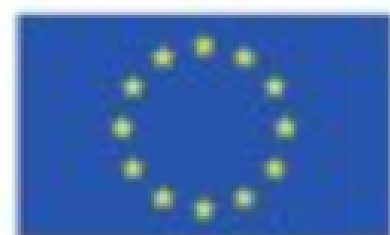


CRITICAL THINKING IN GREEN JOBS

Key to effective environmental
problem solving



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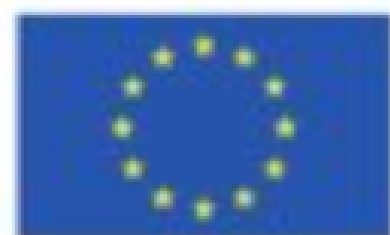
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AGENDA



Critical thinking in the decision-making process	06	Introduction to critical thinking	01
Tools to support critical thinking	07	The importance of critical thinking in green jobs	02
Critical thinking and innovation	08	Basic cognitive processes	03
Ability to argue and communicate	09	Logical fallacies and cognitive biases	04
Summary	10	Analysis of environmental problems	05



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INTRODUCTION TO CRITICAL THINKING



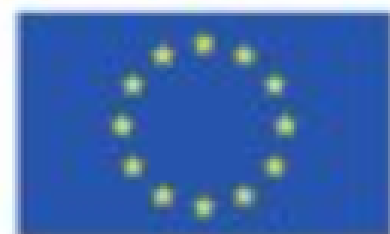
Definition of critical thinking:

Critical thinking is the ability to actively and systematically analyse information, evaluate arguments and form conclusions based on evidence."



The importance of critical thinking in daily life and work:

critical thinking influences decision-making in various areas of life, including the environmental professions.



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WHAT ARE GREEN JOBS?

Green professions are those that support environmental protection and sustainable development.

- **Renewable energy specialist** - installation and operation of renewable energy systems.
- **Environmental management expert** - development and implementation of environmental policies.
- **Environmental engineer** - design of technologies to reduce environmental impact.
- **Recycling worker** - processing waste for reuse.
- **Forester** - sustainable forest management.
- **Green architect** - urban green space design.

These actions are key to a low-carbon economy and tackling climate change.



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CRITICAL THINKING IN GREEN JOBS



Solving complex problems - Analysis and assessment of the environmental impact of activities.



Eco-innovation - Creating and implementing new sustainable solutions.



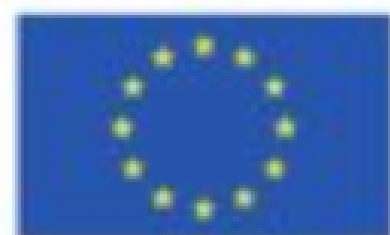
Informed decision making - Choosing the best strategies with minimal environmental impact.



Adaptation to changing conditions - Rapid response to new climatic and regulatory challenges.



Education and impact on society - Imparting knowledge and promoting an environmentally conscious attitude.



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THE THREE BASIC COGNITIVE PROCESSES IN CRITICAL THINKING



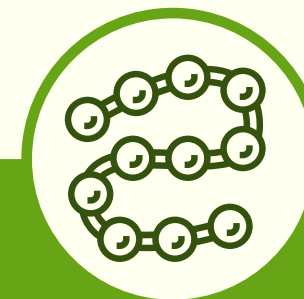
ANALYSIS

It is the ability to break down information into its component parts, identify relationships between them and assess their significance. Analysis enables you to understand a problem in a deeper way, which is crucial for sound decisions.



EVALUATION

It involves assessing the value and reliability of information, arguments and sources. Critical thinking requires the evaluation of evidence and conclusions, which helps to reject erroneous assumptions and select the most logical solutions.



SYNTHESIS

It involves combining different information, ideas and perspectives into coherent wholes. Synthesis is key to creating new ideas and approaches that are innovative and effective in solving problems.



