life course; and unpaid caring are the dimensions identified as potential factors for increasing the likelihood of women falling in energy poverty. Even in households, women control energy costs which constitute emotional labor for them.

The most frequent myths about gender and energy use are the following:

- energy-poor women is homogenous and vulnerable;
- energy saves, modernizes, and empowers women; and
- gender inequality and women's poverty as a result of energy poverty;
- counter-discourse of women as agents; and
- energy empowers women.

There is a complex relationship between gender equality and a set of policy outcomes. The gender pay gap aggravates the process of environmental degradation in the EU. The positive impact of gender inequality on CO2 can be related to consumption behaviors. Energy poverty reduction appears to increase gender equality in employment. Energy poverty reduction re-balances gender inequality in health.

Furthermore, women and men use energy differently, especially in regard to food, hygiene, household effects, health, and leisure. Woman-headed households, for example, have higher emissions than man-headed households, because of a gendered division of labor as women are spending more time at home, while men have higher emissions related to transport and leisure activities. Gender consumption patterns show that men eat more meat than women and drive longer distances, potentially leading to higher total energy use by men. There are gendered practices concerning energy renovations. For example, household renovation usually falls under the men's sphere of interest, as a result of traditional gender roles and work division.

In addition, there is a gender imbalance in the energy industry workforce and energy decision-making. Women tend to be more for renewable energy linked to environmental concerns and intergenerational equity, while men would more favor fossil fuels related to control and power over nature. Women scientists in the EU held a stronger preference for research on renewable energy and energy conservation, compared to men in their field, and were concerned with integrating social issues into energy research. Research finds that men's ideas are implemented to a greater degree than women's. A greater understanding of the gender gap in energy-related industries, as well as more widespread acknowledgment of the positive potential of gender diversity in this sector, would likely promote more sustainable energy practices, support innovation, expand opportunities for women, and encourage greater social engagement in energy-system change. Social norms, resources, and other hardships affect women's interest in modern energy. Engendering policy discourses can be through highlighting the following narratives: gender-neutral; women empowerment; gender mainstreaming; and social inclusion.

One tool of women's empowerment is gender-balanced budgeting. Gender budgeting can be an instrument of democratic governance. The key objective of gender budgeting is to show the revenue and spending activities' impacts on gender

equality to increase sensitivity to gender equality within the budgetary process. Gender equality is not recognized as a policy objective in all budget titles. Similarly, gender mainstreaming is not recognized as an implementation method in all budget titles. Several budget titles are not fully transparent, and they tend to include several umbrella items that bring together diverse policy objectives. This jeopardizes financial and budgetary accountability and raises the risk of gender equality objectives being overshadowed. The absence of gender-disaggregated data not only makes it impossible to evaluate EU policies' actual gender equality effects but also poses impediments to budgetary accountability.

A proposed gender budgeting methodology includes these steps:

- Identifying capabilities key to women's and/or men's well-being and gender equality,
- Matching those capabilities with policies to define policies' gender equality spectrum and impact,
- Analyzing policy objectives and resource allocations in the light of conclusions reached in the previous step,
- Identifying beneficiaries and participants of projects and programs financed by the budget and
- Reflection & recommendations for policy change

Lastly, gender can be integrated into all phases of the policy cycle as shown in Figure 7.

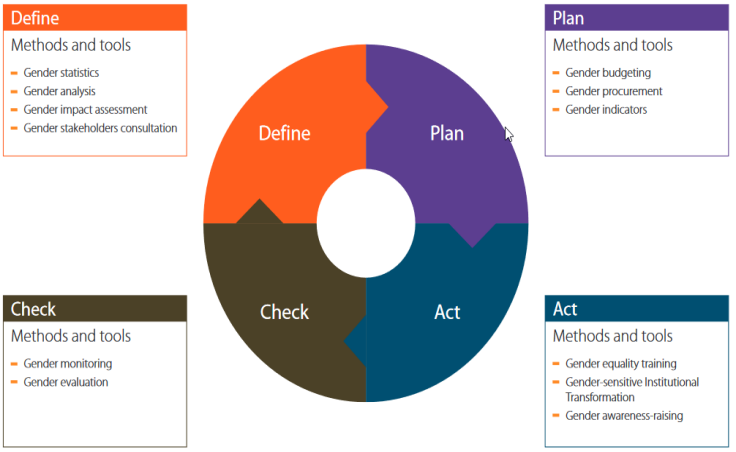

Figure 7: *Suggested integration of gender into all phases of the policy cycle. Source: European Institute for Gender Equality (2016)*

As a cross-cutting issue, the role and relevance of gender is increasing with environmental matters. Gender equality can be evaluated in multiple ways, but the research has shown that both studying and enforcing gender equality in climate and energy areas is still novel and deserves more attention, especially in the context of the inclusive and just Green Deal.

