

# Research progress of vegetation restoration technology in power transmission and transformation project

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**Abstract:** As the basic project of the current urban construction and development, the power transmission and transformation project will transfer the voltage or current from the supply place to the transmission place after transformation. Nowadays, UHV power transmission and transformation project has laid the foundation for realizing the power development strategy of west-east power transmission and North-South mutual supply. Therefore, in order to achieve the goal of sustainable development, scientific researchers began to discuss the vegetation restoration technology of power transmission and transformation project. On the basis of understanding the ecological environment of power transmission projects in China, and according to various technologies mastered by China Practice Research Institute in recent years, This paper discusses deeply how to implement the vegetation restoration technology of power transmission project and establishes a good ecological environment for the construction and development of the city.

**Keywords:** Power transmission and transformation project; Vegetation restoration technology; Soil and water conservation; Hydraulic spray seeding

## 1. Introduction

In order to ensure the stability and sustainability of our ecological environment and truly realize the harmonious coexistence between human and nature, Chinese government departments put forward many legal provisions of miraculous recovery. At the same time, researchers based on the power transmission and transformation project to strengthen the vegetation restoration technology research efforts. For example, enterprises, institutions and producers and business operators need to develop and construct scientifically and comprehensively to protect the ecological environment of our country. During the construction and production activities, if there are problems affecting the ecological environment, effective measures should be taken in a timely manner.[1.2.3] If the impact of serious pollution is caused, then the local ecological environment department at or above the county level shall seal them up; Production and construction project activities should avoid sensitive areas of soil and water loss, and appropriate measures should be selected for comprehensive control and control. Temporary land should not be used for more than two years, and if it is still needed after two years, it should be resubmitted for handling. At the same time, the person responsible for the temporary land should do a good job of land restoration within one year after the use of the land to ensure that it can meet the conditions of use; In case of land loss caused in the process of energy and other infrastructure construction, the responsible person of the land use shall be responsible for the reclamation project with serious land loss. Upon completion of the land reclamation operation, the local competent department of land and resources at or above the county level shall submit an application for acceptance, and consent shall be obtained.

Nowadays, China's power transmission and transformation project includes two contents, one is the power transmission plant, the other is the power transformation project, the overall construction process will have a direct impact on the ecological environment, solid waste environment, atmospheric environment, living environment, etc. Due to the power transmission and transformation project on the ecological impact, mainly embodied in the construction activities on

the influence of plants and animals, such as destruction of vegetation cause soil erosion, soil disturbance, etc., so the current research scholars in the building of the promotion of power transmission and transformation project, will strictly follow the principle of sustainable development and ecological environmental protection concept, develop project construction management measures. Take the power transmission project as an example, as a new type of project, it will have a deep impact on the ecological environment of the region. Therefore, during the construction and promotion period, it needs to be approved by the forestry Bureau, Nature Bureau and other relevant departments. The transmission project is divided into two parts. On the one hand, it refers to the permanent land occupation, and on the other hand, it refers to the temporary land occupation. The former belongs to the base area, which occupies a relatively small area, and can be used to reduce the impact on the regional environment through artificial development. The latter includes crossing the construction field, the construction man lift road, the temporary position of the base construction and so on.[4.5]

In our country, the steady development of social economy, the power transmission and transformation project management into the peak, practice application size and strength is more and more big, the whole construction process of animals and plants, the land resources, ecosystem services, such as direct impact, therefore all gradually enhance the strength, ecological control, ecological impact assessment system, and put forward the power transmission and transformation project The aim is to ensure that power transmission and transformation projects and ecological environmental protection can be coordinated development. The specific evaluation content is shown in Table 1 below:

