Iceland Liechtenstein Norway grants

Teaching module 6. Environmental projects management

6.3 Good Practice Examples

Good practice examples

Mihai Vrîncuț – Bucharest University of Economic Studies

Daniel Jiroveanu – Bucharest University of Economic Studies

Table of contents

Introduction

The realization of environmental projects in the rural area is both an innovative approach and a challenge both for the organizations involved (local authorities, companies, NGOs, other organizations) and for the citizens of the rural environment. That is why it is necessary that the theoretical accumulations regarding "Management of environmental projects" be doubled by the presentation of examples of good practices regarding environmental projects carried out in the rural area.

In this section of the course module, some examples of good practices regarding environmental projects in the rural area are presented. The environmental projects presented were selected so that they are representative of the rural environment, both for Romania and Iceland. The projects are presented in such a way that there is the possibility of a transfer of know-how to potential students, with an obvious impact on their training in this field.

In the presented projects, examples of good practices are illustrated regarding:

- Presentation of the purpose and objectives of the projects;
- Time management of environmental projects;
- Realization of environmental project budgets
- Identifying the risks of environmental projects;
- Realization of the risk register;
- Presentation of the benefits of this type of projects.
- The impact of projects on the environment.

The examples of good practices are focused on three representative types of environmental projects both through the lens of their purpose and objectives and considering the necessity and usefulness of this type of projects for the rural area.

These examples of good practices constitute a first step that the students take in highlighting the application side of the acquired knowledge, with important effects on gaining the confidence of the students regarding their own possibilities of initiating and implementing some environmental projects.

Transilvania University of Brașov

Acest document este realizat cu sprijinul financiar al Mecanismului Financiar al SEE 2014 – 2021. Conținutul acestuia (text, fotografii) nu reflectă opinia oficială a Operatorului de Program, a Punctului Național de Contact sau a Oficiului Mecanismului Financiar. Informațiile și opiniile exprimate reprezintă responsabilitatea exclusivă a autorului/ autorilor.

Good Practice Example no. 1 Project regarding the construction of a solar power plant in Avram Iancu commune

As an example of good practice, we will consider a project aimed at building a 3 MW photovoltaic plant in Avram Iancu commune in Bihor county, northwestern Romania. The power plant will use thin-film photovoltaic modules (a technology that generates up to 10% more power than polycrystalline) and will occupy an area of 6 hectares (Studiu de fezabilitate pentru parc fotovoltaic solar, comuna Avram Iancu , județul Bihor)

To build this solar plant, the municipality of Avram Iancu commune had to undertake the activities listed in the WBS in Figure 1.

