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CLIMATE IN OUR HANDS: HOW SCIENCE INFLUENCES ENVIRONMENTAL PROTECTION EFFORTS

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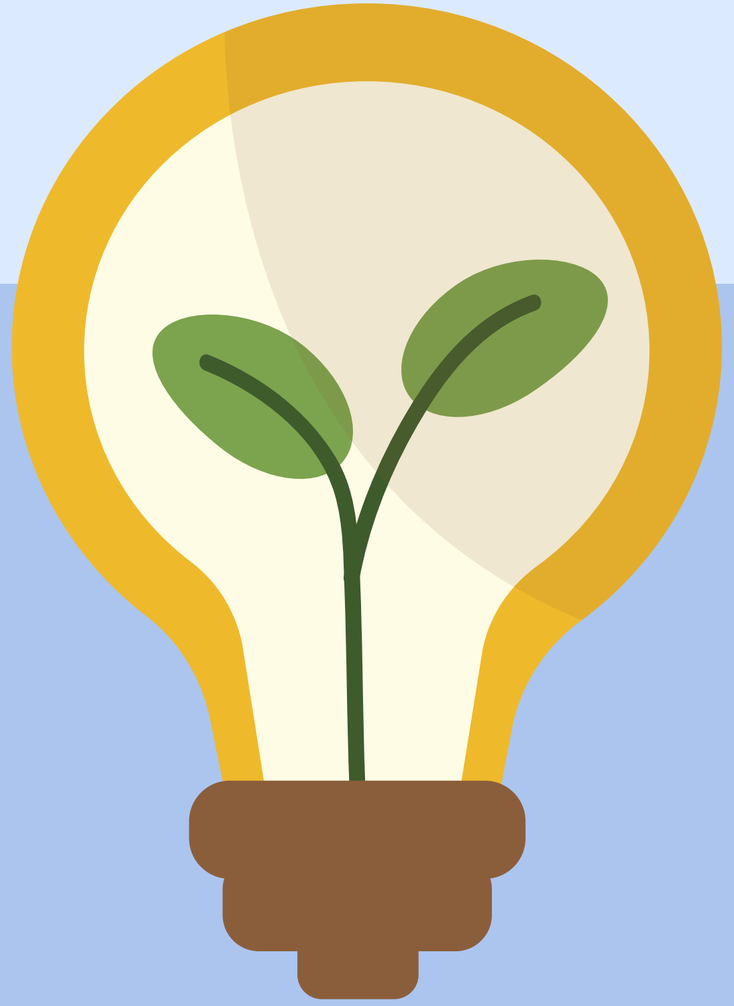
THE BASICS OF CLIMATE CHANGE



- The primary source of energy for processes occurring on Earth's surface is solar radiation (i.e., the Sun).

- Solar energy, which reaches Earth's surface as solar radiation, is absorbed (for example, by the aforementioned oceans). This absorption increases the energy, and consequently, the temperature of Earth's surface rises.

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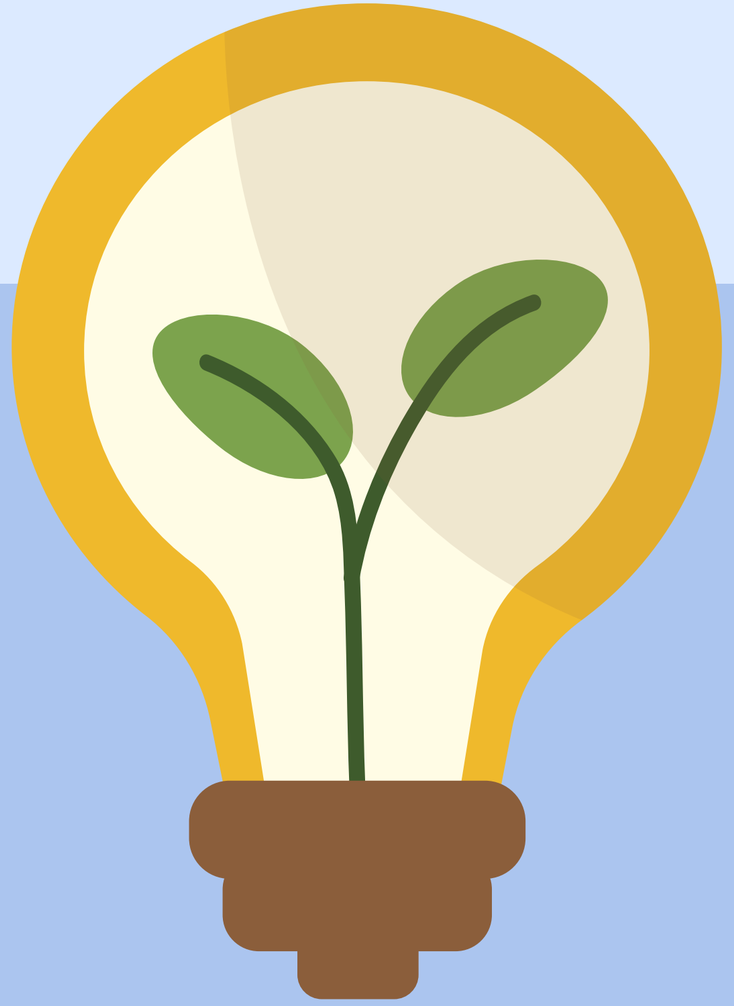
THE BASICS OF CLIMATE CHANGE



- The energy balance is the maintenance of equilibrium between the amount of energy delivered to Earth's surface and the amount of energy it emits and reflects.

- Earth's energy balance determines the average temperature on its surface. If the balance is zero, the temperature remains constant. If it is positive, the planet warms up.

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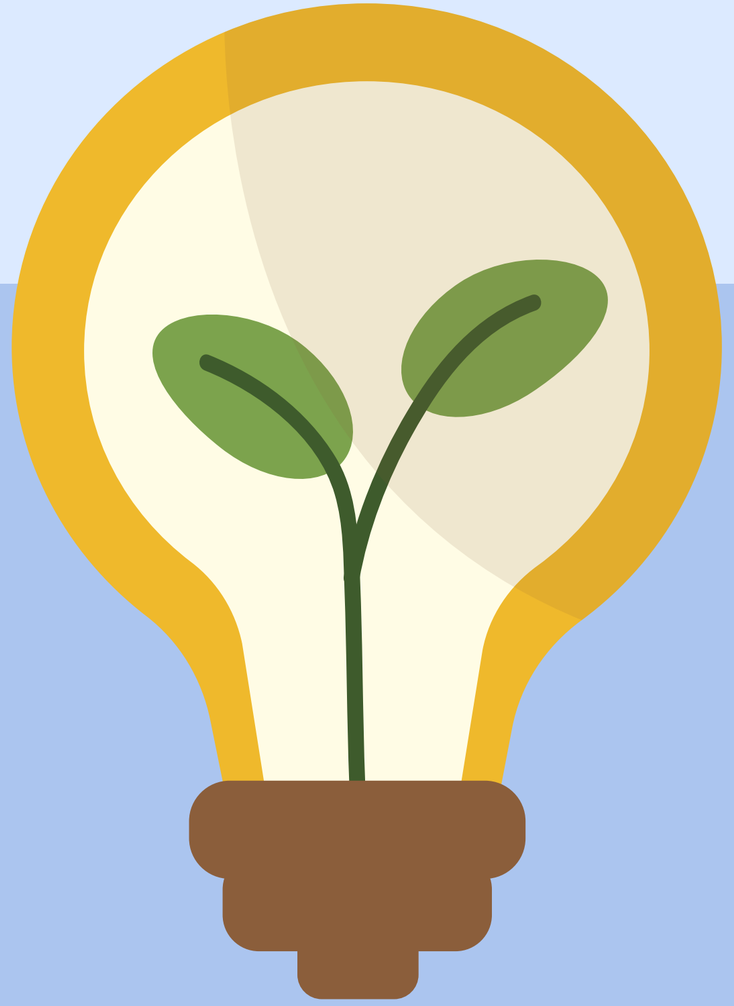

- The greenhouse effect is a phenomenon that occurs because gases present in the upper layers of the atmosphere have properties that allow them to trap some of the solar radiation reflected from Earth's surface, preventing it from escaping our planet.

