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CLIMATE BOX

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From Knowledge to Action: Project-Based Learning on Climate Change

Guide for Educators



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Introduction

Climate change is one of the defining challenges of our era. Addressing it requires not only scientific knowledge but also concrete, meaningful action. Education plays a crucial role in this process — equipping students with the understanding of climate issues, the ability to analyze their causes and impacts, and the skills to develop and implement practical solutions.

Project-based learning offers a powerful way to engage students in this work. Rather than simply learning about climate change, students investigate real-world problems, design viable responses, and put them into practice within their schools and communities. This approach blends research, collaboration, and hands-on experience, making learning more relevant and impactful. In this setting, the teacher is not just a mentor but also an inspiring leader, helping each student realize their potential and direct their energy toward practical tasks.

Through project-based learning, students can:

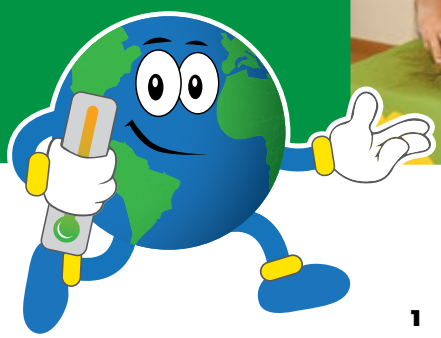
- Apply their knowledge to real situations and see tangible results;
- Develop critical thinking, initiative, and a sense of environmental responsibility;
- Strengthen skills in communication, collaboration, and project management;
- Recognize that even small, well-directed efforts can lead to significant change.

Climate-related projects — whether focused on environmental protection, biodiversity conservation, or climate adaptation — require careful planning and ongoing guidance from educators. One of the key elements of any project is a concrete result — material (e.g., planted trees, created eco-trail) or intangible (e.g., greater awareness among students about climate change).

This guide draws on the Climate Box educational toolkit to inspire and support student projects for learners aged 7–18. It outlines the unique features of climate-focused project work, explains how it differs from other research and environmental initiatives. The guide provides a structured and practical approach to project-based learning on climate change.

The guide offers a practical and structured approach to project-based learning on climate change.





1 Formats, Types, and Thematic Areas of Climate Projects

Project-based learning on climate change can take many forms — from exploring local climate-related issues to designing and implementing practical solutions aimed at mitigating climate impacts or adapting to them. Projects may vary in format, methodological approach, and thematic focus, depending on which specific aspects of climate change they address.

Project Formats

Climate projects can be implemented in a variety of formats, depending on the objectives, the age of participants, and the available resources:

- **Individual projects** – carried out by a single schoolchild, often within the family context or on their own initiative.
- **Group projects** – developed and implemented by a team of students within a single class, club, or school.
- **Network projects** – connect participants from different schools, regions, or even countries. These initiatives encourage the exchange of experience, the scaling-up of successful practices, and broader outreach.

Types of Projects by Approach and Method

Depending on the chosen approach and methods, climate-related projects can be grouped into the following categories:



- **Research projects** — involve formulating research questions, collecting and analyzing data, identifying patterns, and drawing evidence-based conclusions. These projects may include surveys, field observations, analysis of open-source data, creation of infographics, and the development of educational materials based on findings. Unlike a report, which simply summarizes existing sources, a research project requires active data gathering, critical analysis, and the development of well-supported conclusions.



- **Practical and experimental projects** — focus on designing and testing solutions, creating models or prototypes, and conducting laboratory experiments. Examples include creating a drip irrigation system with moisture sensors or assembling water filters. Such projects foster engineering and technological thinking.



- **Social projects** — address specific needs within the school or local community and involve interaction with others and organizing events. Examples include waste reduction campaigns, schoolyard greening, or awareness-raising activities for students, parents, or neighbors. These projects help students develop interpersonal skills, learn to plan, negotiate, and work collaboratively.



- **Creative projects** — integrate elements of art, design, and media to highlight environmental themes. These may include theatrical performances on ecological themes, short films, interactive exhibitions, quests, or board games. Creative projects nurture imagination, emotional intelligence, self-expression, and public speaking skills.



- **Educational and awareness projects** — aim to increase awareness and shift public attitudes toward climate change. They involve creating and disseminating information in diverse formats, engaging different audiences, and promoting responsible behavior, while also strengthening students' communication skills, ability to work with audiences, and to inspire others. Examples include producing videos, infographics, and comics; organizing flash mobs, open lessons, or lectures with experts; and hosting environmental quizzes, exhibitions, or discussion platforms. While such projects may not directly solve climate change issues, they play a crucial role in building public support for climate solutions and inspiring climate-responsible behavior.