SOCIAL EQUALITY

The socially just energy transition with the Green Deal aims to allow citizens active participation in the transition. This refers to their employment opportunities through green jobs, their various characteristics as consumers, including vulnerable ones, and their various agencies of being a citizen in the EU.

The consequences of climate change and environmental challenges affect more the poor population. Air pollution is a problem for developing countries that strike a delicate balance between environmental protection, health, and energy for growth. Ethnic and poor populations are more likely to be exposed to coal pollution. Similarly, coal-dependent regions

draw their economic growth from coal and their populations is that at the highest risk of material deprivation due to the energy transition. On the other hand, just transition must move beyond the jobs argument. This process must seek fairness and equity concerning the major global justice concerns such as ethnicity, income, and gender.

The EU legislation aims to support all customers, but in particular consumers in vulnerable circumstances. It is the responsibility of the member states to ensure the best level of support to consumers in vulnerable situations. This may mean addressing both social policy to support customers with paying their bills and energy policy aimed at improving energy efficiency, along with other relevant policy areas, with the overall aim of creating a fair, equitable, and inclusive market. The term "vulnerable consumers" means it is necessary to reflect the fact that it is not only the final customer who should receive support but rather all vulnerable consumers. The Third Energy Package refers to energy poverty, however, the definition of energy poverty - where it exists - varies between member states.

Energy poverty is the inability to attain a socially and materially necessitated level of domestic energy services. There are two common types of measurements of energy poverty. There is the expenditure approach based on actual or required fuel spent and the consensual approach that uses subjective indicators. However, there could be a mismatch between the objective (measurable) and subjective (opinion/self-reported) measure, as a household could be energy-poor according to the first criterion and non-energy-poor according to the second or vice versa. The consensual approach tends to prevail in collecting data on and measuring energy poverty. There is a tendency to construct composite indicators and indices to measure energy poverty. Some of the most relevant and primary indicators of EPOV include the 2M metric which states that energy-poor is a household if its share of income on energy is larger than twice the national median; and M/2, according to which a household is affected by energy poverty in case its energy spending is lower than half the national median energy spending.

The prevailing understanding of energy poverty drivers includes the triangle of low incomes, low energy efficiency, and high energy costs. Academics have situated these drivers within a transition process. Due to the inherited subsidized energy prices and inefficient residential sector from the previous system, the former communist countries have been facing energy poverty. But, energy poverty as a multidisciplinary and complex phenomenon is embedded in the current system. As shown in Figure 8, there are many drivers and factors shaping energy poverty.

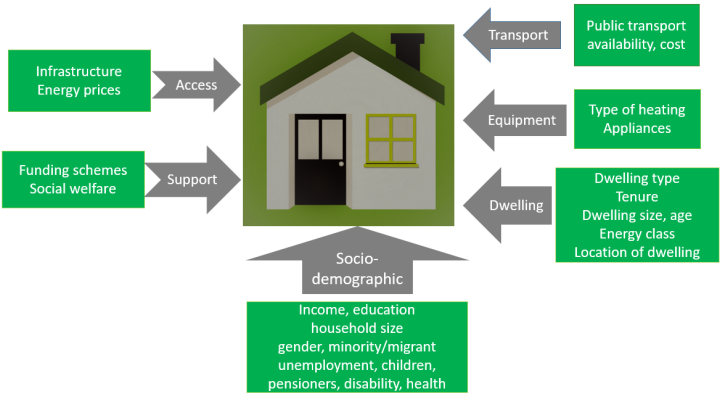

Figure 8: *A complex set of factors co-creating energy poverty.*

Three European regions have high shares of energy poverty: Eastern Central Europe, the Mediterranean countries, and Ireland and the UK. All three regions have a poor quality of the residential buildings that contribute to energy poverty; whereas for the UK, Ireland, Eastern Central Europe the income was mentioned as a factor. Causes of energy poverty in the Mediterranean countries are the need for cooling and the lack of adequate heating systems, while Eastern Central Europe suffers from energy poverty because of lack of proper infrastructure, cold homes, and systemic deficiencies in social welfare.