- The issue of greenhouse gases pertains to how much energy will be retained by the atmosphere and how much will escape (be radiated) into space. The more greenhouse gases in the atmosphere, the more energy is trapped.

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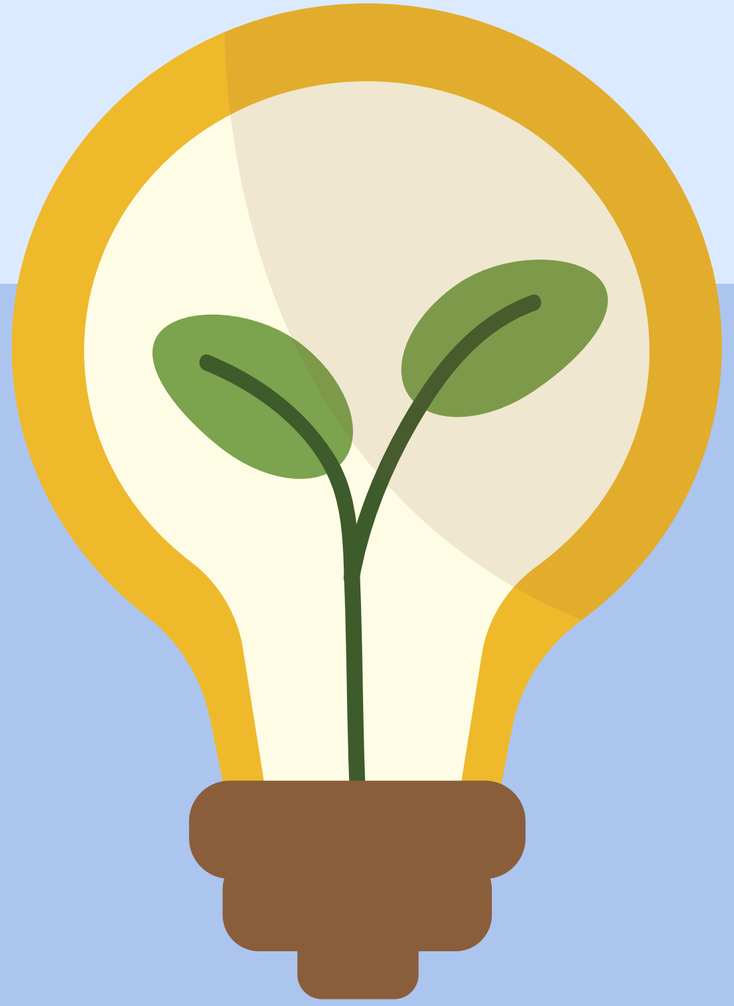

- The average temperature of Earth's surface depends, among other factors, on:

⇨ the amount of radiation absorbed or reflected by Earth's surface,

⇨ the quantity and types of greenhouse gases present.

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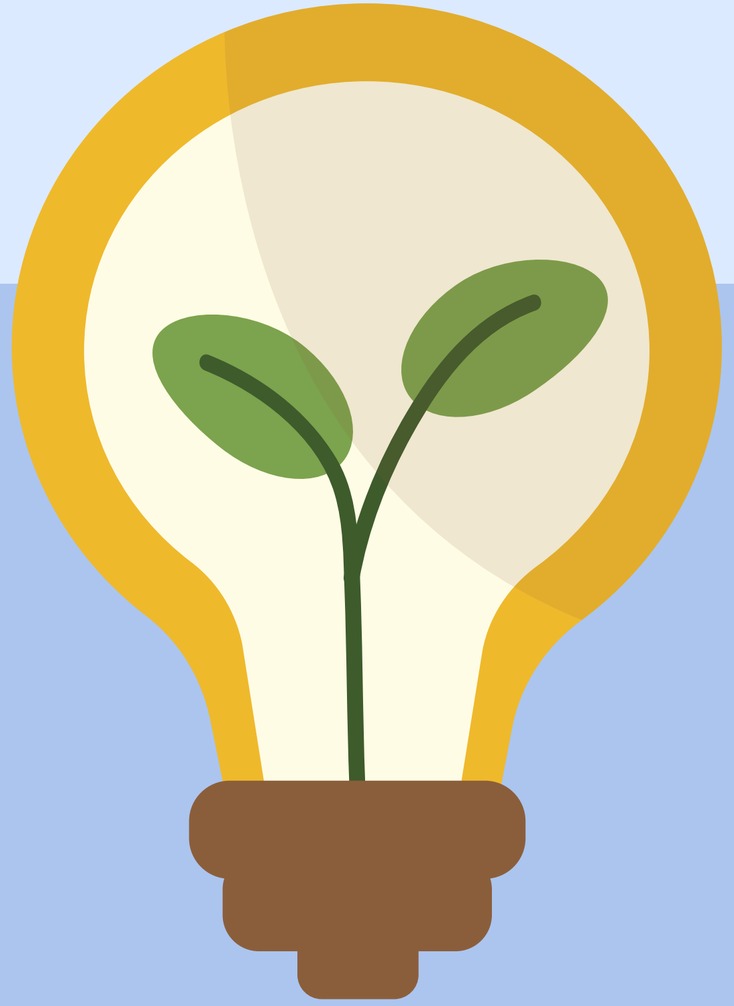

- **Albedo** is a parameter that defines the ability of a surface to reflect radiation.
- **Ice has a high albedo** — it reflects a large portion of the solar radiation that hits it.
- **Water has a low albedo** — it absorbs most of the solar radiation that hits it. Therefore, the more glaciers and ice sheets that melt, the larger the ocean surface becomes, and the more energy is absorbed.

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THE BASICS OF CLIMATE CHANGE

A tipping point in Earth’s climate system is a threshold beyond which significant and potentially irreversible climate changes can occur.

Examples of elements that may be susceptible to such tipping points include the ice sheets over Arctic waters, Greenland, and in western and eastern Antarctica. Rising temperatures on Earth lead to their melting, which, in turn, raises sea and ocean levels.

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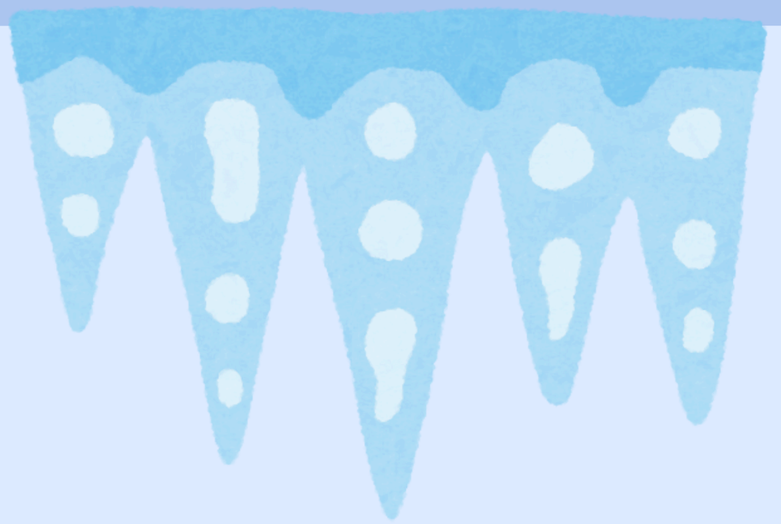

- Since pre-industrial times, the concentration of CO_2 in the atmosphere has increased by over 40%, methane by more than 150%, and nitrous oxide by around 20%. Over half of the CO_2 increase has occurred since 1970.

- Analysis of air trapped in ice accumulating over time in Antarctica shows that CO_2 concentrations began to rise significantly in the 19th century, after remaining within a range of 260 to 280 ppm for the previous 10,000 years.

- Data from ice cores extending back 800,000 years show that during this time, CO_2 concentrations fluctuated between 170 and 300 ppm over many cycles of the "ice age." There is no record of concentrations exceeding 300 ppm until the last 200 years.