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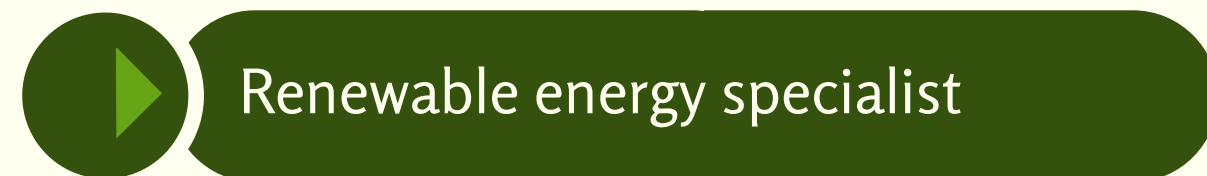
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INFORMATION ANALYSIS PROCESS

Breaking down complex information into its constituent parts, identifying relationships between them, and assessing their significance.

Examples of Application of Analysis in Green Jobs:



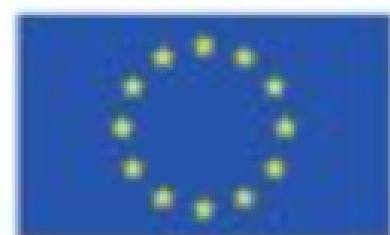
Analysing the performance of solar and wind energy systems to optimise their operation.



Investigating the impact of new regulations on emissions and developing a reduction strategy.



Analysis of pollution data to develop water treatment technologies.



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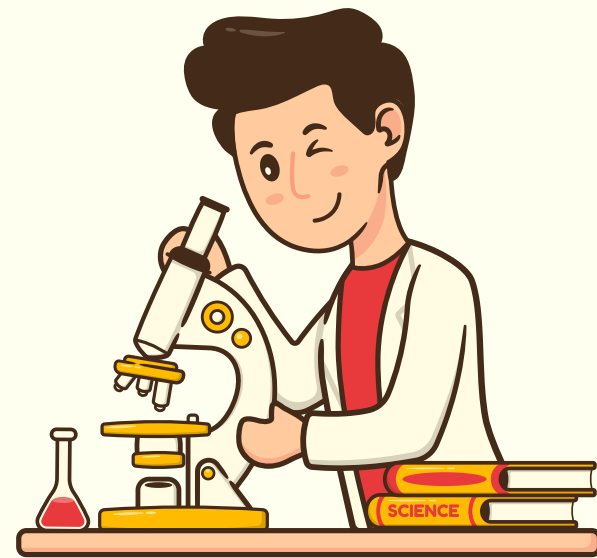


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Examples of Synthesis in Practice:

- Combining data from different sources.
- Using information from scientific research, environmental and technological data to develop comprehensive solutions.
- Creating sustainable projects
- Integration of environmental, social and economic elements in the planning of cities or energy systems.



The importance of Synthesis in the Creation of Innovative Solutions

- Creative approach to problems
- Synthesis enables the generation of new ideas by combining different perspectives and knowledge.
- Increasing efficiency
- Combining different solutions and technologies can lead to more effective and sustainable results.
- Holistic approach
- Enables consideration of broad context and interdependencies, which is key in green professions to achieve sustainable goals.



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Information Evaluation Criteria

- **Source credibility** - assessing whether the information comes from reliable and recognised sources.
- **Timeliness** - checking whether data are up-to-date and relevant to the current situation.
- **Relevance** - examining how relevant the information is to the issue under consideration.
- **Precision** - verifying the accuracy and detail of data.



Examples of Impact Assessment in Green Jobs

- **Analysis of the environmental impact of construction projects** - assessing potential ecological impacts such as pollution, loss of biodiversity, or changes to the landscape.
- **Assessing the effectiveness of green technologies** - investigating whether the technologies introduced actually reduce emissions and resource consumption.
- **Verification of sustainability policies** - assessing whether the strategies implemented by organisations lead to real, long-term environmental benefits.



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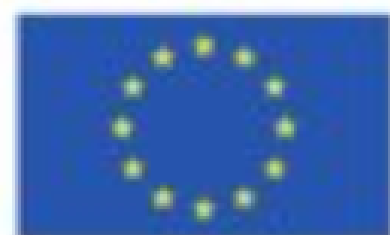


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WHAT ARE LOGICAL FALLACIES?

Definition: Logical fallacies are irregularities in reasoning that lead to false or erroneous conclusions, even though they may appear logical at first glance.