Table 1 Ecological impact assessment system of power transmission and transformation projects

| Project link            | Factors affecting the                 | Affect the object                           | Affect the way                        | Impact properties                    | Influence degree                     |
|-------------------------|---------------------------------------|---|---------------------------------------|--------------------------------------|--------------------------------------|
| During the construction | Construction covers an area of        | Biodiversity of Life                        | The excavation of the Kentucky        | Immediate impact, short-term impact  | Smaller                              |
|                         |                                       | Ecologically sensitive area                 |                                       |                                      |                                      |
| Smaller                 | Soil and water loss                   | Biodiversity of Life                        | The excavation of the Kentucky        | Abandon slag etc.                    | Indirect effects, short-term effects |
|                         |                                       | The natural landscape                       |                                       |                                      |                                      |
|                         |                                       | Ecologically sensitive area                 |                                       |                                      |                                      |
|                         |                                       | The ecological system                       |                                       |                                      |                                      |
|                         | Construction noise                    | Animal activity and its distribution        | Construction activities               | Immediate impact, short-term impact  | Smaller                              |
|                         | Water pollution                       | Wetland ecosystem                           | Construction activities               | Indirect effects, short-term effects | Smaller                              |
|                         |                                       | Aquatic living resources and habitats       | Construction activities               |                                      |                                      |
|                         | Water pollution                       | The survival and reproduction of plants     | Construction activities               | Indirect effects, short-term effects | Smaller                              |
|                         |                                       | Aquatic life habitat                        | Construction activities               |                                      |                                      |
|                         | Human disturbance                     | Biological resources and their distribution | Construction activities               | Indirect effects, short-term effects | Smaller                              |
| The run-time            | Noise                                 | Diversity of animals                        | Running noise                         | Immediate impact, short-term impact  | Smaller                              |
|                         | Power frequency electromagnetic field | Plant and animal diversity                  | Power frequency electromagnetic field | Immediate impact, short-term impact  | Smaller                              |
|                         | Cut off                               | Diversity of birds                          | Transmission line barrier             | Immediate impact, short-term impact  | Smaller                              |
|                         | Operations                            | The ecological environment                  | Safety inspection                     | Immediate impact, short-term impact  | Smaller                              |

The concept of environmental impact assessment first appeared in the International academic Conference on Environmental Quality Assessment in 1964. After that, the United States first promulgated the national environmental Policy law and became the first country in the world to determine the environmental impact assessment system, thus driving the research activities on environmental impact of all countries in the world. The environmental impact assessment system of project was formally established in 1974, and the technical guidelines for environmental impact assessment were put forward in 1993. However, the impact brought by electromagnetic radiation is mainly concerned in the early studies. In the late 1990 s, facing the increasingly serious ecological environment in our country, the state environmental protection administration put forward the "environmental impact assessment technical guideline, non pollution, ecological environment (T24-1998), which is the environmental protection industry in our country the first ecological impact assessment standards, for subsequent rich provides effective basis for factors of ecological environmental impact assessment. Therefore, on the basis of mastering the current situation of ecological impact assessment of power transmission and transformation projects in recent years, this paper focuses on the application and future development trend of vegetation restoration technology in the base, so as to create favorable conditions for the construction of a harmonious social environment.[6.7]

## 2. Method

### 2.1 Soil and water conservation technology

Nowadays, in the construction of power transmission and transformation engineering of soil and water conservation technology, workers will be focused on technological innovation, this paper mainly discusses how to live in a new environment and working conditions, the reasonable use are shown in figure 1 below artificial intelligence and other advanced technology to construct soil and water conservation monitoring system, dynamic monitoring of soil and water to help department staff quality, increase the efficiency of the who remain technology.[8.9]