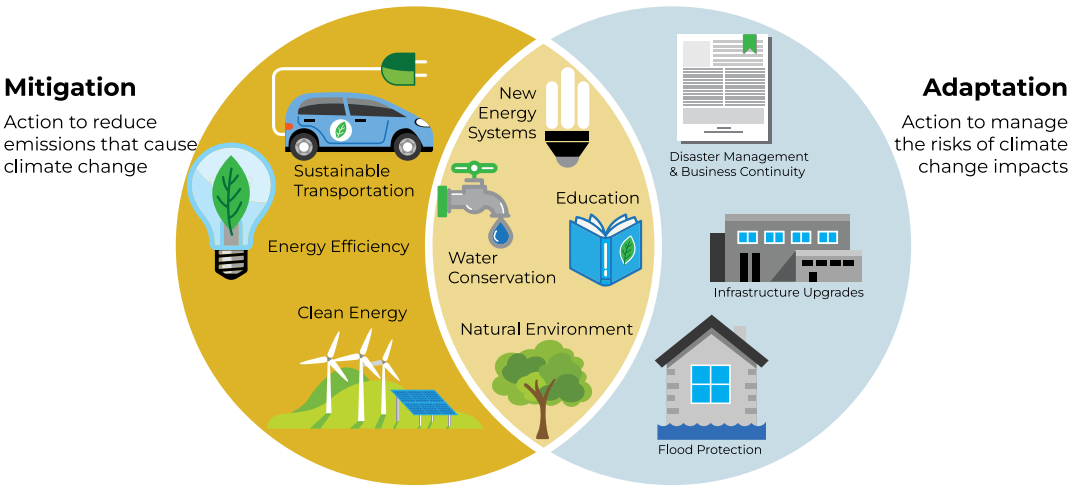
Regardless of type, every project creates opportunities for active learning, fosters critical thinking and independence, and strengthens students' ability to work with information and propose solutions. Unlike routine assignments, projects encourage initiative, purposeful action, and allow students to see the tangible results of their work — significantly boosting motivation and engagement. In this way, project-based learning enables students not only to study phenomena but also to become active participants in driving change. Moreover, when such projects are replicated and scaled, they generate a synergy of positive outcomes for the planet, expanding and enriching the overall practical impact.

Thematic Areas of Climate Projects

Thematic areas of climate projects are closely linked to the two main strategies for addressing climate change — **mitigation** and **adaptation**.

Some projects can contribute to both at the same time. For example, greening urban areas — such as planting trees along streets and in schoolyards — helps reduce local air temperatures (adaptation to heat) while also absorbing carbon dioxide (mitigation). Similarly, projects focused on saving water and energy, raising awareness, creating resilient communities, or promoting sustainable lifestyles can support both strategies, depending on their objectives and approach.

Figure 1. Thematic areas of climate projects.



The choice of a specific theme will depend on the climate-related challenges in the region, the students' level of preparedness, and the available resources.

Examples of Climate Change Mitigation Projects

Improving energy efficiency at school — replacing bulbs with LEDs, turning off electrical devices after classes, improving heating and ventilation systems.

Reducing the carbon footprint — promoting "green" transport (bicycles, carpooling, use of public transport).

Using renewable energy sources — installing solar panels or small wind turbines.

Reducing waste — introducing waste separation, reusing materials, and refusing single-use plastic.

Examples of Climate Change Adaptation Projects

Greening the school area — planting trees, creating vertical gardens, and installing shade structures.

Water conservation — collecting rainwater, fixing leaks, and using water-saving technologies.

Improving preparedness for extreme weather — creating a school alert system, evacuation plan, and conducting drills.

Climate-resilient agriculture — protecting soil from erosion and growing drought-resistant crops (for rural schools).

Educational campaigns — raising awareness on protection from heat, floods, and other climate-related risks.









2 Using the Climate Box toolkit for Project-Based Education

The **Climate Box**[1] is more than just a source of information about climate change — it is a hands-on tool that helps students gain a deeper understanding of the problem, recognize their role in addressing it, and move from knowledge to action. It supports not only the study of climate change impacts but also the development of adaptation and mitigation measures that can be applied in schools, at home, and within the community.[1]

Parts 2 and 3 of the Climate Box Textbook play a particularly important role in organizing project-based learning:

- **Part 2 — " How climate change affects the natural world and human beings. Can we adapt to the inevitable consequences of climate change?"** – helps students grasp the scale of the problem, understand how climate change impacts both the natural world and human societies, and identify potential adaptation strategies.
- **Part 3 — "How to prevent dangerous climate change?"** – presents strategies for mitigation, including reducing greenhouse gas emissions, improving energy efficiency, and lowering the carbon footprint.

Using these materials in project work allows students to:

- Understand the consequences of climate change not only as abstract facts but through personal engagement and problem-solving.
- See themselves not as passive observers but as active contributors to mitigation and adaptation efforts.
- Identify priority areas for action based on examples and recommendations from the guide.
- Design projects that address real changes in their surroundings.

To ensure students move beyond simply studying the problem to taking practical action, the **Climate Box materials** can be used in project activities as follows:

- When examining the impacts of climate change, discuss not only the risks but also potential adaptation measures.
- When studying ways to reduce the carbon footprint, consider both personal and collective actions that can make a difference.
- Integrate calculations of impact into projects — for example, how saved electricity or planted trees can reduce CO_2 emissions.

This approach helps students better understand the link between global processes and local actions, making project-based learning both meaningful and action-oriented.

Tables 1 and 2 present examples of school projects that can be developed using the content from Parts 2 and 3 of the **Climate Box**.

*1 The **Climate Box** materials are available online at https://climate-box.com/.*

Table 1.
Examples of School Projects Based on Part 2 of the Climate Box.