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EXAMPLES OF TYPICAL LOGICAL FALLACIES:

- **Ad hominem argument** - attacking the person instead of their arguments, e.g. "You can't be right because you're not an expert".
- **Vicious circle (petitio principii)** – assuming the truth of what is to be proven, e.g. "It is true because this authority says so".
- **False dilemma fallacy** - presenting only two options when there are more possibilities, e.g. "Either you are with us or against us".
- **Post hoc ergo propter hoc** – assuming that if something came after something, it was caused by it, e.g. "Wearing an amulet brings good luck because I won the lottery thanks to wearing it".
- **Cognitive biases** - These are systematic errors in thinking that affect the way people process information and make decisions. They cause assessments and decisions to be often distorted by subjective factors instead of being based on objective data.



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HOW BIASES AFFECT DECISION-MAKING?

▶ Confirmation of existing beliefs

Willingness to search for, interpret and remember information in a way that confirms beliefs already held.

▶ Heuristics

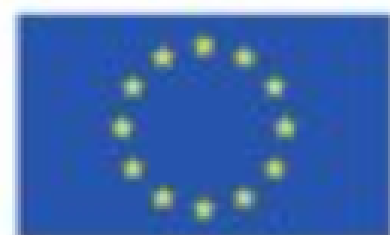
Biases lead to simplistic thinking and the use of "rules of thumb" (heuristics) that can lead to erroneous conclusions.

▶ Limited perception

Biases can limit the ability to see alternatives or new perspectives, which can lead to less accurate or sustainable decisions.

▶ Resistance to change

Cognitive biases can cause resistance to change, even in the face of new and better information.



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TYPES OF COGNITIVE BIASES

Confirmation bias

The tendency to search for and interpret information in a way that confirms already existing beliefs, while ignoring contradictory data. For example, a believer in a particular conspiracy theory may ignore contrary evidence, focusing only on information that supports their point of view.



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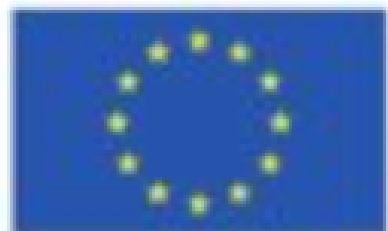
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TYPES OF COGNITIVE BIASES

Anchoring effect

It involves an over-reliance on the first piece of information (the anchor) that influences all subsequent decisions and judgements. Example: During price negotiations, the first amount proposed often sets the benchmark for further negotiations, influencing the final outcome.



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TYPES OF COGNITIVE BIASES

Fundamental attribution error

The tendency to attribute other people's behaviour to their personality traits rather than to the external situation. For example, when we see someone clumsily dropping something on the floor, we may assume that they are inattentive, rather than considering the possibility that they were simply tired or distracted.



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IMPACT OF FALLACIES AND BIASES ON GREEN JOBS

▶ Erroneous risk assessment

Biases, such as availability heuristics, can lead to overestimation or underestimation of environmental risks, influencing poor environmental decisions.

▶ Lack of innovation

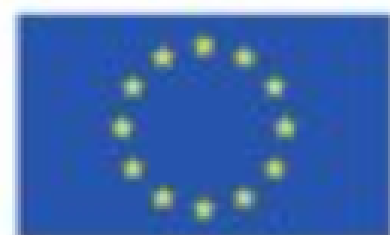
Logical errors, such as the fallacy of the false dilemma, can limit the perception of available options, leading to the selection of less effective technological solutions.

▶ Ignoring alternatives

Biases, such as the confirmation bias, can lead to alternatives, perhaps greener, being ignored in favour of those already known or preferred.

▶ Poor project management

Attribution errors can result in incorrect attribution of the causes of project problems, leading to ineffective corrective action and further exacerbating problems.



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ANALYSIS OF ENVIRONMENTAL PROBLEMS

SWOT analysis:

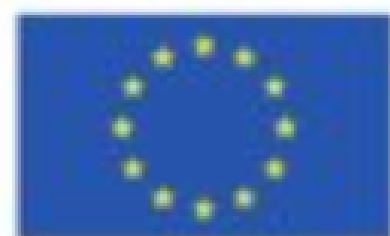
Assessment of the Strengths, Weaknesses, Opportunities and Threats associated with an environmental problem. It helps to understand what are the internal and external factors influencing the problem.



ANALYSIS OF ENVIRONMENTAL PROBLEMS

Cause and Effect Analysis:

Use of cause-effect diagrams (e.g. Ishikawa diagram) to identify the root causes of a problem and to understand what effects these causes may have.