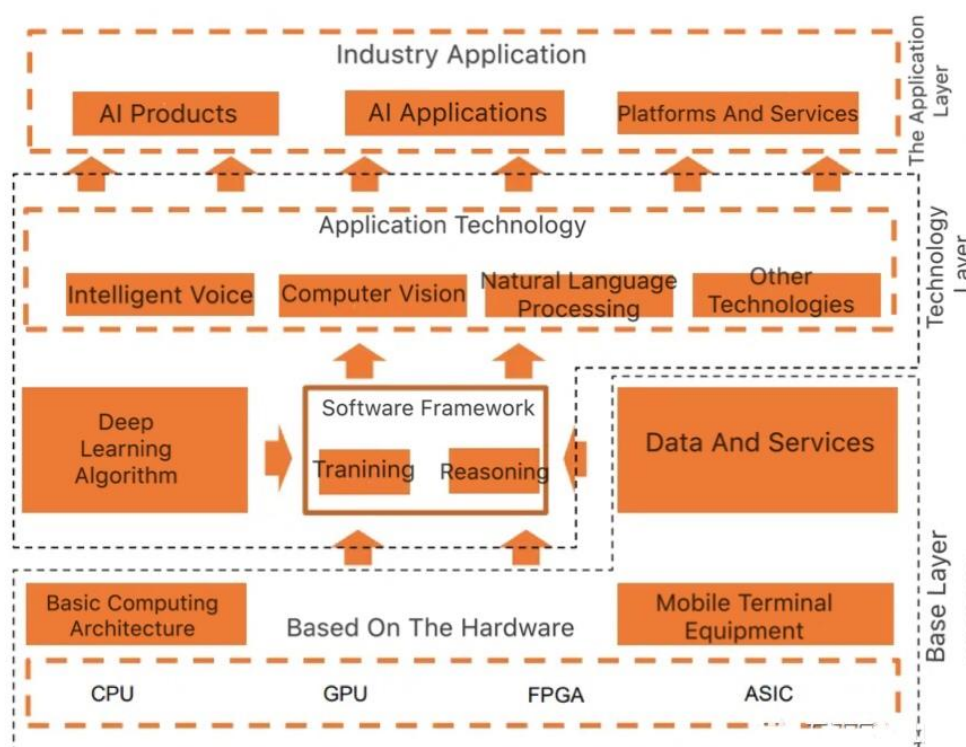


Figure 1 Structure diagram of artificial intelligence

With the continuous improvement of the construction level of power transmission project in China, soil and water conservation technology should also be optimized. When the construction units pay attention to the standardization of technology processing, some solutions should be put forward according to the specific problems. Figure 2 below refers to the soil and water conservation system with impact factor warning as the core. The standardized construction of soil and water conservation technology in the power transmission and transformation project has a positive impact on accelerating the pace of technological innovation in the power industry, and is also a key element to improve the performance of soil and water conservation. Nowadays, the construction of water and soil conservation technology of power transmission and transformation project should start from the perspective of existing technology system, and improve the application value of water and soil conservation technology on the basis of optimizing the corresponding technical theory. Especially in the face of the more complex construction environment and building system structure, the current soil and water loss is faced with many internal and external factors, at this time, the construction and promotion of safe and effective soil and water conservation technology, is an important means to ensure the vegetation restoration of power transmission and transformation engineering base.