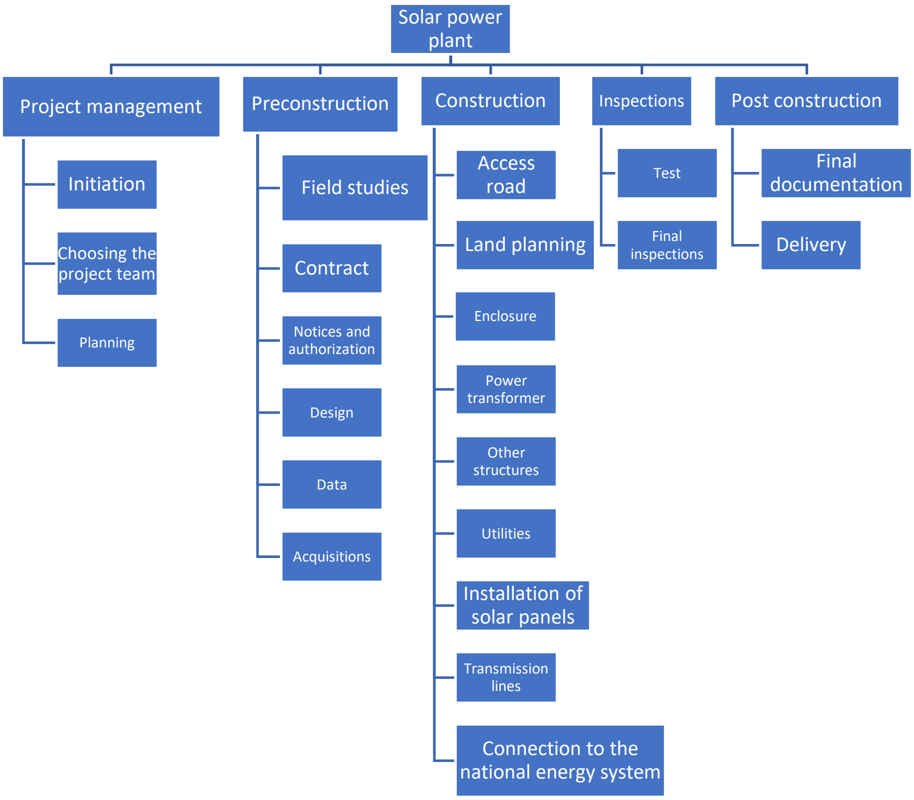

Figure 1. WBS for a project to build a photovoltaic plant

Source: adaptation after (https://checkykey.com/work-breakdown-structure-for-solar-project, 2021)

A more detailed list of the activities for the project, including the estimated duration of the activities and the links between the activities can be seen in Table 1. The estimation of the durations was made in the case of the Avram Iancu solar plant based on the expert opinion provided by a consulting company. In the table mentioned above, SI represents an "end-start" link.

All the activities can then be organized in a network diagram, as we learned previously (Figure 2). Arrows indicate the sequence of activities. We will mark the **minimum activity start term** ($t^{mî}$) to the left of the activity and **the minimum activity end term** (t^{mt}) on the right, calculations are made directly on the diagram.

Table 1. Task list for a photovoltaic plant construction project

Activity ID	Activity	Estimated duration	Predecessor activity
1	Initiation	0 days	-
2	Choosing the project team	7 days	1
3	Planning	7 days	2
4	Field studies	2 days	2
5	Contracting	1 day	2
6	Construction permits	20 days	1
7	Other legal notices	20 days	1
8	Design and engineering	7 days	2
9	Consultancy	7 days	2
10	Acquisitions	14 days	2
11	Access road	7 days	4, 5, 6, 7, 8, 9, 10
12	Landscaping	15 days	11
13	Enclosure	7 days	12
14	Power transformer	7 days	13
15	Other structures	15 days	14
16	Utilities	7 days	15
17	Instalation of solar panels	15 days	16
18	Transmission lines	7 days	17
19	Connection to the national energy system	7 days	18
20	Tests	5 days	19

Transilvania University of Brașov

Acest document este realizat cu sprijinul financiar al Mecanismului Financiar al SEE 2014 – 2021. Conținutul acestuia (text, fotografii) nu reflectă opinia oficială a Operatorului de Program, a Punctului Național de Contact sau a Oficiului Mecanismului Financiar. Informațiile și opiniile exprimate reprezintă responsabilitatea exclusivă a autorului/ autorilor.

21	Final inspections	1 day	20
22	Final documentation	7 day	20
23	Delivery	0 days	21, 22

Source: own creation

We start by marking the minimum term for starting the activity ($t^{mî}$) to the left of the first activity. Usually this is 0. Next, we determine the start time ($t^{mî}$) of each activity. This is given by the largest number to the right of the activity's immediate predecessor (*i.e* its minimum completion term t^{mt}). If the activity has two predecessor activities, the one with t^{mt} higher will give you $t^{mî}$ of the activity. t^{mt} of an activity is given by its minimum start time ($t^{mî}$) and its estimated duration (d), namely $t^{mî}$ + d. So if $t^{mî}$ of an activity is 7 and it is estimated to last 7 days, t^{mt} his will be 14. Mark all these numbers on the project schedule diagram. Figure 2 shows the results.