Part 2. How climate change affects the natural world and human beings?	
Chapter	**Possible School Projects**
2.1 How Climate Change Affects Weather	• Analyze local weather data and create a "climate calendar." • Develop a school early warning system. • Organize a campaign on how to protect yourself from heat, heavy rains, and storms.
2.2 How Climate Change Affects Plants and Animals	• Observe flowering times of plants and bird migration patterns. • Create a school biodiversity corner. • Plant trees or protect the school's green area.
2.4 How Climate Change Affects Water Resources	• Install rainwater harvesting systems. • Identify sources of water waste in the school and propose solutions. Install low-flow taps, fix leaks, and raise student awarenes about responsible water use. • Organize a water conservation campaign (leaflets, posters, videos).
2.5 How Climate Change Affects Agriculture	• Grow drought-resistant crops in the school garden. • Use mulch and other soil protection methods. • Interview local farmers about climate challenges.
2.8 How Climate Change Affects Arctic Regions	• Create an infographic on the impacts of sea ice loss. • Research how permafrost thaw affects nature and infrastructure.
2.9 How Climate Change Affects Cities	• Green school grounds, install shaded areas, or create a "green wall." • Study the urban heat island effect in the school area.
2.10 How Climate Change Affects Social Issues	• Launch a climate justice campaign. • Organize a role-play on "negotiations between countries at different levels of development." • Interview older community members about climate changes they have observed.

Table 2.
Examples of School Projects Based on Part 3 of the Climate Box.

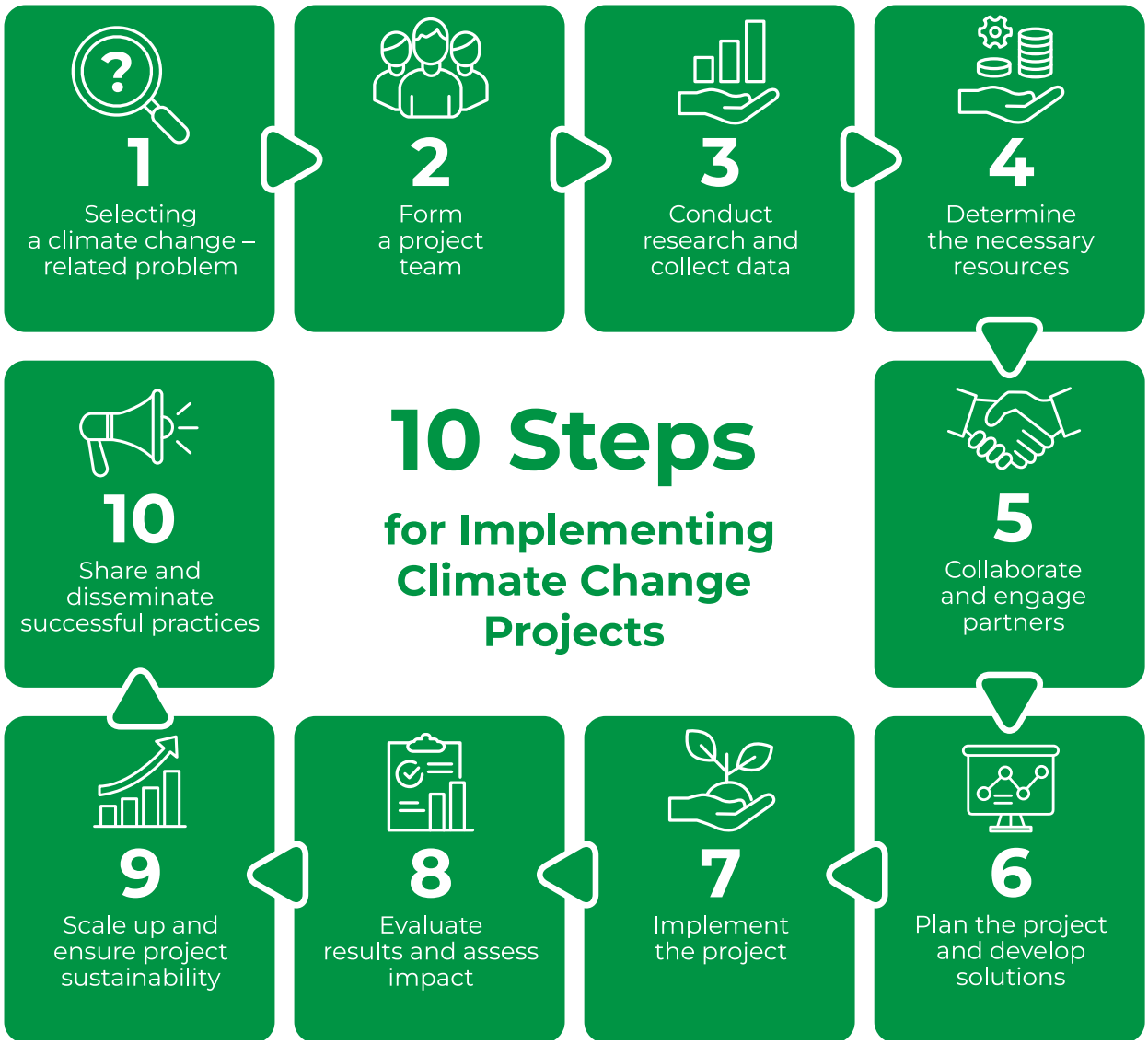
Part 3. How to prevent dangerous climate change?	
Chapter	**Possible School Projects**
3.1 Green Energy Sources	• Build a model of a solar collector or wind turbine. • Research what energy sources students' households use. • Install a mini solar-powered lamp in the schoolyard. • Investigate which energy sources are used in the region and prepare a comparison display. • Create an information stand on renewable energy and their role in mitigating climate change.
3.2 Energy Efficiency and Energy Saving	• Reduce electricity consumption and heat loss – identify ways to lower energy use in classrooms and homes. • Improve insulation and prevent heat loss through windows, doors, and heating systems.
3.2.1 Sustainable Transport / **3.2.2 Household Appliances and Electrical Devices**	• Conduct a survey on travel methods and create a "safe walking route to school" map. • Organize a campaign promoting cycling and walking. • Analyze the use of electrical appliances at school and home, and propose ways to reduce their operation.
3.3 Sustainable Construction: Passive and Active Houses	• Build a model of an energy-efficient house. • Develop a project for creating a "green classroom." • Design a plan for a "sustainable school of the future."
3.4 Carbon Footprint and How I Can Help the Planet	• Reduce waste – introduce a school composting system and separate waste collection, cut single-use plastics, and promote reusable materials. • Organize a "zero-emissions day" or a "week of eco-friendly habits."