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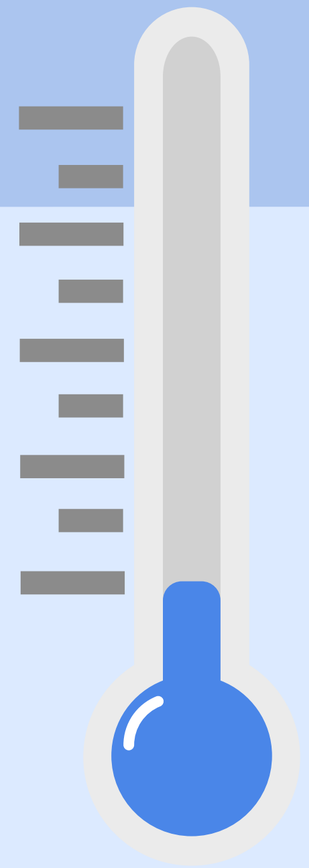

- The global average air temperature at Earth's surface has increased by about 1°C since 1900. Although there have been several pauses and accelerations in the upward trend, each of the last four decades has been warmer than any previous decade in the instrumental record since 1850.
- Comparisons of thermometer records suggest that the period since the early 1980s has been the warmest 40-year span in at least eight centuries and that global temperatures are rising towards peak temperatures last observed 5,000 to 10,000 years ago during the warmest part of our current interglacial period.
- Since 1901, the average global sea level has risen by about 16 cm, due both to the expansion of warmer ocean waters and the addition of meltwater from glaciers and ice sheets.

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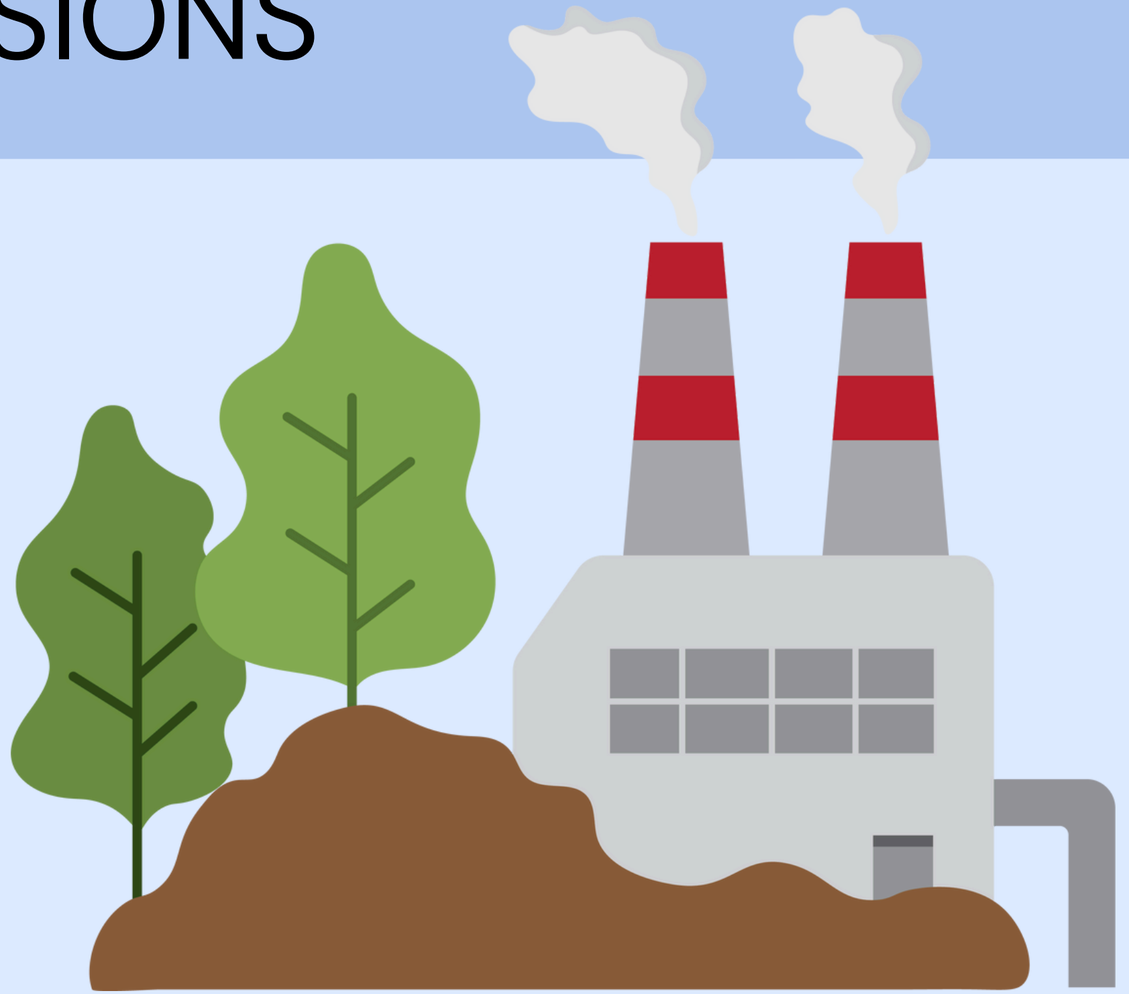
THE BASICS OF CLIMATE CHANGE – GREENHOUSE GAS EMISSIONS

- The total greenhouse gas emissions are the sum of emissions from various gases: carbon dioxide, methane, nitrous oxide, and smaller trace gases such as hydrofluorocarbons (HFCs) and sulfur hexafluoride (SF_6).
- Current research indicates that carbon dioxide emissions account for about 75%, methane emissions for approximately 20%, and nitrous oxide emissions for around 5% of total greenhouse gas emissions.



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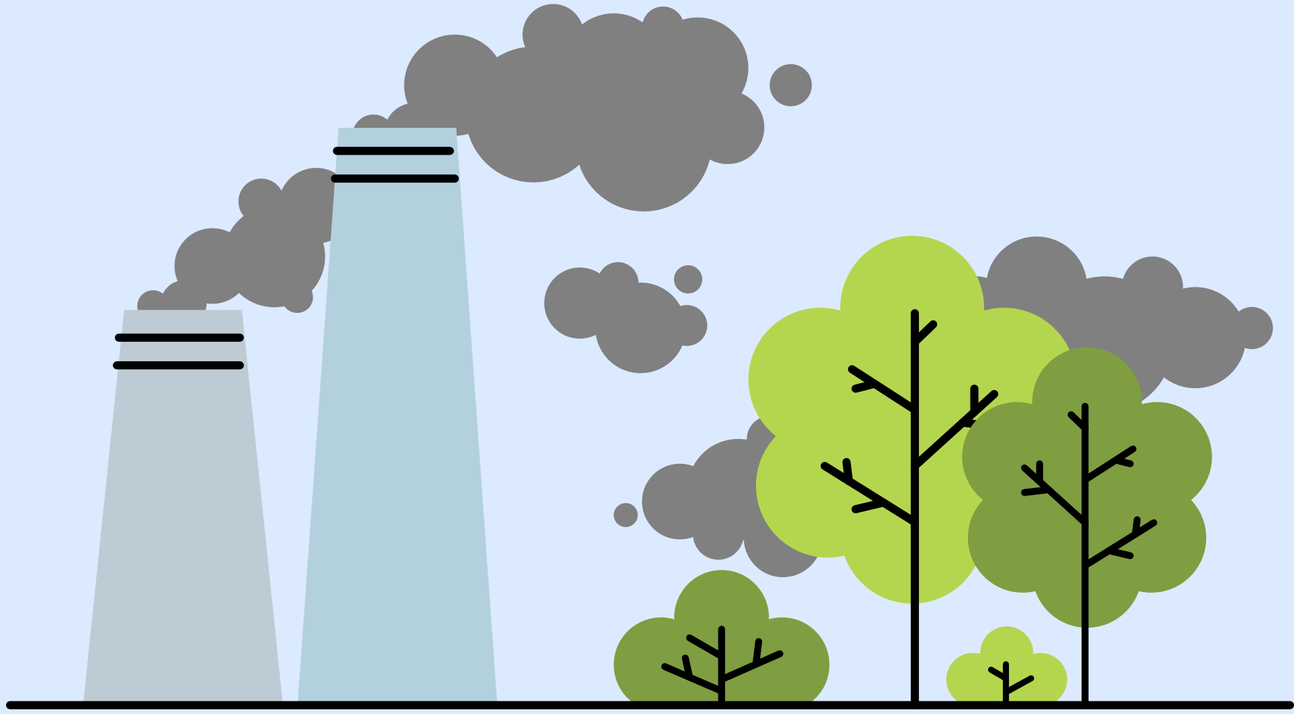
THE BASICS OF CLIMATE CHANGE – GREENHOUSE GAS EMISSIONS

The main sources of methane emissions are:

- Agriculture
- Fossil fuel production
- Waste management

Over a 100-year period, one ton of methane would cause 28 times more warming than one ton of CO_2.