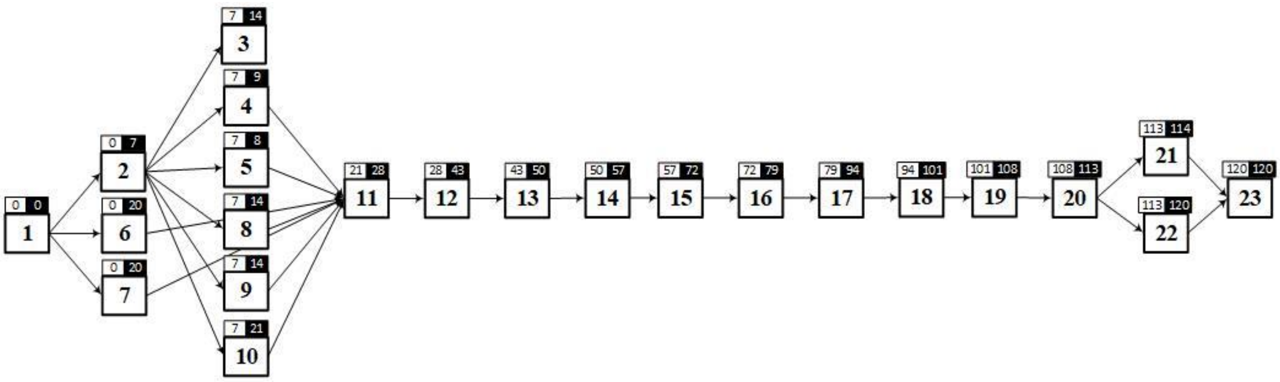

Figure 2. Network diagram for a photovoltaic plant construction project

source: own creation in MS Visio

The longest path through the diagram will be the critical path and the last number to the right of the last activity in the diagram will tell you the minimum time required to complete the project. In our case the critical path consists of activities 1-2-10-11-12-13-14-15-16-17-18-19-20-22-23 and the project should be completed in 120 days.

Transilvania University of Brașov

Acest document este realizat cu sprijinul financiar al Mecanismului Financiar al SEE 2014 – 2021. Conținutul acestuia (text, fotografii) nu reflectă opinia oficială a Operatorului de Program, a Punctului Național de Contact sau a Oficiului Mecanismului Financiar. Informațiile și opiniile exprimate reprezintă responsabilitatea exclusivă a autorului/ autorilor.

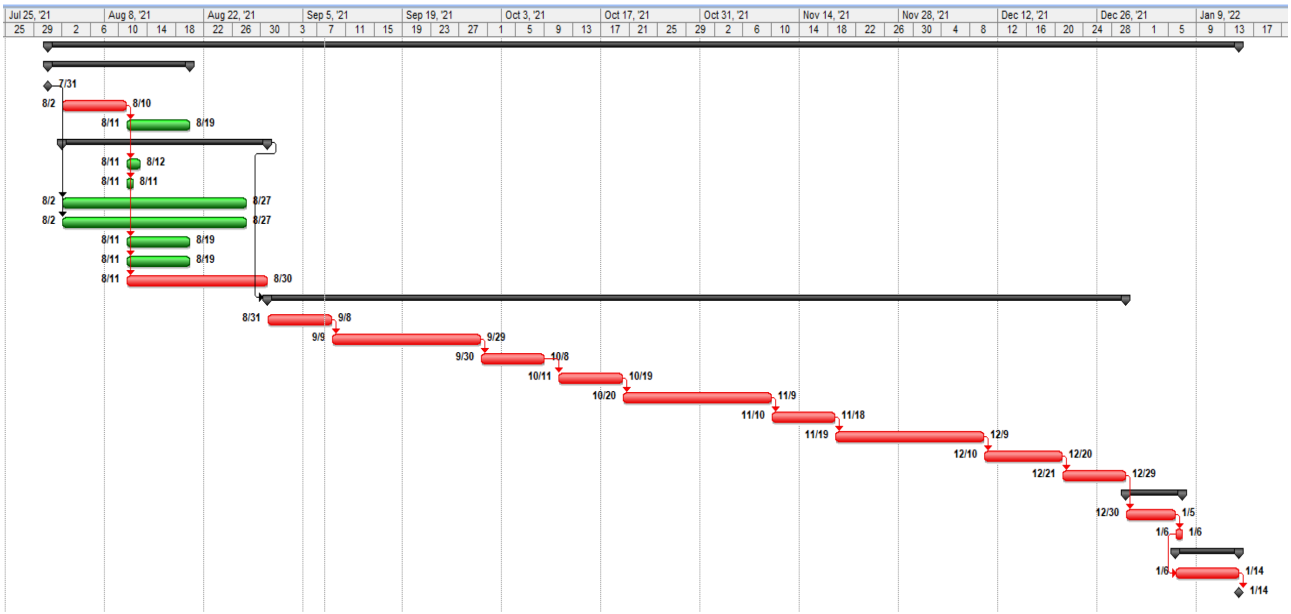

Figure 3. Gantt chart for a photovoltaic plant construction project

source: own creation in MS Project

Figure 3 shows the baseline/baseline Gantt chart for the photovoltaic plant construction project. The activities shown in red are those that make up the critical path.