3 Ten Steps for Implementing Climate Change Projects

Effective planning of student project activities is a key factor for success and forms the foundation for productive collaboration between teachers and students. Project-based learning requires not only a clear understanding of the topic, but also a structured approach that guides the process from the initial idea to evaluation and sustainable implementation of results.

To this end, ten interrelated steps have been identified to ensure logical and consistent work on projects, while fostering student independence and engagement. These steps cover the entire project cycle — from identifying a problem to scaling up successful solutions — and are described in detail in the following sections.



Step 1: Selecting a Climate Change – Related Problem

The first step is to identify a specific climate change–related problem that students can realistically address. It is important to encourage them to observe their surroundings and spot issues within the school and local community.

How to identify a problem?

To find the most relevant and meaningful challenge, the following methods can be used:

- **Brainstorming** – students share environmental issues they notice in the school or community. Ideas should be recorded on a board or sticky notes.
- **The "Why?"** method – by asking a series of "why" questions, students can dig deeper into root causes. For example:
  "Why is there a lot of waste in the school?" → "Because we don't separate waste." → "Why don't we separate waste?" → "Because there are no containers for recycling," and so on.
- **Observation walks** – a tour of the school and its grounds to identify problems, such as water leaks, lights left on in empty classrooms, or a lack of waste separation.
- **Data analysis** – reviewing electricity and water bills, waste volumes, or classroom temperatures to identify the school's environmental impact using objective data.
- **Surveys and interviews** – discussing environmental issues with students, teachers, and school staff to determine the most pressing concerns.

After compiling a list of climate-related problems, students can choose the most relevant and feasible one using three key criteria:

- **Significance** – how important the issue is for the school or community.
- **Feasibility** – whether the project can realistically address the problem under school conditions.
- **Measurability** – whether the results of the proposed solutions can be assessed.

Students should be encouraged to take a creative approach, which can help identify problems more effectively and inspire unconventional solutions.

Examples of projects implemented in schools across different countries are provided in Annex 1.

These projects address real climate challenges and can be adapted to specific school or community contexts. They help students not only learn about climate change but also design practical solutions. Tangible results — such as water savings or reductions in CO_2 emissions — allow students to clearly see the impact of their work, boosting both motivation and engagement.

Whether following the structured process described above or developing a completely original idea enriched with creativity, youthful enthusiasm, and the desire to make the world a better, fairer place, any successfully implemented project will bring students great satisfaction and pride in their achievements.





Step 2: Forming a Project Team

Assigning roles within the team helps distribute the workload evenly, improve efficiency, and strengthen participants' sense of responsibility. Once the topic is chosen, it is important to form a well-structured team in which each member has defined functions.

Roles may vary depending on the scope of the project, local conditions, and available resources. In some cases, students may take on multiple roles. To help develop a variety of skills, it is recommended to rotate roles over the course of the project.

Possible roles and responsibilities:

- **Project Leader** – oversees task completion and deadlines, and organizes team meetings.
- **Data Collection** – gathers and analyzes information on the school's climate-related aspects (e.g., energy use, waste volumes).
- **Workshop Facilitators** – plan and conduct training sessions for students, teachers, or the local community.
- **Design and Creative Materials Team** – creates posters, infographics, educational materials, and visual presentations.
- **Social Media and Communications Team** – promotes the project through social networks, school newspapers, and newsletters.
- **Technology and Innovation Group** – develops mobile apps, digital tools, or prototype solutions.
- **Monitoring** – tracks project impact, collects feedback, and suggests improvements.



Step 3: Research and Data Collection

Before developing solutions, students should gain a deeper understanding of the problem through careful data analysis.

The methods may include:

- **Surveys and interviews** – gathering opinions from students, teachers, school staff, and local residents.
- **Data collection** – studying electricity and water consumption, waste volumes, air quality at school, and reviewing examples of successful climate projects implemented in other schools, cities, or countries.
- **Consultations with experts** – speaking with environmental specialists, local authorities, or NGO representatives.

Documenting the collected data using charts, infographics, and reports will help provide a solid foundation for justifying proposed solutions in the next stage of the project.



Step 4: Determining the Necessary Resources

Every project requires specific materials, tools, and sources of financial support. Clearly identifying these needs at the outset helps ensure smooth implementation.