The average “lifetime” of methane in the atmosphere is around 12 years. This means that reducing methane emissions quickly results in a decrease in its concentration in the atmosphere



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THE BASICS OF CLIMATE CHANGE – GREENHOUSE GAS EMISSIONS

Most of our nitrous oxide (N_2O) emissions come from agriculture—N_2O is produced when nitrogen fertilizers are applied to soil.

Nitrous oxide is generated not only from the use of synthetic nitrogen fertilizers; the same processes occur when we use organic fertilizers, such as animal manure.

Over a 100-year period, one ton of nitrous oxide would cause 265 times more warming than one ton of CO_2.

The average “lifetime” of nitrous oxide in the atmosphere is around 121 years.

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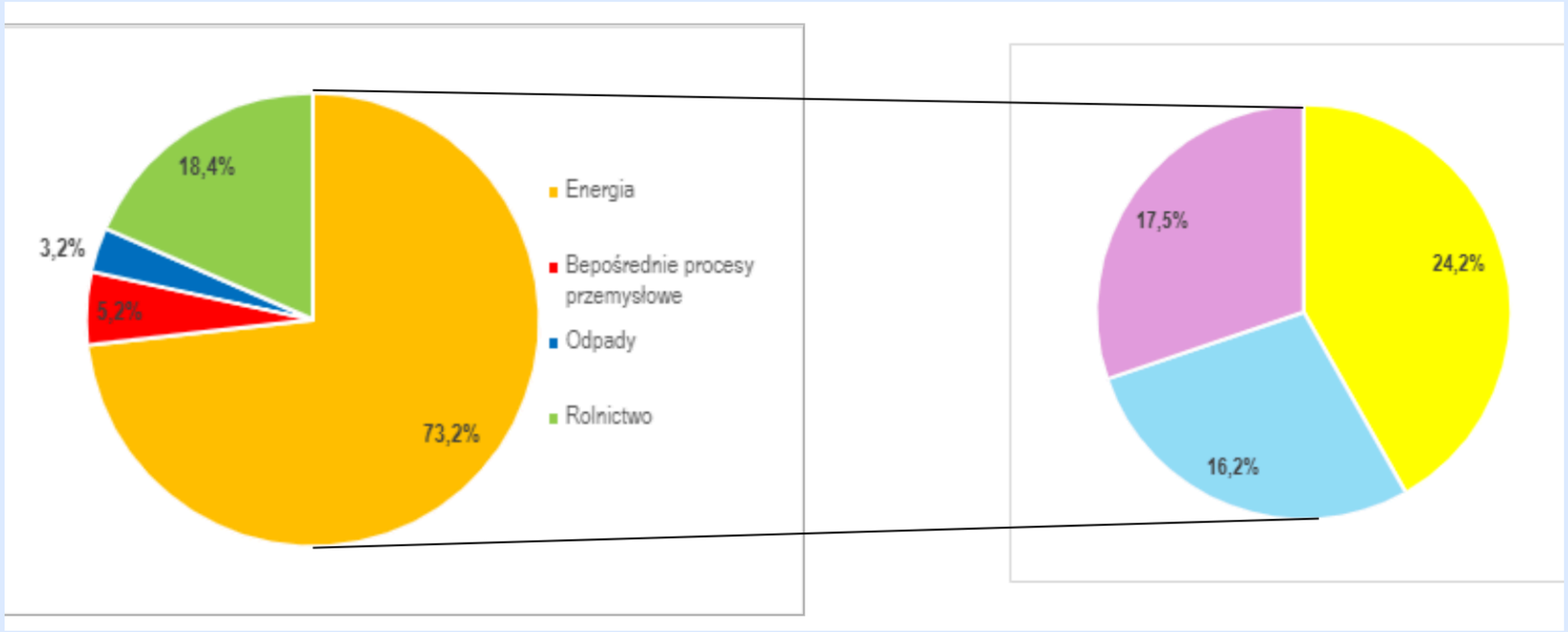
THE BASICS OF CLIMATE CHANGE – GREENHOUSE GAS EMISSIONS

Energy
Direct industrial processes
Waste
Agriculture
Energy consumption in transportation
Transport
Energy consumption in buildings



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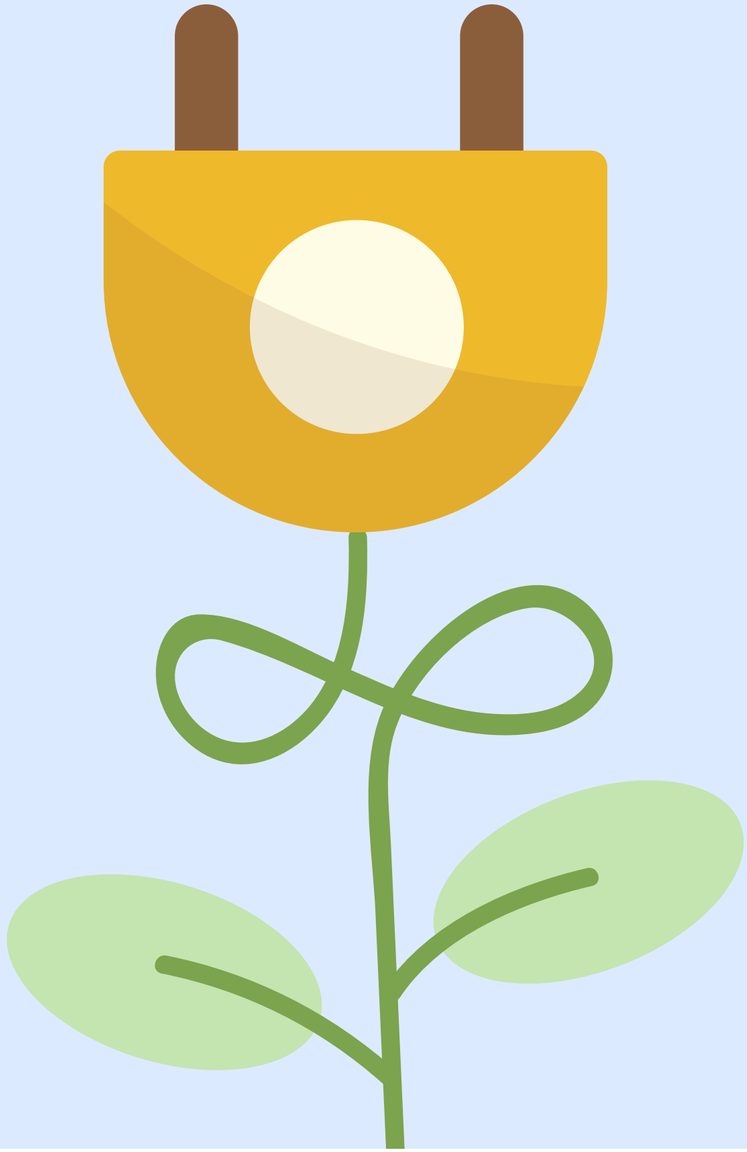

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Technologies Related to Problem Identification:

- Identifying global emission hotspots using machine learning-based satellites
- Detecting emissions from the global supply chain with artificial intelligence
- Measuring the digital carbon footprint

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Technologie związane z zatrzymaniem dalszych szkód środowiskowych:

1.Reducing and reusing food waste

2. Solar-powered fabric

3. Energy from water droplets

4. Wave energy

5. Utilizing Marine Creatures that Store Carbon

6. Wind generators

7. Transparent wood

9. Energy-efficient programming

10. Mitigating Building Inefficiencies Using Sensors, Analytics, and Artificial Intelligence

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Technologies Related to Regeneration: Reversing Existing Damage

- Carbon capture and utilization
- Biochar for soil restoration
- Alternative uses of fungi
- Regenerative agriculture
- 3D-printed coral reefs

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EXTREME WEATHER EVENTS

About **80%** of occurring extreme weather events have been caused by human activity.