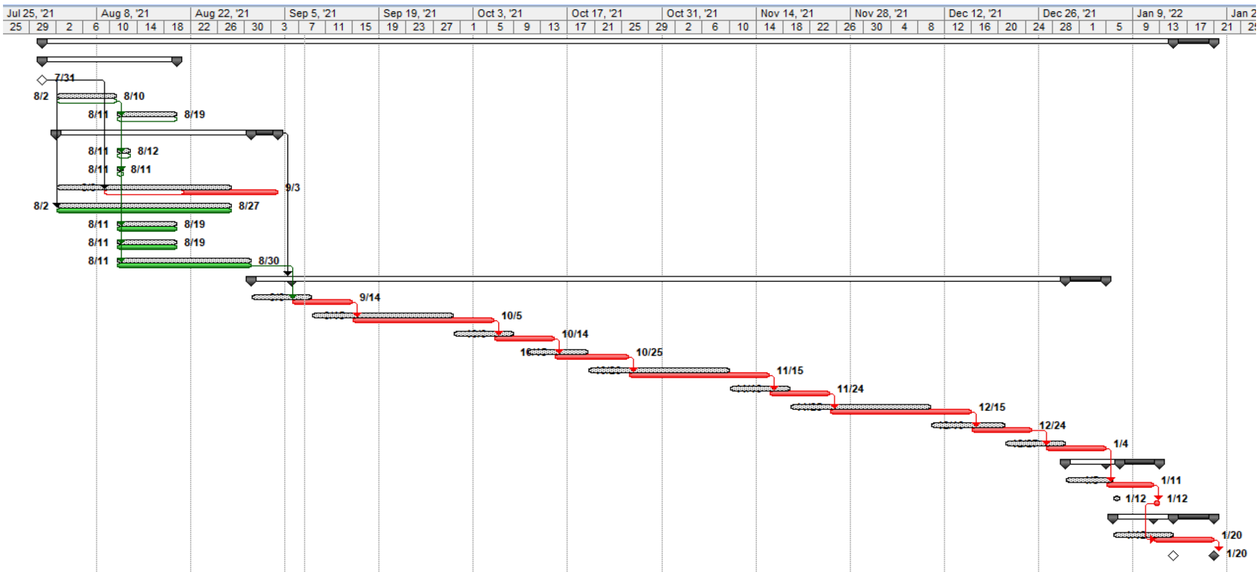

Figure 4. Gantt chart with baseline schedule and actual activity durations for a photovoltaic plant construction project

source: own creation in MS Project

Project schedule control involved constantly checking schedule changes, identifying the nature of schedule changes - whether they have a positive or negative impact - as well as managing changes so that they do not affect the project completion date and/or project scope . In Figure 4, the base graph is the gray one.

Transilvania University of Brașov

Acest document este realizat cu sprijinul financiar al Mecanismului Financiar al SEE 2014 – 2021. Conținutul acestuia (text, fotografii) nu reflectă opinia oficială a Operatorului de Program, a Punctului Național de Contact sau a Oficiului Mecanismului Financiar. Informațiile și opiniile exprimate reprezintă responsabilitatea exclusivă a autorului/ autorilor.

Example: The construction activity of an access road to the photovoltaic plant was supposed to start on August 31, but due to the fact that the obtaining of construction permits started a week later and has not yet been completed, it has to be postponed. This is clearly a negative change in the project schedule (see Figure 4). As we can see, the whole project will now be delayed, finishing on the 20th of January instead of the 14th. This will be addressed in this case by a crashing process for the access road construction and landscaping work , so that the project is completed on time.

As mentioned before, a simple way to organize project costs is according to the activities (based on bottom-up estimation) that generate them, as we can see in Table 2. This is also the organization chosen by the Bihor County Council, the beneficiary of the project.

Table 2. Simple budget for a photovoltaic plant construction project

Activity ID	Activity	Estimated cost
1	Initiation	0 €
2	Choosing the project team	1,000 €
3	Planning	2,500 €
4	Field studies	54,080 €
5	Contracting	55,000 €
6	Construction permits	2,500 €
7	Other legal notices	2,500 €
8	Design and engineering	139,960 €
9	Consultancy	12,540 €
10	Acquisitions	13,007,950 €
11	Access road	840,000 €
12	Landscaping	22,800 €
13	Enclosure	35,740 €
14	Power transformer	724,000 €
15	Other structures	657,090 €
16	Utilities	111,576 €
17	Instalation of solar panels	455,000 €
18	Transmission lines	110,100 €

Transilvania University of Brașov

Acest document este realizat cu sprijinul financiar al Mecanismului Financiar al SEE 2014 – 2021. Conținutul acestuia (text, fotografii) nu reflectă opinia oficială a Operatorului de Program, a Punctului Național de Contact sau a Oficiului Mecanismului Financiar. Informațiile și opiniile exprimate reprezintă responsabilitatea exclusivă a autorului/ autorilor.