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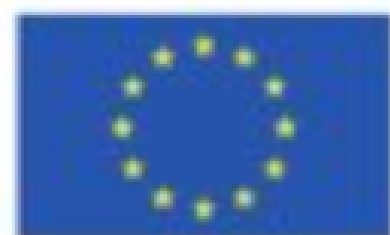
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ANALYSIS OF ENVIRONMENTAL PROBLEMS

Life Cycle Analysis (LCA):

An assessment of the environmental impact of a product or process at all stages of its life cycle, from raw material extraction to disposal. LCA helps to identify the stages where improvements can be made to reduce environmental impact.



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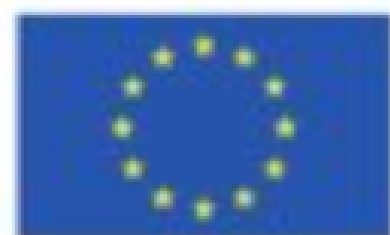
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ANALYSIS OF ENVIRONMENTAL PROBLEMS

Cost-benefit analysis (CBA):

Assessment of the economic and environmental costs and benefits of different solutions to environmental problems. CBA helps to select the most cost-effective and sustainable solution.



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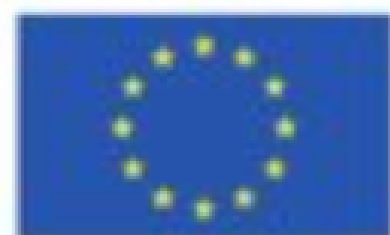
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ANALYSIS OF ENVIRONMENTAL PROBLEMS

Scenario analysis:

Creation of different future scenarios based on current data and projections. This helps to assess how different strategies may affect the environment in the long term.



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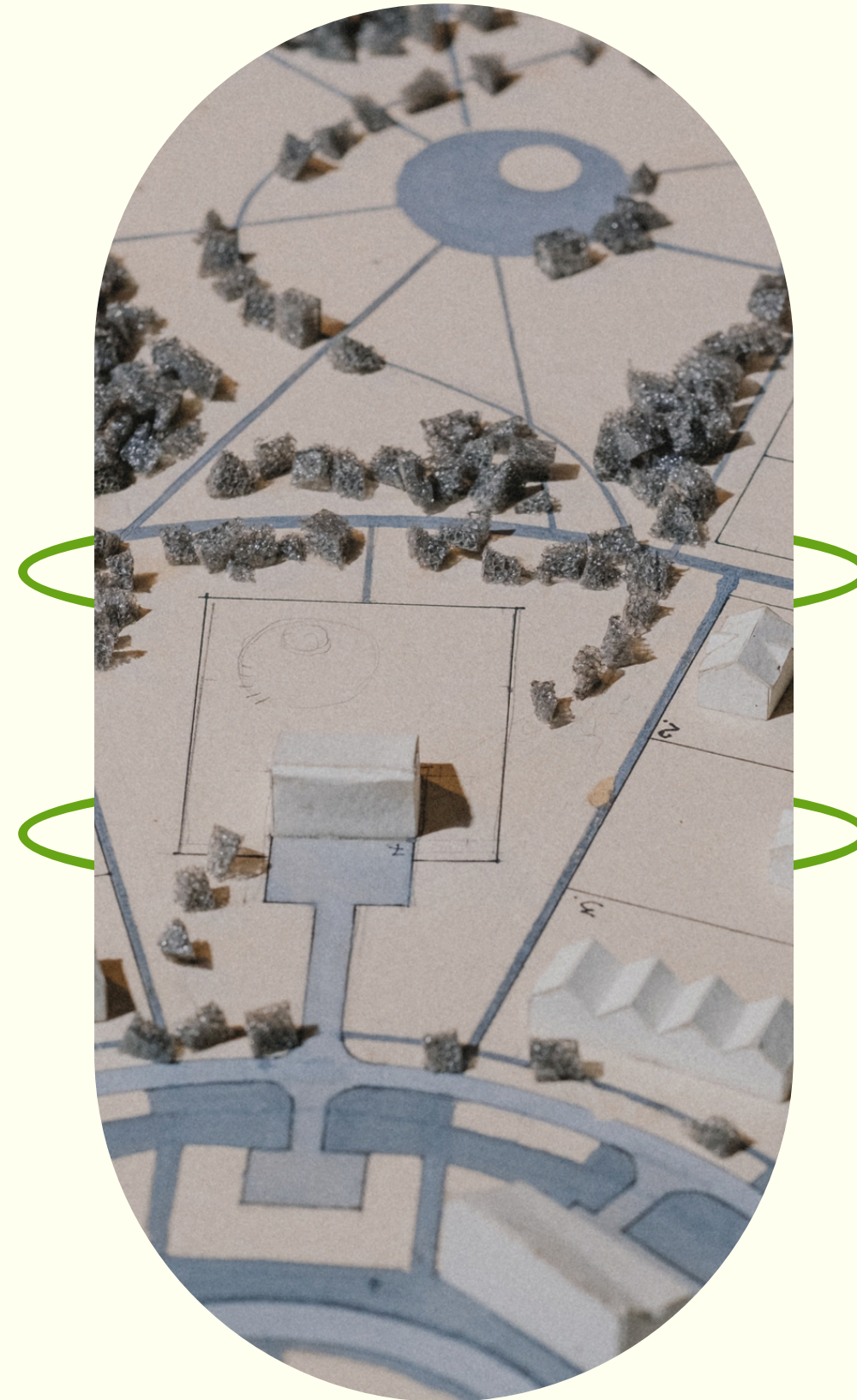
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ANALYSIS OF ENVIRONMENTAL PROBLEMS