The emerging phenomenon of extreme heat is **93%** caused by human activity, while for rainfall and flooding, this percentage is **56%**, and in the case of droughts and the resulting fires, it is **68%**

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CRITICAL AND CREATIVE THINKING – CLIMATE DISINFORMATION

Climate disinformation refers to misleading or deceptive content that:

- Undermines the existence or effects of climate change, the clear human impact on climate change, and the need for urgent action in line with scientific consensus and the goals of the Paris Climate Agreement.
- Misrepresents scientific data, including through omission or selective approaches, in order to undermine trust in climate science, institutions, experts, and climate-related solutions.
- Falsely highlights efforts as supporting climate goals that actually contribute to climate warming or contradict the scientific consensus on climate change mitigation or adaptation.

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CRITICAL AND CREATIVE THINKING – CLIMATE DISINFORMATION

Fossil fuel companies, as well as other environmentally polluting companies and their allies, spend hundreds of millions of dollars disseminating false and misleading content on social media

One analysis found that the 16 largest polluting companies in the world were responsible for placing over 1,700 such ads on Facebook in 2021. Collectively, these ads garnered around 150 million views, and the platform earned nearly $5 million

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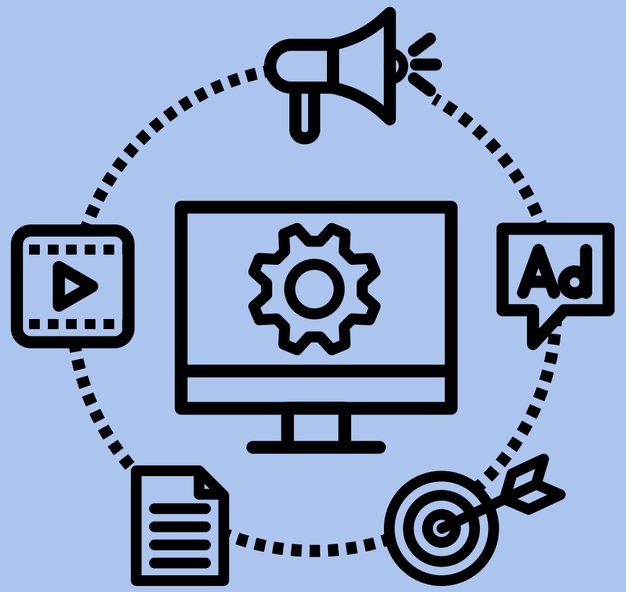
CRITICAL AND CREATIVE THINKING – CLIMATE DISINFORMATION



In 2023, ExxonMobil paid for at least 350 ads aimed at influencing proposed regulations in New York State that would phase out natural gas from new buildings.

Knowing that users are much more likely to trust information that appears to come from grassroots organizations rather than corporate ads, oil and gas companies have become skilled at creating front groups that look, sound, and act like nationwide collections of "concerned" citizens.

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CRITICAL AND CREATIVE THINKING – CLIMATE DISINFORMATION

Types of behaviors that make us more susceptible to incidental misinformation on social media:

- Cognitive biases
- Social biases
- Algorithmic biases

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CRITICAL AND CREATIVE THINKING – CLIMATE DISINFORMATION

How to deal with misinformation, especially online:

1. Approach headlines with skepticism
2. Examine the URL carefully
3. Research the source
4. Be cautious of unusual formatting
5. Pay attention to images
6. Check the dates
7. Verify the evidence
9. Review other reports
10. Determine if the information was intended as a joke
11. Think critically

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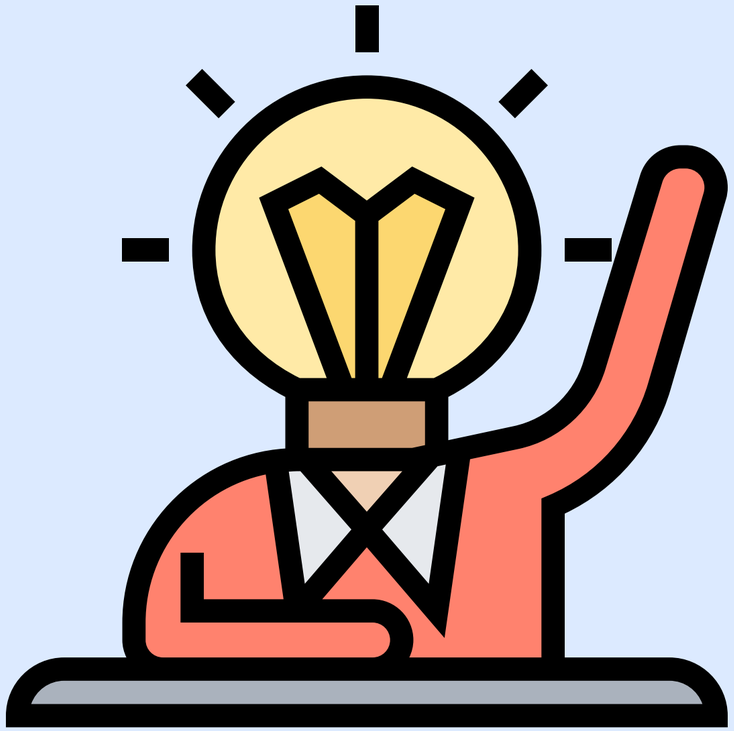
LOCAL SUSTAINABILITY INITIATIVES



Community-driven sustainability initiatives are grassroots efforts by local communities to implement practices and promote sustainable development.

Key characteristics:

- Local ownership
- Inclusivity
- Flexibility
- Collaboration
- Innovation

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LOCAL SUSTAINABILITY INITIATIVES

Benefits of community engagement:

- Empowerment
- Local relevance
- Resource efficiency
- Behavior change
- Social cohesion

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LOCAL SUSTAINABILITY INITIATIVES

Challenges and limitations:

- Resource constraints
- Political and regulatory barriers
- Inclusivity and equality

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CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY

A project is a unique, time-limited endeavor to achieve a specific goal. It has a beginning and an end. A project involves using specific inputs to improve the situation for beneficiaries.

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CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY

“Project management” involves applying skills, tools, and techniques to project activities to achieve the project's objectives.

The goal is to maximize project return on investment so that the project is completed on time, within budget, and scope, while meeting relevant quality metrics.

At its core, project management creates a structure that enables managing the process toward achieving the project's goal.

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CLIMATE PROTECTION PROJECT PLANNING – IMPORTANCE OF PROJECT PLANNING

A project plan is a crucial component of any successful project. Without a proper plan, projects can become chaotic and difficult to manage. Therefore, it is essential to create an effective project plan to achieve set goals.

According to a study by the Project Management Institute, there is a strong connection between planning and successful project execution. Mastering the art of project planning contributes to improved efficiency and better results.