Activity ID	Activity	Estimated cost
19	Connection to the national energy system	529,540 €
20	Tests	55,000 €
21	Final inspections	124 €
22	Final documentation	5,000 €
23	Delivery	0 €
TOTAL		**16,824,000 €**

source: own creation in MS Word

This is what a portion of the MS Project Earned Value table looks like for this project:

Task name	Planned Value - PV (BCWS)	Earned Value - EV (BCWP)	AC (ACWP)	SV	CV	EAC	BAC	VAC
-PHOTOVOLTAIC PLANT CONSTRUCTION PROJECT	14,122,590.00 €	113,830.00 €	114,550.00 €	4,008,760.00 €)	(720.00 €)	6,930,415.53 €	6,824,000.00 €	(106,415.53 €)
-PROJECT MANAGEMENT	3,500.00 €	3,500.00 €	3,500.00 €	0.00 €	0.00 €	3,500.00 €	3,500.00 €	0.00 €
Initiation	0.00 €	0.00 €	0.00 €	0.00 €	0.00 €	0.00 €	0.00 €	0.00 €
Choosing the project team	1,000.00 €	1,000.00 €	1,000.00 €	0.00 €	0.00 €	1,000.00 €	1,000.00 €	0.00 €
Planning	2,500.00 €	2,500.00 €	2,500.00 €	0.00 €	0.00 €	2,500.00 €	2,500.00 €	0.00 €
-BEFORE CONSTRUCTION	13,274,530.00 €	110,330.00 €	111,050.00 €	64,200.00 €)	(720.00 €)	361,157.95 €	274,530.00 €	86,627.95 €)
Field studies	54,080.00 €	54,080.00 €	56,800.00 €	0.00 €	(2,720.00 €)	56,800.00 €	54,080.00 €	(2,720.00 €)
Contracting	55,000.00 €	55,000.00 €	53,000.00 €	0.00 €	2,000.00 €	53,000.00 €	55,000.00 €	2,000.00 €
Construction permits	2,500.00 €	1,250.00 €	1,250.00 €	(1,250.00 €)	0.00 €	2,500.00 €	2,500.00 €	0.00 €
Other legal notices	2,500.00 €	0.00 €	0.00 €	(2,500.00 €)	0.00 €	2,500.00 €	2,500.00 €	0.00 €

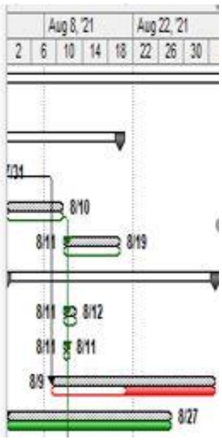

Figura 5. Example of an earned value report generated by MS Project for a photovoltaic plant construction project

source: own creation in MS Project

As you can see, some activities managed to fall within the expected costs, such as choosing the project team or planning, while others ended up with a final cost above the initial cost (field studies) or below the initial cost (contracting). Some activities have only accrued part of their costs because they are still in progress - see construction notices in Figure 5. A cost realized below the base value appears as a positive variance (earned value), while a cost above the value basis appears as a negative variance. In total, the project so far has a negative variance of €720, which means it has cost €720 more than the budgeted cost.

Good Practice Example no. 2 – Ecological reconstruction project through afforestation of degraded agricultural land in Fălciu commune, Vaslui county

The ecological reconstruction project in Fălciu commune, Vaslui County, aims to ensure environmental conditions in the area of Fălciu commune in Vaslui County by carrying out afforestationactions, an area affected in time by destruction and degradation. (https://primariafalciu.ro/index.php/proiecte/reconstructie-ecologica-prin-

Acest document este realizat cu sprijinul financiar al Mecanismului Financiar al SEE 2014 – 2021. Conținutul acestuia (text, fotografii) nu reflectă opinia oficială a Operatorului de Program, a Punctului Național de Contact sau a Oficiului Mecanismului Financiar. Informațiile și opiniile exprimate reprezintă responsabilitatea exclusivă a autorului/ autorilor.

impadurire-a-terenurilor-agricole-degradate-din-perimetrele-de-ameliorare-valea-in-sus-dealul-in-jos-capu-dealului-din-comuna-falciu-judetul-vaslui, 2021).