Types of resources may include:

- **Materials** – for example, containers for separate waste collection, insulation materials, or other physical items needed for the project.
- **Information and data** – such as school electricity and water bills, or local climate reports.
- **Funding** – from the school budget, crowdfunding campaigns, or environmental grant programs.
- **Educational** materials – climate education guides, online courses, or reference resources to support learning.



Step 5: Collaboration and Partner Engagement

Partnerships can greatly enhance the effectiveness of a project by providing expert knowledge, additional resources, and communication support.

Internal partners:

- **School administration and teachers** – approve initiatives, provide guidance, and grant access to resources.
- **Technical staff** – assist with practical implementation (e.g., installing recycling bins, optimizing lighting).
- **School clubs and organizations** – eco-clubs, student councils, or science groups can support and promote the project.

External partners:

- **Other schools and educational institutions** – collaborate to expand initiatives and share experiences.
- **Municipal organizations** – supply data, regulatory guidance, and potential funding.
- **Universities and research institutions** – offer expert advice, research support, and mentorship.
- **Community organizations** – provide educational materials, consultation, and networking opportunities.
- **Local businesses and sponsors** – contribute equipment, materials, or financial support.
- **Media outlets** – help raise awareness and promote the project.

Developing a long-term partnership strategy will help ensure the sustainability of the project and extend its impact to a wider audience.

Step 6: Project Planning and Developing Solutions

At this stage, students move on to creating a detailed action plan and identifying concrete solutions. Well-thought-out planning helps make the project realistic, achievable, and impactful.

Key elements of project planning:

- **Defining project boundaries** – clarify which problem will be addressed, what aspects are included, and what is outside the project's scope.
- **Assigning roles and responsibilities** – determine who is responsible for each stage of work and how the team will coordinate.
- **Setting timelines and milestones** – break the project into phases (e.g., research, prototype development, implementation, evaluation) and establish deadlines.
- **Developing success criteria** – define how the results will be measured (e.g., reduced energy use, student participation rates, amount of waste recycled). Examples of project impact assessment methods are provided in Annex 2.
- **Anticipating challenges and finding solutions** – identify potential obstacles and ways to overcome them.

Designing practical and realistic solutions:

Once the planning stage is complete, students can begin developing specific, evidence-based solutions adapted to the school's conditions. These solutions should be feasible, scalable, and measurable.

Examples of possible solutions:

- **Energy saving** – replacing lightbulbs with LED lamps, running information campaigns on responsible electricity use.
- **Waste reduction** – installing clearly marked recycling bins and tracking the volume of recycled waste.
- **Water conservation** – fitting taps with water-saving devices, raising awareness about efficient water use.
- **Greening the school grounds** – planting trees, creating a school garden, or installing green roofs.
- **Educational initiatives** – organizing debates, interactive lessons, or school competitions on environmental topics.

Before scaling up, it is important to test solutions on a smaller scale. For example, a paper recycling drive could start in one classroom before being expanded to the entire school.



Step 7: Project Implementation

Once planning is complete, the most active and engaging stage begins — putting the project into action. This step involves carrying out planned activities, working as a team, adapting to real-world conditions, and maintaining regular communication with participants and partners.

Typical activities may include:

- Installing recycling containers, planting trees, replacing lightbulbs with energy-efficient alternatives, creating a school recycling corner, testing prototypes, and other planned tasks.
- Keeping stakeholders informed — providing regular updates through school radio, bulletin boards, social media, and presentations for parents, teachers, and partners.

At this stage, it is important not only to follow the plan but also to respond flexibly to challenges, maintain participants' motivation, and document changes as they happen.

Step 8: Evaluating Results and Assessing Impact

After implementation, students assess the project's effectiveness, reflect on successes and challenges, and look for opportunities for improvement.

Key evaluation questions include:

- To what extent did the project meet its objectives?
- What were the main achievements, and what problems arose?
- What measurable impact did the project have? (e.g., reduction in energy use, decrease in waste volume, increase in climate awareness among students)

Evaluation helps not only to measure effectiveness but also to draw lessons that can inform future initiatives.

Examples of methods for evaluating project results are provided in Annex 2. Using these methods allows educators and students to assess both the educational value of the project and its real environmental impact.

Climate change–related project-based learning helps students develop critical thinking, teamwork skills, and the ability to make a tangible contribution to climate action.



Step 9: Scaling Up and Ensuring Project Sustainability

To make positive changes last, it is important to plan for the project's sustainability from the very beginning.

How to maintain and expand the project?

- Integrate solutions into school policies – for example, make waste separation a mandatory practice.
- Pass the project on to new students – establish a mentorship system where older students train younger ones.
- Organize regular training events – hold workshops for new project participants to maintain momentum and skills.

Expanding the project beyond the school:

- Collaborate with other schools – exchange experience, share resources, and launch joint initiatives.
- Seek new funding sources – apply for grants or secure sponsorship from local businesses.
- Engage with local authorities – integrate school initiatives into municipal sustainability programs.

A school project can grow into part of a larger movement, where small, local actions contribute to meaningful global change.

Step 10: Sharing Achievements and Inspiring Others

Sharing the outcomes of a project helps inspire other schools and communities to launch similar initiatives and demonstrates the real impact of students' efforts.

Ways to communicate achievements:

- **Organize an exhibition or eco-forum** – where students present their results and share experiences.
- **Publish reports and success stories** – in school media, on the school website, and through social networks.
- **Student presentations for peers** – speaking to other classes or schools as a way to engage the next generation of participants.
- **Presenting results to local authorities** – discussing opportunities to scale the project at the municipal or regional level.