Spatial analysis (GIS = Geographic Information System)

Use of geographical tools to analyse the distribution of environmental problems such as air pollution, water pollution or land degradation. GIS enables the visualisation of data and supports decision-making based on spatial analyses.



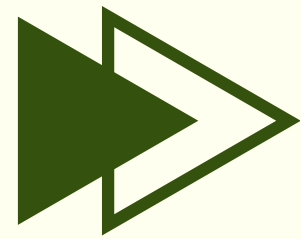
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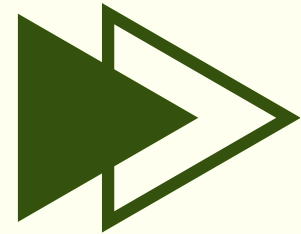
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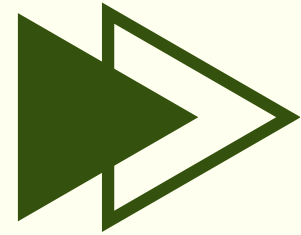
EXAMPLES OF PROBLEM ANALYSIS



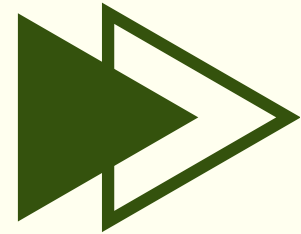
Soil Remediation in Industrial Areas



Example: Soil contamination as a result of industrial activities in the Silesia region.



Analysis: Assessment of the level of contamination, sources of pollution, and impact on residents' health.



Solutions: Site remediation, introduction of bioremediation technology, soil quality monitoring.



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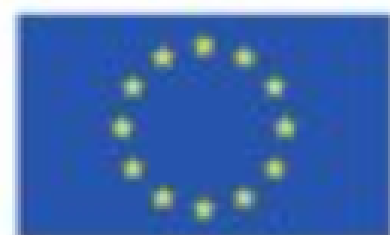
THE ROLE OF ASSESSING OPTIONS, RISKS, AND BENEFITS.

Informed decision-making

Considering the assessment of options, risks and benefits is key to making informed and responsible decisions that minimise negative impacts and maximise positive outcomes.

Sustainable Development

A well-conducted analysis helps to select solutions that are not only efficient but also sustainable, contributing to long-term environmental protection.



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EXAMPLES OF SUSTAINABLE SOLUTIONS

Renewable energy:

- **Decision:** Investment in wind farms, photovoltaic installations and the development of geothermal technology.
- **Sustainable Solution:** Renewable energy production reduces dependence on fossil fuels, reduces CO₂ emissions and supports sustainable energy development.



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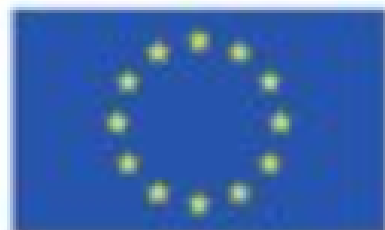


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WASTE MANAGEMENT

- **Decision:** Introduction of recycling systems and development of technologies for converting organic waste into biogas.
- **Sustainable Solution:** Efficient waste management minimises the environmental impact of waste, reduces the amount of waste going to landfill and supports a circular economy.