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CLIMATE PROTECTION PROJECT PLANNING – IMPORTANCE OF PROJECT PLANNING

6 steps to create an action plan:

1. Set project objectives
2. Determine actions leading to the realization of each objective
3. Identify and allocate resources
4. Prioritize objectives
5. Set timelines and milestones
6. Monitor and verify your action plan

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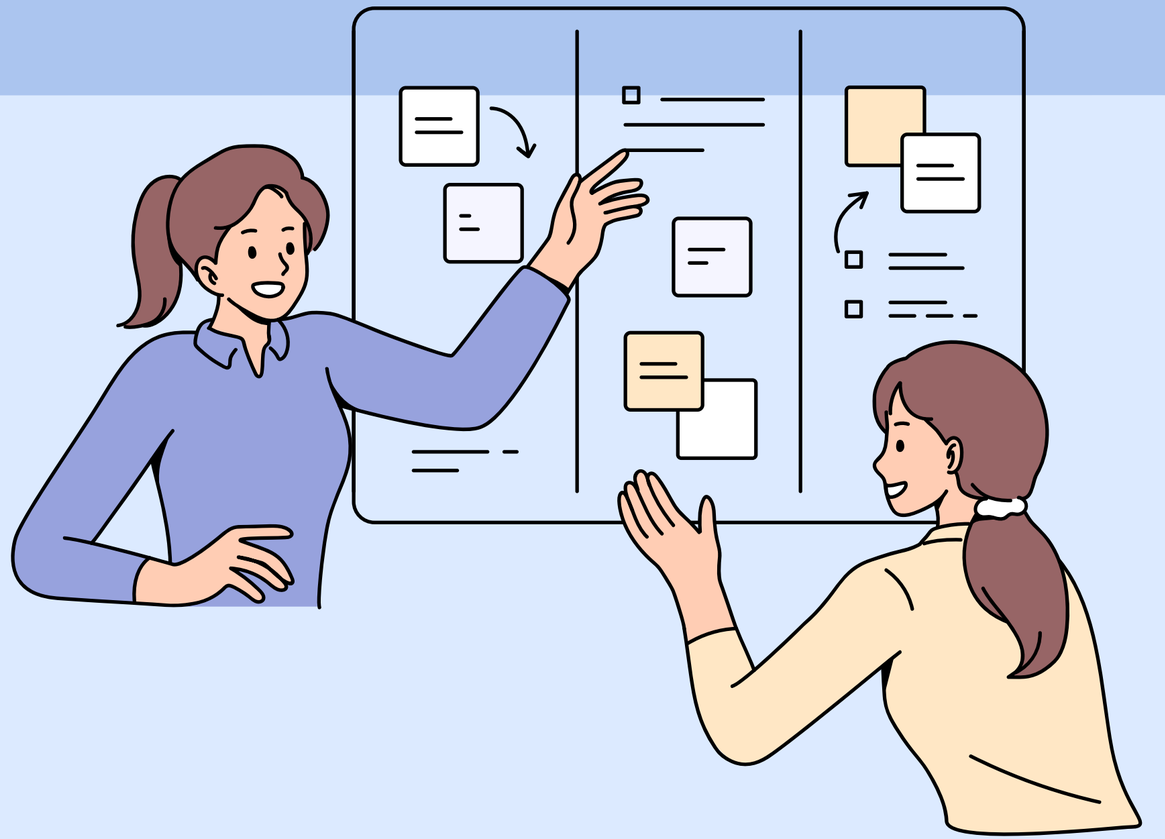
CLIMATE PROTECTION PROJECT PLANNING – IMPORTANCE OF PROJECT PLANNING

Benefits of implementing an action plan:

1. Greater transparency
2. Increased efficiency and productivity
3. Reduced project failure risk
4. Better decision-making
5. Improved team morale and motivation



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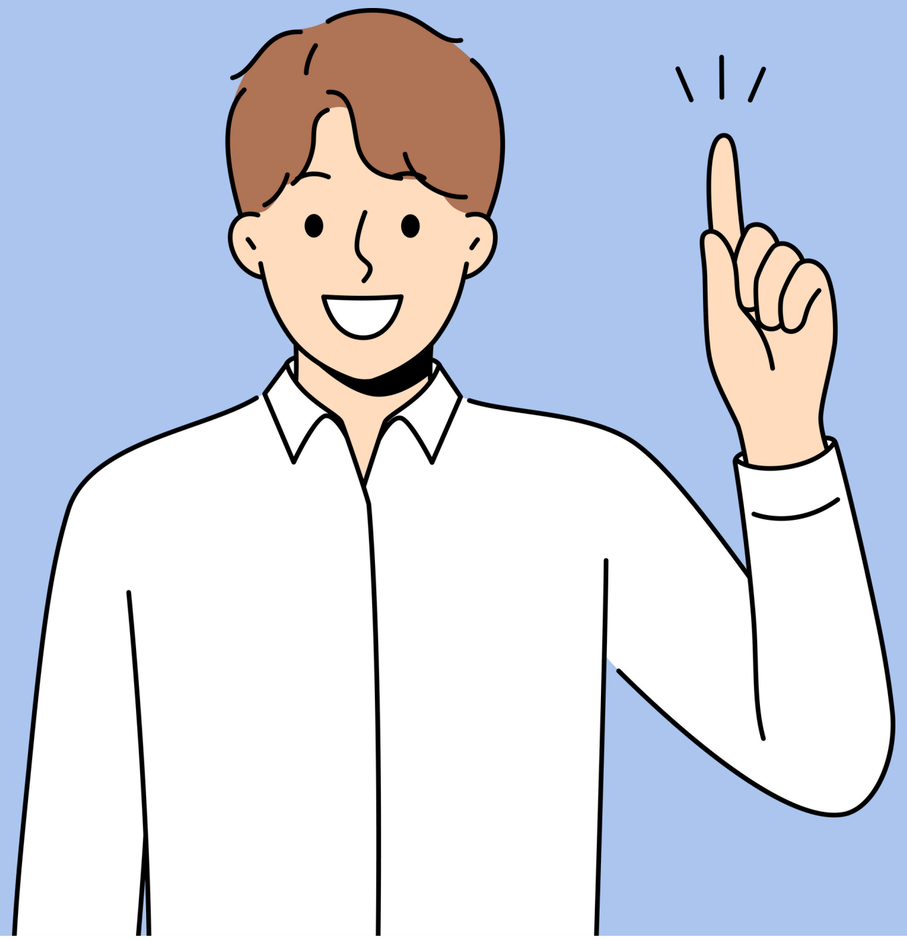
CLIMATE PROTECTION PROJECT PLANNING – IMPORTANCE OF PROJECT PLANNING



There are many methods for setting project goals, and one of the most effective remains the SMART analysis.

SMART is an acronym for five English words and a method that enables the creation of precise, repeatable, and achievable objectives.

SMART stands for:

- Specific
- Measurable
- Achievable
- Relevant
- Time-bound

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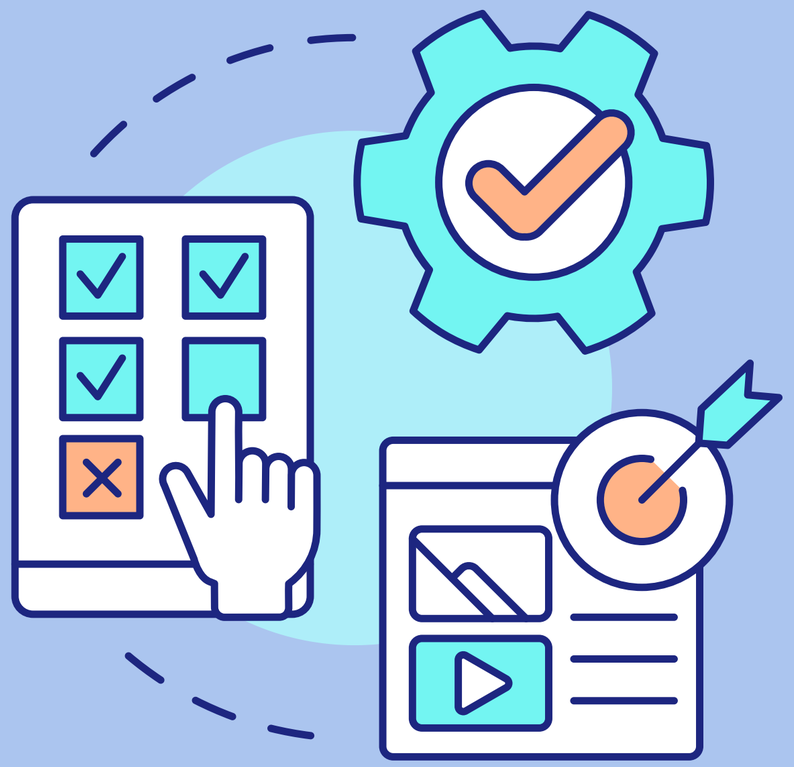
SPECIFIC



The first step in creating a SMART goal is to define it specifically. A goal is specific when every project participant understands it the same way. Failure to meet this condition can cause the entire endeavor to fail, as individual team members involved in the project may interpret the goal differently.