The main goal of the project was the ecological reconstruction of the land using the most accessible options, more precisely the increase of the forest area necessary for the protection of soils, water and microclimate. Thus, actions aimed at reducing the destruction generated by man (deforestation) and nature (alluvium) as well as increasing the retention capacity were considered. At the same time, it was also aimed at securing resources for the production of biomass and high-quality wood. The actions taken also stimulate the development of biodiversity.

The location of the project must take into account the environmental, economic and social conditions. In terms of environmental conditions, ecological, geographical and climatic aspects must be taken into account. Geographical space is important especially from the perspective of landforms that can favorably influence the afforestation process. At the same time, the hydrographic level and precipitation have a determining role in the long-term success of the project by contributing to ensuring the water level at a reasonable level for the development of the forest area. The other factors, such as the nature of the soils and the wind regime, complete the environmental environment of the project, and through mutual interaction contribute to the success of the project.

The results of the project are visible, they refer to reducing the degree of soil erosion and reducing the degree of pollution by increasing the volume of oxygen generated and retaining increased amounts of carbon dioxide.

The project was estimated to have an implementation duration of 5 months and envisaged the afforestation of an area of over 30 ha. The project budget was estimated at approximately 1.1 million lei.

Regarding the analysis of financial resources, the comparison between benefits and efforts is taken into account. While efforts can be accurately measured, planned, and accomplished, benefits cannot be rigorously measured and cannot be accurately quantified in monetary terms. For this reason, the economic analysis is based on a comparison between two options:

- The first variant is an estimate of the evolution over time of the space that is the object of the project, variant that is based on the scenario in which the area is not intervened. This variant is called "no project".

- The second option is a time estimate based on the implementation of the activities provided by the project. This variant assumes the realization of all planned actions and is called "with project".

The comparison of the two variants is aimed at estimating the "differences" which by their scale justify the necessity and timeliness of the project. At the same time, the aim is to justify the necessary financial effort.

Regarding the resources involved, besides the financial resource, human resources and material resources were involved (seedlings, tools, fertilizers, etc.) . As far as material resources are concerned, they must be chosen according to the objectives, the budget and the afforestation technique adapted to the conditions ensured by the environment.

For the afforestation of the land, trees with a long service life (80 years) were used that allow the achievement of the long-term project objectives without major interventions, but only maintenance and grooming. At the same time, the main impediment of this type of environmental project is given by the fact that the time horizon in which the maximum favorable impact is reached is between 25 and 30 years.

The actual realization of afforestation was based on a afforestation model based on the number of seedlings needed for afforestation per hectare, the preparation of the land, the technology and the way of planting. Thus, in the more arid areas, it is envisaged to plant seedlings more often, but also to improve the soil to ensure the success of planting.

Project-specific risks:

- The macro-level risks (legal, technical, economic, social and environmental) that have been identified do not have a major impact on projects, in particular due to policies to encourage such actions;
- Economic risks are the ones with the most important impact because the first economic results (revenues) are achieved in about 30 years. At the same time, most of the project efforts materialize at the beginning of the project;
- Technical risks refer to diminished results due mainly to the failure to adapt the planted trees to the new environment. At the same time, certain maintenance work that is carried out improperly, can lead to a significant reduction in the success of the project;
- Environmental risks, especially those related to extreme climatic events, can diminish the success of the project. However, according to statistics, the area does not present significant potential for the manifestation of such phenomena.

Based on the identified risks, the risk register for this project can be completed (presented in table no. 3)

Table 3. The risk register for the project of ecological reconstruction through afforestation of agricultural land

No.	Description of the risk	Project activity affected	Probability	Impact (euro)	Expected value	Response actions
1.	The long period of obtaining the first economic results	Exploitation of the project	50%	10000	5000	Starting actions to obtain the first economic results at the beginning of the exploitation period
2.	Too high implementation efforts compared to the period of obtaining the first economic results	Project implementation	20%	10000	2000	Introduction of a clarification period for the offers received

3.	Non-adaptation of the planted trees to the new environment	Exploitation of the project	10%	5000	500	The choice of afforestation solutions/types of trees whose adaptation to the microclimate of the area should be validated in the case of previous forestry operations
4.	Maintenance work that is performed improperly	Project maintenance	20%	10000	2000	1.Choosing executors with experience in performing maintenance works 2. Selection of a specialist consultant to participate in the reception of the works.