Recognizing and celebrating students' efforts not only boosts their motivation but also encourages continued participation in environmental initiatives, turning individual projects into a source of wider inspiration.



4 How to Evaluate and Track the Results of Climate Projects

Project-based learning focuses on solving real problems, requiring an interdisciplinary approach and the practical application of knowledge. To ensure that projects achieve their educational objectives and create a lasting impact, it is essential to apply systematic monitoring and evaluation.

Every climate project should conclude with a concrete, measurable outcome — this may be a physical object, or a change in behavior, attitudes, or levels of knowledge. It is important that students clearly understand how their activities contribute to solving climate challenges and what effects these activities may have on their school, family, or community.

Table 3.
Examples of Climate Project Results and Evaluation Indicators.

Tangible Results	
Energy-saving measures: replacing lightbulbs, installing motion sensors, improving insulation, sealing windows and doors	Energy savings (kWh); reduction of CO_2-equivalent emissions (kg/ton) according to accepted coefficients
Trees planted, greened areas on school grounds	Number of trees; area of green space
Installed systems: waste separation, composting, rainwater harvesting	Water savings (liters); reduction of waste (kg)
Informational and Educational Results	
Educational and informational materials: booklets, stands, infographics	Number of materials produced
Media products: videos, podcasts, social media posts	Number of materials; reach; views
Events held: lessons, activities, debates, eco-forums, exhibitions	Number of events; number of participants, classes, and groups involved
Awareness campaigns and school actions	Frequency and duration of campaigns; outreach; level of engagement
Intangible Results	
Increase in knowledge on the topic	Pre-/post-tests (% of correct answers)
Changes in attitudes and intentions (e.g., toward waste separation, resource saving)	Attitude surveys (agreement scales); share of students willing to support measures
Changes in behavior (regular waste separation, saving energy/water, switching to walking or cycling)	Behavioral indicators: share of students separating waste; per-student electricity or water consumption

Effective Evaluation of Climate Projects

Effective evaluation combines both qualitative and quantitative indicators, analyzing not only the learning process but also the project's real impact on the environment and the community.

A key element of project evaluation is its impact on the climate issue itself. Every project should contribute either to reducing greenhouse gas emissions or to lowering vulnerability to climate change impacts.

- **For adaptation projects**, evaluation should focus on how well the project reduces risks for the community and nature (e.g., increase in green spaces, reduction of building overheating).
- **For mitigation projects,** evaluation should measure resource savings and reductions in CO_2 emissions.

A strong evaluation system not only determines the project's success but also increases student engagement and develops their skills in analysis, planning, and reflection. It is important to apply different forms of evaluation at different stages of the project, as well as to track the project's long-term influence on student behavior and the school environment.

Types of evaluation:

- **Formative evaluation** – carried out during the project, helping the team adjust work, improve solutions, and monitor progress.
- **Summative evaluation** – conducted at the end of the project to summarize outcomes and analyze achieved results.
- **Monitoring** – conducted after the project's completion to assess sustainability and longer-term impact (e.g., how the school environment or student behavior has changed).



The following table presents tools and methods suitable for all three stages.

Table 4.
Evaluation and Monitoring Methods.

Formative Evaluation (Learning Process Evaluation)	
Feedback and discussions	Students receive regular comments from teachers, experts, and peers throughout the project.
Student reflection	Keeping project journals or notes documenting results, challenges, and solutions.
Interim presentations	Presenting ongoing project stages, exchanging ideas, and receiving recommendations.
Final Result Evaluation	
Final presentation	Students present their project to an audience, explaining the problem, approach, and achieved impact.
Rubrics and checklists	Evaluation based on criteria such as: • Validity and relevance of solutions (scientific basis, local significance) • Practical application (feasibility, long-term effect) • Teamwork (effectiveness of collaboration)
Peer and self-assessment	Participants evaluate their own roles and contributions, as well as provide feedback to other teams.
Monitoring (Project Follow-Up)	
Project journals	Document the progress of implementation, observations, changes, and conclusions.
Surveys and questionnaires	Measure changes in students' knowledge, attitudes, and behaviors compared to the beginning of the project.
Quantitative indicators	Track concrete results, such as reductions in CO_2 emissions, water and energy savings, or waste reduction.





Annex 1 | Examples of Climate Projects of Schoolchildren

1. Home Vermicomposting as a Way to Reduce Greenhouse Gas Emissions



Category: Mitigation

Type: Practical/Experimental

Objective: Reduce the volume of organic waste sent to landfills and cut methane emissions from decomposition.

Students analyze the amount of organic waste in households and create a vermicomposting system using Californian worms to process food waste into natural fertilizer. They record the volume of waste processed and assess the ecological and economic benefits, including replacing chemical fertilizers with natural ones.

Expected results:

- Reduction of greenhouse gas emissions.
- Decrease in the volume of organic waste.
- Reduced use of chemical fertilizers by replacing them with natural compost.
- Data on waste processing and the project's local environmental impact.

2. Producing Low-Carbon Pet Food



Category: Mitigation

Type: Practical/Experimental

Objective: Lower the carbon footprint of pet ownership through alternative feed production.

Students research the climate impact of commercial pet food production and experiment with growing live feed (e.g., mealworms) using organic waste. This reduces food waste and the carbon footprint from packaging and transport.