To execute this process correctly, the goal should be considered in measurable terms by asking the following questions:

- What do I want to achieve?
- Will achieving this task have a significant impact?
- What actions will I need to take?

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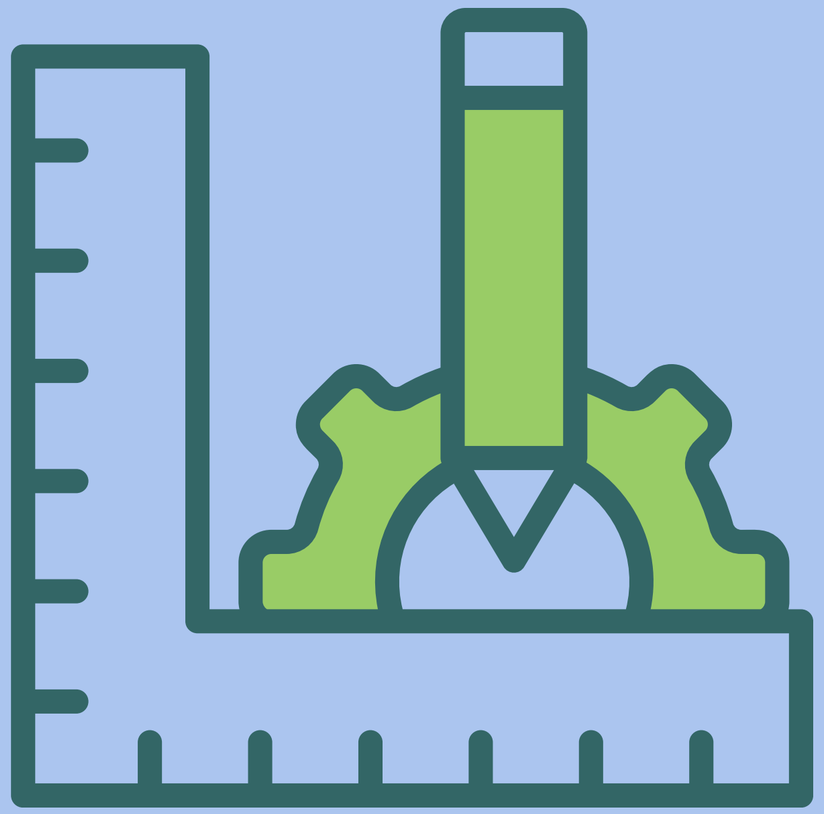
MEASURABLE



A goal should be defined in numerical terms (e.g., financial) that can be objectively measured and assessed. This way, it is possible to check whether and to what extent the goal has been achieved. If a goal cannot be measured, unfortunately, it cannot be managed. Therefore, goals should include an objective method for measuring their outcomes. This could be a deadline, a quantity, a percentage change, or another measurable indicator.

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ACHIEVABLE

This aspect of the SMART strategy refers to whether your goal is achievable. Do you have the resources and time needed to reach the goal? Goals should not, of course, be too simple, but you should also ensure they are feasible. This element implies that goals should not be entirely abstract.

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RELEVANT

At this stage, you need to ensure that your goal is important to you and aligns with the initiative's objective.

A properly formulated goal should be able to answer "yes" to the following questions:

- Does this seem worthwhile?
- Is this the right time?
- Does this align with our other efforts/needs?
- Am I the right person to accomplish this goal?
- Is this applicable in the current socio-economic environment?

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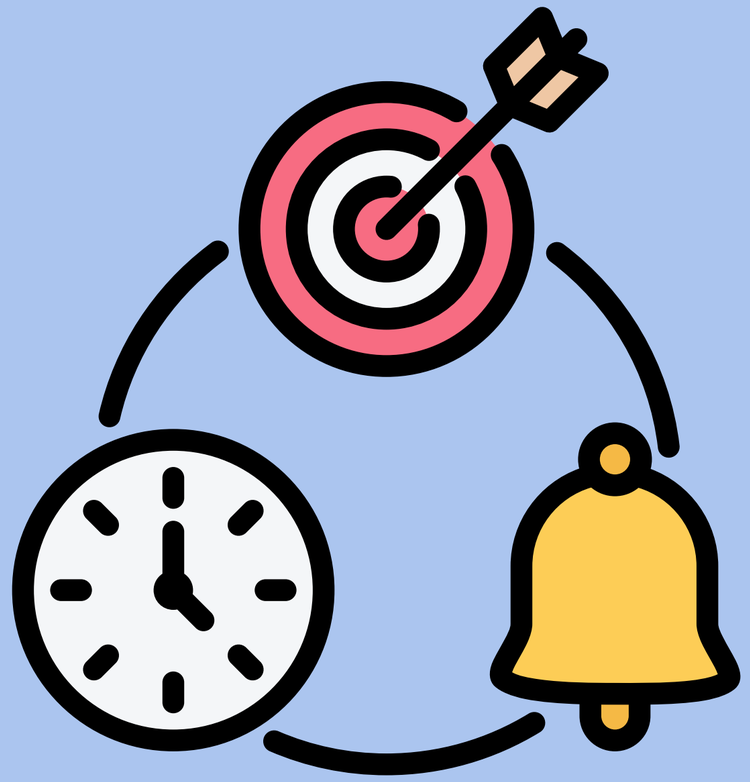
TIME-BOUND



A goal should have a specific deadline. You will want to determine whether your goal is short-term, long-term, or a combination of both. Based on this, you can establish a timeline to meet deadlines and achieve your goal. Your timeline should be realistic and allow for many opportunities to adjust the goal in terms of its relevance, specificity, and achievability.

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CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY

Seven steps to achieving goals:

1. Goals should be written down
2. Goals must be clear and specific
3. Set short-term goals
4. Ensure that long-term goals are phased and achievable
5. Consider potential obstacles in your plans
6. Track progress and reward the team
7. Confirm and recognize the achievement of your goals

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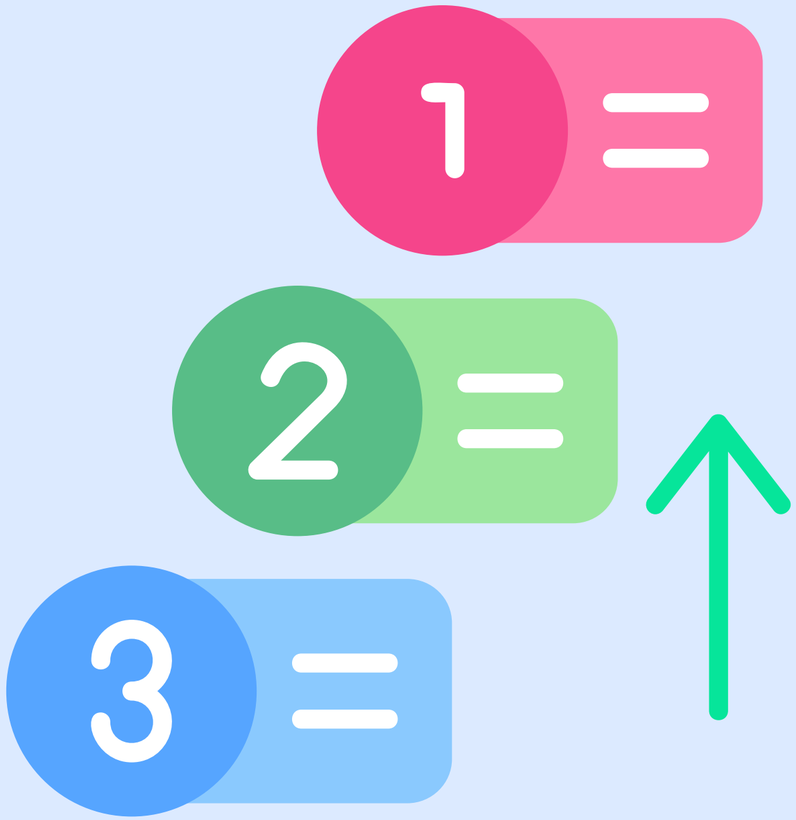
CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY



To prioritize specific SMART goals, four criteria should be considered:

- Urgency
- Importance
- Effort
- Impact

By assessing specific SMART goals based on these criteria, they can be ranked from high to low priority.