The main benefits obtained from the implementation of the project:

- Reducing carbon dioxide and other greenhouse gas emissions;
- Combating global warming and reducing soil and water pollution;
- Generating material resources and renewable energy resources;
- Aesthetic appearance and recreation space.

In conclusion, this kind of projects has a very high success rate if the provisions of the technical projects are respected and if the activities are carried out according to the assumed schedules. It is the quality and success of these projects that make them attractive, and it is the parameters of budget and time that contribute favorably, being characterized by a relatively low complexity.

Good Practice Example no. 3 - Sewerage and treatment plant in Hulubești commune, Dâmbovița county

This example of good practices aims to present a project to reduce the negative impact generated by the social and demographic factor on the environment. By building a sewage system and a sewage treatment plant at the level of Hulubești commune, Dâmbovița county, the aim was to reduce the impact on the environment generated by the activities carried out by the community in the previously designated space (https://www.primariahulubesti.ro/consiliu-local/proiecte-in-derulare/90-infiintare-retea-de-canalizare-si-statie-de-epurare-in-comuna-hulubesti.html, 2021).

This kind of project is a complex one, requiring both thorough design and rigorous implementation. The design stage requires, based on the existing situation in the field, to generate an optimal sewerage network. The routes must be established in such a way that they do not generate a budgetary waste, but also very low maintenance costs. These projects are also influenced by time estimates, it is known that large infrastructure projects generate discomfort and hamper social and economic activities, with a negative impact on the community.

This project started from the urgent need to modernize the community, to provide conditions for a decent living for citizens and proper functioning for economic agents and institutions. At the same time, this project provided obvious conditions for reducing the rate of depopulation of the area and creating the premises for a sustainable development of the commune. With regard to the environment, the project allowed the reduction of the degree of pollution of groundwater in the perimeter of the commune.

In order to ensure a significant favorable impact for the improvement of the quality of the environment, the project considered carrying out some sewerage works and building a sewage treatment plant. They have contributed to increasing the comfort of citizens and provide the prerequisites for the harmonious and civilized development of the community.

The opportunity for this project was ensured by a favorable period in terms of financing provided both from the state budget and from non-reimbursable sources. Thus, the budget of approximately 5 million euros was secured through PNDL 2, which represented an opportunity for the final beneficiaries. Without the provision of significant financial resources and support, the success of such a project is greatly diminished.

From a technical point of view, for this kind of projects, you can opt for a network system from those specified below:

- Routes made of concrete pipes and classic sewage treatment plant;
- Routes made of PVC pipes and treatment station based on a modularized container;
- Routes made of PVC pipes and collection basin for draining waste water.

For the choice of the technical solution, the budget, realization time and reliability of the chosen solution must be taken into account. As expected, each option has advantages and disadvantages in terms of financial, material and human resources, as well as in terms of outcome.

The variant recommended in this case was the second one due to the benefits offered in this case. Thus, this variant mainly offers the advantage that it can capture large flows and can cope with the quantitative oscillations

Transilvania University of Brașov

Acest document este realizat cu sprijinul financiar al Mecanismului Financiar al SEE 2014 – 2021. Conținutul acestuia (text, fotografii) nu reflectă opinia oficială a Operatorului de Program, a Punctului Național de Contact sau a Oficiului Mecanismului Financiar. Informațiile și opiniile exprimate reprezintă responsabilitatea exclusivă a autorului/ autorilor.

generated in certain periods of the year. Another advantage is given by automatic operation and operational safety thanks to the advanced technology used, an advantage accompanied by simple maintenance and low energy consumption.

Regarding the material resources used in this project, we mention:

- PVC sewer pipes of different sizes depending on the intended section;
- PEID discharge pipes;
- Visiting dorms that require standard building materials;
- Connecting fireplaces that require standard construction materials;
- Sewage pumping stations;
- The treatment plant;
- Manifolds for discharge pipes.

The location of this type of project is significantly influenced by the location environment, especially by the soil component and possible surface water. A significant influencing factor from the environment is freezing, a process that can seriously affect the operation of the system. Thus, in carrying out the project, account is also taken of ensuring the operation of the system in freezing conditions specific to the area. However, the main problem in the realization of these projects is given by the existence of gas and water pipelines that oblige possible bypass options that obviously involve increasing the complexity of the project and implicitly the realization time and the budget. Also here we can include the need to cross some roads, which requires under-crossings and over-crossings.