Expected results:

- Reduction in CO_2 emissions.
- Decrease in food waste.
- Greater awareness of the environmental impact of pet ownership.

3. Producing Fuel Briquettes from Leaves and Waste Paper



Category: Mitigation

Type: Practical/Experimental

Objective: Reduce greenhouse gas emissions by replacing firewood with eco-friendly fuel briquettes made from secondary materials.

Students collect fallen leaves and waste paper, shred them, and form dried briquettes. The project promotes waste reuse while reducing pressure on forests, important carbon sinks.

Expected results:

- Lower demand for firewood.
- Use of organic and paper waste.
- Lower costs for collecting and disposing of fallen leaves and waste paper.
- Development of practical recycling skills.

4. Using Fungi to Process Wood Waste in Parks



Category: Mitigation

Type: Practical/Experimental

Objective: Find an alternative way to utilize wood residues and reduce CO_2 emissions from burning.

Students study traditional methods of park waste disposal (removal or burning) and test inoculating wood with fungi (e.g., bracket fungi) that decompose it without additional emissions.

Expected results:

- Reduction in CO_2 emissions.
- Increased biodiversity in parks.
- Lower costs for removing and disposing of wood waste.

5. Saving Water at Home



Category: Mitigation and Adaptation

Type: Social

Objective: Promote efficient household water use and reduce pressure on water resources.

Students analyze household water consumption, identify inefficient practices, and propose solutions such as installing aerators, changing daily habits, and using rainwater.

Expected results:

- Reduced freshwater consumption.
- Increased awareness of water conservation.
- Lower household water costs.

6. Drought-Resistant School Garden



Category: Adaptation

Type: Practical/Experimental

Objective: Adapt the school garden for hot/dry periods by planting drought-resistant species, mulching, and creating a simple gravity-fed drip irrigation system from bottles.

Students compare water use between pilot and control plots.

Expected results:

- Reduced water consumption while maintaining/improving plant survival.
- Lower watering frequency during heat thanks to mulching/drip irrigation.
- Greater resilience of plants to heat/water stress.
- Improved soil water retention and microclimate benefits (more shade/less overheating).



7. Producing Biofuel and Fertilizer from Rabbit Manure



Category: Mitigation

Type: Practical/Experimental

Objective: Use livestock waste to produce biofuel and organic fertilizer.

Students study the composition of rabbit manure, its suitability for biogas plants, and potential for composting. They build a small unit, measure biogas production, and evaluate fertilizer output.

Expected results:

- Reduction in livestock waste.
- Production of eco-friendly fuel.
- Replacement of chemical fertilizers with organic alternatives.

8. Collecting and Using Rainwater



Category: Adaptation

Type: Practical/Experimental

Objective: Reduce the use of tap water for non-potable needs by collecting rainwater, especially in drought-prone regions.

Students design a system for collecting and storing rainwater and use it to water plants and for other non-potable purposes. They calculate the efficiency of the system and the amount of water saved.

Expected results:

- Reduced use of tap water for non-potable needs.
- More sustainable water use in drought-prone areas.
- Increased awareness of sustainable water use.

9. Designing a Smart Recycling Bin



Category: Mitigation

Type: Practical/Experimental

Objective: Create an automated system for waste recognition and sorting.

Students design a model or prototype of a “smart” bin using sensors and algorithms to separate plastics, paper, glass, and organic waste.

Expected results:

- Improved waste sorting efficiency.
- Reduction in mixed waste volumes.
- Lower landfill pressure.

10. Building a School Greenhouse



Category: Adaptation

Type: Practical/Experimental

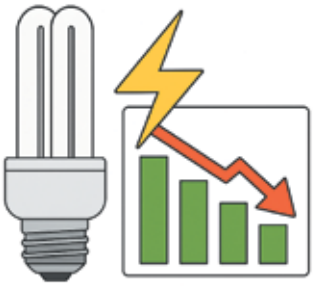
Objective: Create a sustainable plant-growing system at school with minimal environmental impact.

The project includes building a greenhouse with drip irrigation, rainwater harvesting, LED lighting, and microclimate monitoring.

Expected results:

- Water and energy savings.
- Locally grown produce for the school, reducing transport needs.
- Learning principles of climate-adapted agriculture.
- Increased interest in agroecology and sustainable farming.

11. Optimizing Household Energy Use



Category: Mitigation

Type: Practical/Experimental and Research

Objective: Reduce the household carbon footprint through energy conservation.

The project includes analyzing energy consumption, replacing inefficient devices, running an awareness campaign, and tracking results.

Expected results:

- Lower energy use.
- Reduction in CO_2 emissions.
- Increased awareness of how daily habits influence climate change.

12. Preventing Tick/Mosquito Bites on Outdoor Activities



Category: Adaptation

Type: Educational and awareness projects

Objective: Reduce tick and mosquito bites during field trips, considering longer vector activity seasons under climate warming.

Activities include leaflets for parents/students, self-check checklists, mandatory pre-trip briefings, dress code (long clothes/closed shoes), agreed use of repellents, training on application, updating the school first aid kit (tweezers, antiseptic, instructions), incident log, and seasonal analysis.

Expected results:

- Reduced number of bites during field trips.
- Correct application of basic protection measures (dress code, repellents, self-check).
- Increased awareness of seasonal risks and adoption of school safety procedures.