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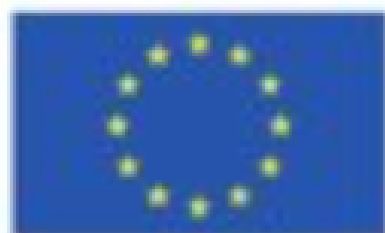


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GREEN BUILDING

- **Decision:** Use of low carbon footprint building materials, energy efficient building design and integration of green roofs.
- **Sustainable Solution:** Green building reduces resource consumption, improves energy efficiency and increases occupant comfort while reducing environmental impact.



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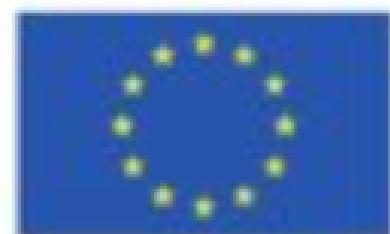


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ECO-MOBILITY

- **Decision:** Development of public transport based on low-emission technologies and promotion of electromobility.
- **Sustainable Solution:** Reducing urban emissions and noise, improving air quality and reducing the negative impact of transport on the climate.



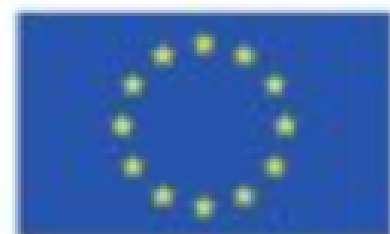
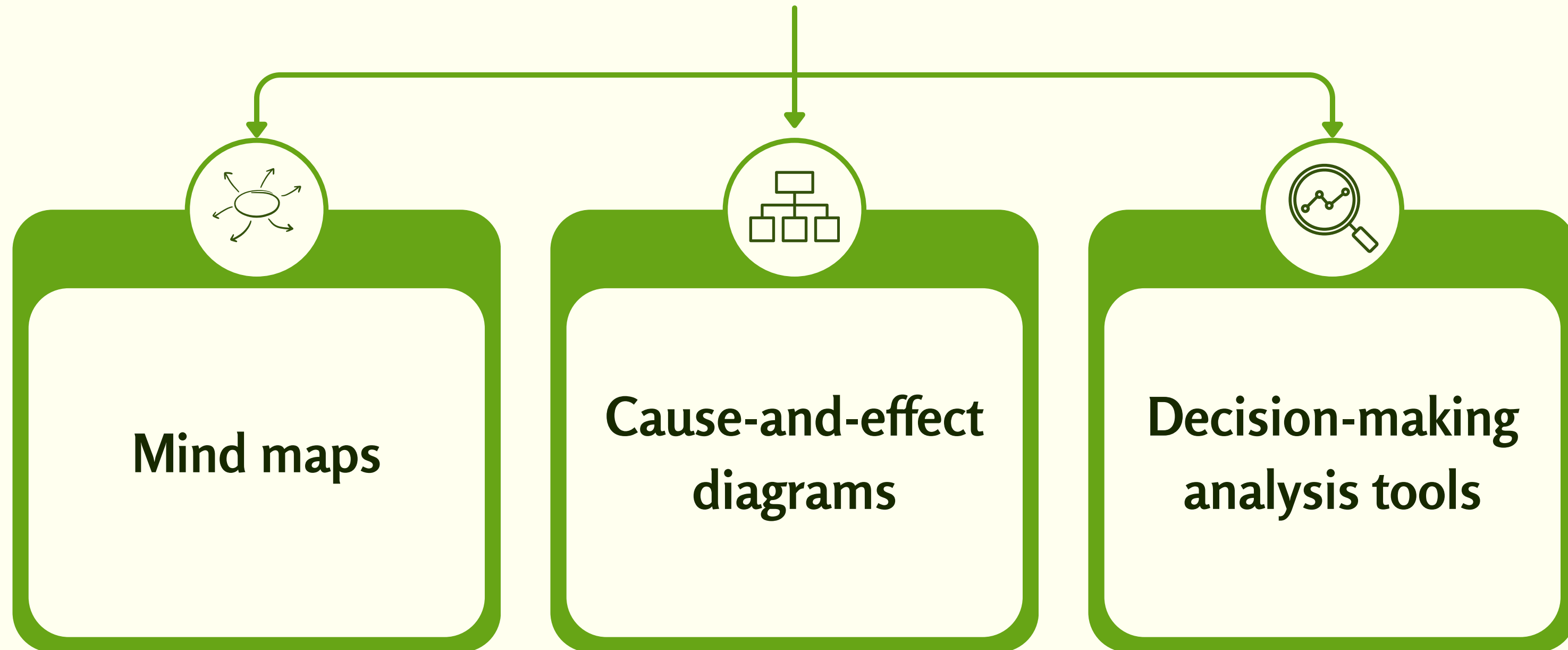
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TOOLS TO SUPPORT CRITICAL THINKING