In terms of environmental protection, the project ensures the reduction of the impact generated by the wastewater resulting from domestic, production and institutional processes in the area. In this sense, we can say that this kind of project is more than necessary in the Romanian countryside. However, for the good functioning of the objectives achieved through this kind of projects, it is recommended to adopt an environmentally friendly policy, especially regarding the substances used for the homogenization and denitrification of the waters in the collection basins.

The main categories of risks that can affect the construction project of a sewage system and a treatment plant at the level of Hulubești commune are:

- Technical risks – which originate from the processes of designing and carrying out project activities
- Risks external to the project - arising from the project's relationship with the environment;
- Risks internal to the project - what are the sources of the project team, the planning process and the relationship with subcontractors
- Economic risks – which come from the initial cost estimates, from the budgeting process and the evolution of prices and the availability of the material resources used.

Transilvania University of Brașov

Acest document este realizat cu sprijinul financiar al Mecanismului Financiar al SEE 2014 – 2021. Conținutul acestuia (text, fotografii) nu reflectă opinia oficială a Operatorului de Program, a Punctului Național de Contact sau a Oficiului Mecanismului Financiar. Informațiile și opiniile exprimate reprezintă responsabilitatea exclusivă a autorului/ autorilor.

The risks considered for such a project are presented, in the form of the decomposed structure of the risks, in the following figure.

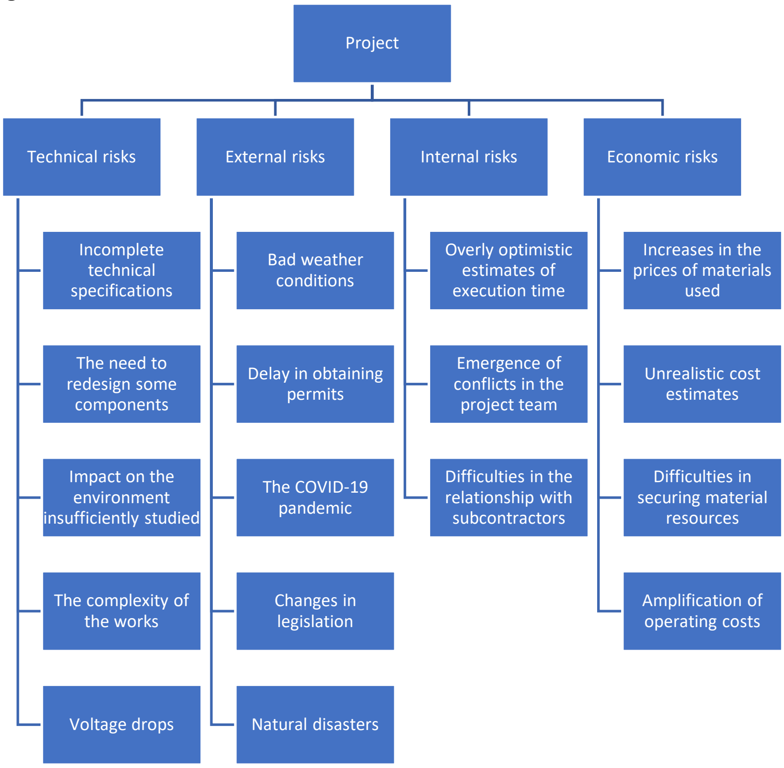

Figure 6. The work breakdown structure of the risks for the construction of a sewage system and a treatment plant in Hulubești commune

In conclusion, wastewater collection and treatment projects ensure the reduction of groundwater and surface water pollution and, implicitly, the reduction of the impact of human-generated activities on environmental factors. Obviously, reducing the impact on the water table has an indirect impact on the soil and biodiversity of the area.

References

https://checkykey.com/work-breakdown-structure-for-solar-project. (2021).

https://primariafalciu.ro/index.php/proiecte/reconstructie-ecologica-prin-impadurire-a-terenurilor-agricole-degradate-din-perimetrele-de-ameliorare-valea-in-sus-dealul-in-jos-capu-dealului-din-comuna-falciu-judetul-vaslui. (2021, september 22).

https://www.primariahulubesti.ro/consiliu-local/proiecte-in-derulare/90-infiintare-retea-de-canalizare-si-statie-de-epurare-in-comuna-hulubesti.html. (2021, September 22).

Studiu de fezabilitate pentru parc fotovoltaic solar, comuna Avram Iancu , județul Bihor. (n.d.).