Annex 2 | Examples of Evaluating Climate Projects

1. Reducing Greenhouse Gas Emissions

Objective: Reduce the school's carbon footprint.

Evaluation methods:

- Baseline measurements – calculate the school's carbon footprint (for example, using online calculators or analyzing energy consumption).
- Post-implementation evaluation – measure CO_2 emissions after introducing solutions, such as switching to LED lamps or reducing waste.
- Long-term monitoring – analyze emissions over the course of a year to assess the sustainability of changes.

It is important that students understand the ultimate goal of the project — reducing greenhouse gas emissions (most often CO_2) or developing adaptation measures to climate change. Project activities should not only lead to concrete environmental outcomes but also demonstrate measurable positive changes.

One simple way of evaluating project impact is to calculate the volume of reduced or avoided CO_2 emissions, expressed in kilograms or tonnes in line with international practice.

Two approaches can be used:

a) Online carbon footprint calculators – suitable for younger and middle school students. Many free calculators are available (e.g., Carbon Footprint Calculator), which allow estimation of CO_2 and other GHG emissions from various activities: electricity use, heating, household appliances, and transport. By comparing data before and after project implementation, students can visualize the real impact of their actions. However, such calculators often apply average emission factors depending on the national or regional energy system. For example, in countries with coal-based power generation, emissions per kWh will be higher than in countries with a high share of renewables.

b) Calculation using emission factors (manual method) – more suitable for older students and advanced projects. For example:

- By taking into account the type of fuel used (gas, oil, coal), students can calculate the amount of CO_2 emitted when it is burned.
- Students can calculate the difference between baseline and reduced energy consumption and then convert this into equivalent CO_2 reduction.

This method helps deepen knowledge of physics, chemistry, and mathematics, while also building skills in working with data. National environmental agencies often publish country- or sector-specific emission factors. It is important to use reliable sources and cite them in project work.

2. Water Conservation in Schools

Objective: Reduce water consumption in schools.

Evaluation methods:

- Before the project – analyze water consumption and identify problem areas (e.g., leaks). Study the regional water balance and review future water availability scenarios under climate change (using data from national or local hydrometeorological services).
- Implementation – install water-saving devices, set up rainwater harvesting systems, conduct awareness campaigns.
- Evaluation – measure water consumption before and after the project, compare results, and assess how the changes reduce pressure on the regional water balance.
- Behavioral change – survey students about their daily water use practices.

3. Waste Sorting and Recycling

Objective: Reduce the volume of waste sent to landfill.

Example: A school paper recycling drive with 100 students, each collecting 5 kg of paper.

Total collected paper: 100 × 5 kg = 500 kg = 0.5 tonnes.

Evaluation methods (see Table 3.3.1 of the Climate Box):

By recycling this paper instead of using virgin pulp, the project achieved:

- Saving about 12 trees (equivalent to 1.5 tonnes of wood).
- Saving 2,350 kWh of electricity.
- Avoided emissions of about 478 kg CO_2-equivalent.
- Saving 16,550 liters of water.

4. Energy Efficiency

Objective: Reduce school energy consumption.

Example measures: Replace old bulbs with LEDs; run energy-efficiency training.

Evaluation methods:

- Before the project – baseline electricity use: 833 kWh/month (same month last year to ensure comparable seasonal conditions).
- After the project – consumption: 667 kWh/month.
- Savings: 166 kWh/month (833 − 667).

CO_2 reduction:

- Emission factor: 0.5 kg CO_2 per 1 kWh saved (replace with the national factor if available).
- Calculation: 166 × 0.5 = ≈83 kg CO_2 avoided per month.

5. Preparing Schools for Extreme Weather Events

Objective: Increase school community resilience to climate risks (extreme heat waves, heavy rainfall, storms).

Evaluation methods:

Before the project – survey students on their knowledge of safety rules for extreme weather.

Implementation – develop and distribute leaflets, green school grounds to create shaded areas, conduct emergency evacuation drills.

After the project:

- Awareness growth: before – 40% of students gave correct answers, after – 85%.
- Three schoolyard areas greened, 15 trees planted.
- Two evacuation drills conducted involving all classes.
- 25% of students reported discussing adaptation measures with their families.



From Knowledge to Action: Project-Based Learning on Climate Change. Guide for Educators

A. Poghosyan, D. Sorokin, Yu. Dobrolyubova

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This guide complements the Climate Box educational toolkit on climate change, developed by the United Nations Development Programme (UNDP)) with financial support provided by the Government of Russian Federation and other donors and is intended to support educators who wish to integrate project-based learning on climate change into their teaching practice. It provides a step-by-step approach to designing and implementing school projects that help students develop environmentally responsible thinking, collaboration skills, and the ability to take practical action in response to the challenges of climate change.

The guide is aimed at teachers, education methodologists, extracurricular educators, as well as representatives of youth and environmental organizations interested in making effective use of the Climate Box in education.

Authors

Armine Poghosyan, Regional Consultant, Climate Box Programme

Danila Sorokin, Regional Consultant, Climate Box Programme

Yulia Dobrolyubova, Lead Author of the Climate Box Toolkit, Regional Technical Consultant, Climate Box Programme

Climate Box Program Managers

Natalia Olofinskaya, UNDP

Petra Valastinova, UNDP

Design and Layout

Anna Golovatyuk

Illustrations

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