The dominant approach to addressing energy poverty is through energy efficiency. Until the Green Deal, but still, currently, the EU's dominant approach towards the low-carbon transformation is in the expectation that households can invest in energy efficiency measures. This invited a techno-economic approach to alleviating energy poverty. The need to consider the wellbeing of energy vulnerable households highlights the human rights of energy consumers, and the need to rethink the role of the state's involvement in the energy market. The 'right to energy' activists put pressure on utilities and the role of the state by requiring enhanced protection of vulnerable consumers through a ban on disconnections, social prices, and funded energy efficiency interventions. At the same time, there is a criticism about portraying citizens only in the capacity of consumers, since they are more than just passive participants in the system needing to pay their bills and play a predetermined role in the energy transition.

CONCLUSION

Assoc. Prof. Efsun DİNDAR
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Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, the European Green Deal will transform the EU into a modern, resource-efficient and competitive economy.

European Commission described the European Green Deal as "Europe's man-on-the-moon moment". With this plan, the European Union aims to achieve climate neutrality by 2050, protect nature and sustainably transform the European economy and society. The European Green Deal was adopted by the European Commission in December 2019. Since then, its provisions have been elaborated upon in more detail in respect to key sectors; energy, transport, circular economy, food, agriculture, climate protection and the preservation of biodiversity.

Creating more green jobs is also one of the focuses of the European Green Deal which in addition to several other priorities, aims to improve the well-being and health of citizens and future generations by providing future-proof jobs and skills training for the transition.

What is the European Green Deal and which role does it have for future generations? The outputs of this project

can also contribute to Europe's green transition. In this regard, the project aims to disseminate the Green Deal among young people, to raise awareness on environmental and climate issues, to increase knowledge about the Green Deal, to create synergies and to protect the health and well-being of citizens from environmental risks and impacts.

In the fields of education and training, it is crucial to provide youth with career advice on green jobs and offer lifelong learning strategies, including upskilling and reskilling elements that are related to green jobs.

Young people see the European Green Deal as an opportunity for a just transition towards the foundation of a just and sustainable society in Europe. For this reason, the Green Deal should be ambitious in its intended outcomes in order to earn the support of young people who fear that the ecological and economic consequences of inaction towards climate change would be catastrophic.

Youth have the potential to contribute to national discourses on climate change and green economy through campaigns, advocacy and other forms of public engagement. They can voice their opinions in global and national forums and contribute to shaping policies. This handbook is specifically targeted at young people and identifying opportunities through which they can play a role in accelerating action towards a green economy.

The Green Deal sets up a historic momentum in rethinking not just the way we use energy, but we reach the decarbonization goal. At the core of the energy system are the citizens which vary in their

socio-demographic features, consumer profiles, and levels of affordability, but citizens with multiple agencies and capabilities. Gender is finally getting the deserved place about plans, strategies, and ideas around energy use and environmental outcomes. Social issues are less about poverty and more about who puts households and citizens in poverty. However the Green Deal is very ambitious, and social and gender equality issues need to be raised further, by using the inclusive participation channels the Green Deal offers.

This requires in-depth system reforms and reconsidering the role of multiple sectors.

Young people are engaged and concerned about the environment and their future. Still, it is recommended that we further support them through education and awareness-raising to enhance their understanding of the activities needed to limit the worst impacts of climate change, including circular behaviour.

Young people are the builders of tomorrow and must play a more significant role in advising business and political leaders on the most critical issues faced by the planet and its present and future generations. The European Green Deal commits the Commission to develop a European competence framework for schools, training institutions, and universities to develop attitudes, skills, and knowledge on climate change and sustainable development.

Looking to the future, educating young people is key to the transition to a green deal. It is also crucial to develop an appropriate and interdisciplinary curriculum on environment to move closer to sustainable development and the Green Deal goals. We must strive to train young people in the practical implementation of the Green Deal. Based on exciting experiences, young people will come to think more meaningfully and make better decisions. It is necessary to empower them to bring about visible change because, after all, they are the most important actors for the future of our planet.

***Figure 9**. Sectors that need to be considered for a just transition. Source: Industriall_Global_Union, (2017)*

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This book aims for expressing the key notions of the European Green Deal, environmental issues and sustainability, legislations related to the environment, the best available techniques, concepts of green entrepreneurship and social goals in the environmental aspect which was presented in December 2019 by the European Commission. The book provides an overview of the European Green Deal like an executive summary which contains what is it and what is not.

While explaining the main environmental issues, book delivers how to chieve environmental sustainability, how to sustain the green economy, how to develop green entrepreneurship skills, what are the ways of managing environmental systems and last but not least, applications of policies and legislations based on the environment, European approach and directives and what kind of solutions produced in different societies. The book especially targets the youth who are the main actors of the new green future.

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