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EXAMPLES OF TOOL APPLICATION

Green Building

- **Decision** - Use of low carbon footprint building materials, energy efficient building design and integration of green roofs.
- **Sustainable Solution** - Green building reduces resource consumption, improves energy efficiency and increases occupant comfort while reducing environmental impact.

Eco-mobility

- **Decision** - Development of public transport based on low-emission technologies and promotion of electromobility.
- **Sustainable Solution** - Reducing urban emissions and noise, improving air quality and reducing the negative impact of transport on the climate.



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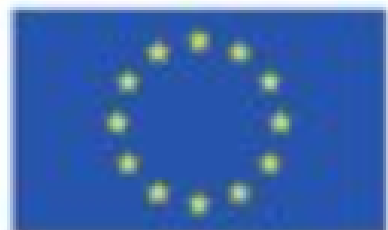


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THE LINK BETWEEN CRITICAL THINKING AND INNOVATION CREATION

Critical thinking is fundamental to the creation of innovations as it allows for in-depth analysis of problems, assessment of opportunities and generation of new ideas. Innovations based on critical thinking are more effective, relevant and have a greater potential to bring about sustainable change.



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INNOVATION IN GREEN JOBS

Critical Thinking as a Foundation for Innovation Creation

Critical thinking allows for in-depth analysis of problems, evaluation of available options and generation of new, creative ideas.

Innovations that are based on critical thinking are more effective, relevant and have greater potential to bring about lasting, positive change.

Critical thinking helps to avoid logical fallacies, opens the mind to different perspectives and fosters the creation of solutions that respond to real needs and challenges.

For innovation to be effective and sustainable, it must be rooted in sound, critical thinking that enables the creation of valuable and thoughtful solutions.



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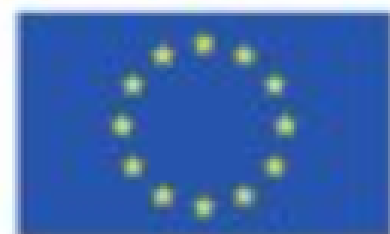


ARGUMENTATION SKILLS

Examples of Well-Reasoned Decisions

Introduction of Offshore Wind Energy:

1. **Decision:** Investing in the development of offshore wind farms.
2. **Argument:** Analysis has shown that offshore winds are more stable and stronger than onshore winds, leading to higher efficiency in energy production. In addition, being away from land minimises the impact on the landscape and local communities, while reducing CO₂ emissions.



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CASE STUDIES - EXAMPLES OF IMPLEMENTATION

Ban on Disposable Plastics



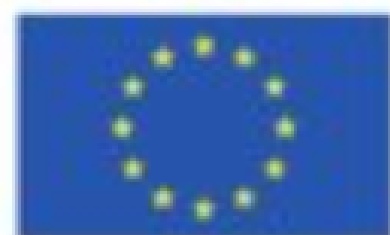
Decision

Banning the sale of single-use plastic products.



Argument

Studies have pointed out the disastrous impact of plastic waste on marine and terrestrial ecosystems. Alternatives, such as biodegradable materials, are available and can significantly reduce plastic waste while promoting sustainable consumer practices.



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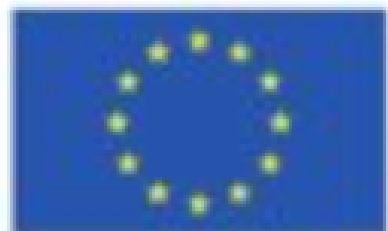




QUESTIONS AND DISCUSSION



- Open questions to participants
- Encouraging discussion and sharing of experiences



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