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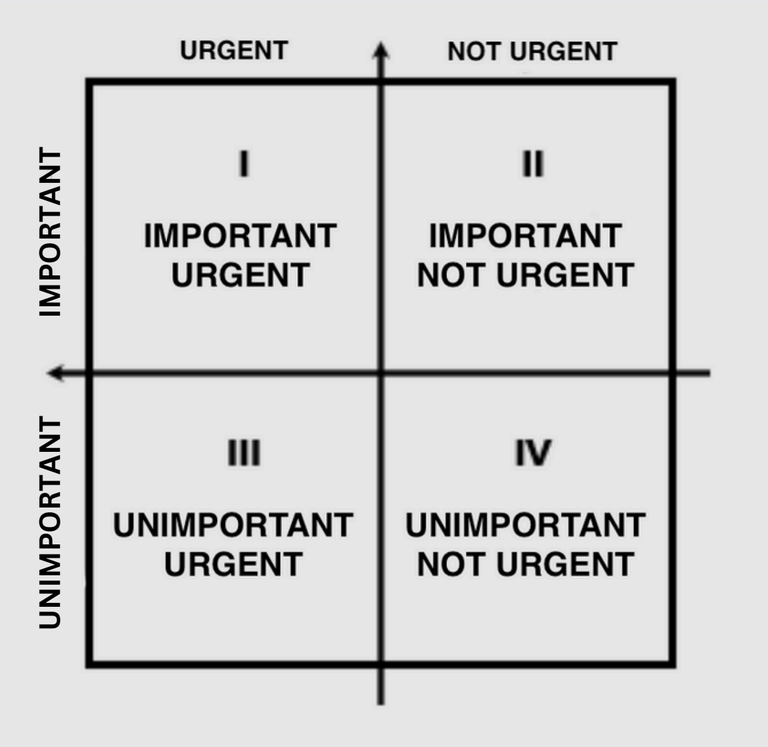
EISENHOWER MATRIX



CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY

There are various tools and methods that can help prioritize SMART goals based on the four criteria.

One of the most common is the Eisenhower Matrix, which divides tasks into four quadrants based on urgency and importance.

The quadrants are:

- Firefighting (urgent and important)
- Productivity (important but not urgent)
- Illusions and Obligations (urgent but not important)
- Desires and Ideas (neither urgent nor important)

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CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY

A project management schedule visually represents the project's life cycle, including all its tasks, stages, and objectives. It outlines the project scope, identifies its needs, and helps team members better understand their roles. The schedule also indicates the project's completion date and deadlines for delivering individual products and milestones.

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CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY

A project management schedule can help break projects down into phases, allowing for a better understanding of their scope, which helps determine how much time each phase may take.

Creating a schedule requires identifying project elements such as objectives, participants, deliverables, resources, milestones, deadlines, requirements, risks, opportunities, and dependencies.

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CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY

- The primary and most commonly used tool for creating a schedule is the Gantt chart. It presents a list of activities (or tasks) along with their duration over time.
- A Gantt chart is a type of bar chart used to illustrate plans and schedules. The rows represent activities, while the columns serve as the time scale.
- The duration of each activity is represented by the length of the bar plotted on this time scale. The start of the bar indicates the beginning of the activity, and the end of the bar indicates when the activity should be completed.
- Color-coding the bars allows for grouping activities. To show the percentage of completion of an activity, the bar can be partially filled, shaded differently, or use another color to distinguish what has been completed from what remains to be done.

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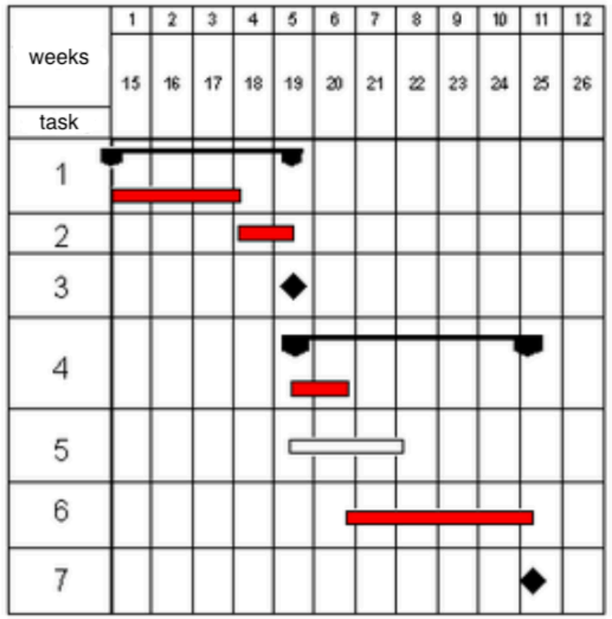
GANTT CHART – EXAMPLE



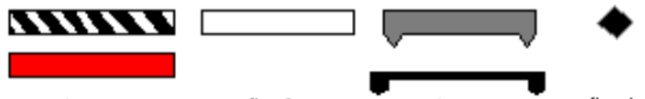


fig. 1. fig. 2. fig. 3. fig. 4.

critical task	shaded rectangle	fig. 1.	A critical task is an essential task for the project, whose completion determines further progress. Critical and non-critical tasks are summarized by a milestone.
non-critical task	unfilled rectangle	fig. 2.	A non-critical task is less essential to the project—it does not determine its success, although it may facilitate reaching the goal.
summary	filled rectangle with "teeth" on the ends	fig. 3.	This represents a specific stage of the project, composed of tasks. Usually, a milestone follows a summary, allowing for the approval of a given phase and transition to the next.
milestone	Filled square rotated 45°	fig. 4.	A milestone is a particular type of task that marks the completion of a certain phase. It is a one-time event that determines the transition to the next stage.

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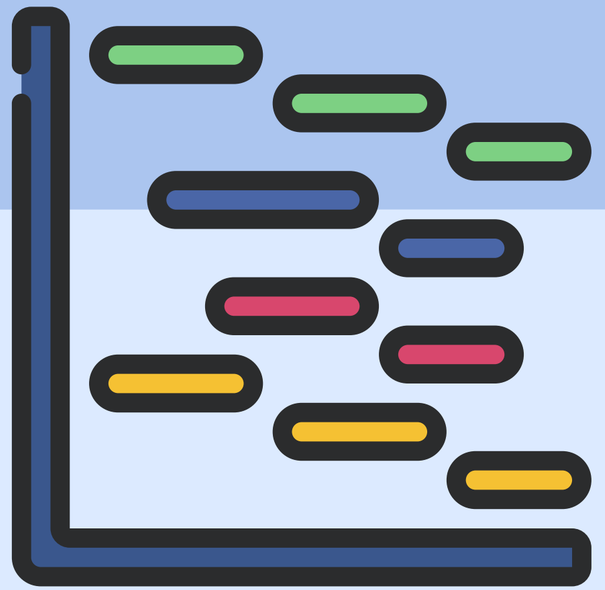
CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY



Steps for creating a Gantt chart:

Step 1: Create a list of tasks to be completed in the project

Step 2: Assign individuals responsible for each task

Step 3: Estimate how many working days each task will take

Step 4: Determine which actions are prerequisites for starting each specific task

Step 5: Specify when the first task in the project will begin

Step 6: Based on this information, fill in the start and end dates for each task

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CLIMATE PROTECTION PROJECT PLANNING IN THE LOCAL COMMUNITY

In project management, a project milestone can be defined as a way to observe, measure, and monitor the progress and performance of a project. Having project milestones means that the project manager or team sets certain tasks and steps that must be completed before the project can be considered finished

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- Project milestones allow you to present the defined objectives of the project to stakeholders, as well as communicate the schedule for achieving them.
- Project milestones help break the project into smaller sections, providing a clear view of which tasks need to be completed and by when.
- Project milestones serve as a method for defining important phases of the project. They can mark major progress points or be divided into smaller target points.
- With milestones, your team can focus solely on the task needed to move on to the next phase of the project. This helps track the project's progress as it moves from one stage to another.

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