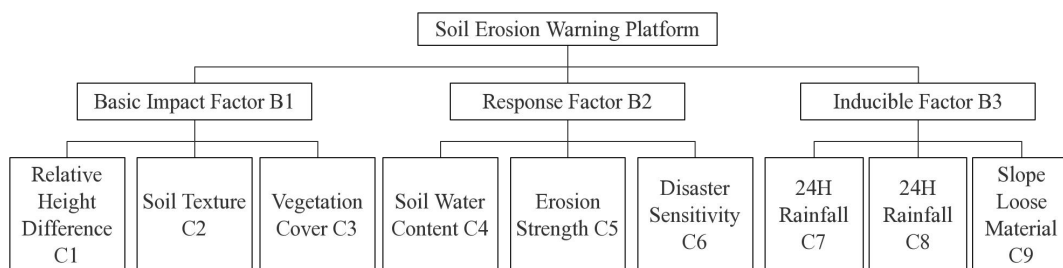


FIG. 2 Soil and water conservation system based on impact factor warning

## 2.2 Vegetation restoration technology

First, according to the greening technology, the low and gentle soil slope can be treated in the power transmission and transformation project. Hydraulic spraying and grass planting measures can be used for greening treatment. This method will spray a variety of mixtures directly into the predetermined area through a special jet, which is an efficient greening treatment technology. From the perspective of current construction management, hydraulic injection grass planting has a high level of machinery, high construction efficiency, high technical content, fast operation speed, low basic cost and other unique. Second, large seedling afforestation. According to the restoration technology of the sparsely vegetated area produced by mining, for the sparsely vegetated area produced by the excavation of the foundation of power transmission and transformation project, temporary road, stretch field, etc., we can also choose the way of afforestation of large seedlings in foreign soil to restore the ecological environment. This restoration technology requires the cultivation of local flowers, plants and shrubs on partially exposed slope soil, which is mainly used to improve the coverage rate of vegetation and truly realize ecological restoration treatment. Third, clear silt soil preparation + sow plant seeds. Assuming that there is no soil on the surface of the slag disposal platform, clear soil can be spread on the surface to completely rectify the residue, and then plant mixed seeds are sown to complete ecological restoration. Fourth, other technologies. Combined with the plant measures of other construction projects, to restore the soil with too high or too low pH value, chemical materials such as lime, gypsum and blackboard can be selected for optimization treatment, so as to ensure the effect of soil and water conservation and adapt to the needs of plant growth faster. At the same time, polyacrylamide can reduce ground runoff, increase soil water content, optimize the overall soil structure, enhance hydrology, and improve soil corrosion resistance and water holding capacity.[10]

### 2.3 Land consolidation technology

According to the accumulated experience in the construction and management of power transmission and transformation projects in recent years, the management measures of cultivated land should be scientifically selected according to the basic information such as slope change and topographic position, such as anti-slope terrace land preparation, hole land preparation and comprehensive land preparation. For example, in the case of a relatively gentle slope, cavitation or comprehensive land preparation can be used; In the case of slope up to  $15^{\circ}$  to  $25^{\circ}$ , the land can be prepared using the anti-slope terrace; In the case of slope more than  $25^{\circ}$ , can choose fish scale pit land preparation.

### 2.4 Slope protection technology

In the construction management of power transmission and transformation project, part of slope protection technology can protect the base slope from the foundation. For example, SNS flexible lakes can be applied to the pavement of hidden geological hazards, which includes three types of steel wire grids, wire mesh, and high-strength steel wire grids. In the case of slope instability, three-dimensional drainage flexible production belt can be used to protect the slope, which belongs to a composite stable ecological slope composed of triangular internal friction tight cable structure, three-dimensional drainage, vegetation and root system. The practical operation is very simple, and it is suitable to quickly solve the stability of the power line along the base and the green problem of the simple body. According to the protective measures of the broken face formed by quarrying, the lake technology is applied in the pavement protection of the power transmission and transformation project. The specific work involves the following points: First, the simple vegetation restoration substrate is sprayed and attached. When dealing with the higher and steeper slope, there are some platforms, potholes and large cracks at the edge of the rock mass, and simple vegetation can be used to restore the substrate. Secondly, ecological vegetation bag. In the side slope where the rock face lacks soil and is not very high, the vegetation bag equipped with vegetation restoration matrix can be used to complete ecological restoration. In the practice of construction process, in the vegetation bag into the nutrient soil, after sealing, according to the slope protection requirements for stacking, after watering and maintenance, can optimize the production environment of the construction site. Finally, bidirectional grille + vegetation restoration substrate spray attached + ecological vegetation blanket. This treatment technique focuses on exposed rock slopes with slopes approaching  $75^{\circ}$ . Nowadays, in the gradual update of intelligent technology, the power transmission and transformation project begins to use cloud computing, AI, UAV and other technologies for optimization processing when restoring vegetation in the miraculous area. The specific structure is shown in the figure below:

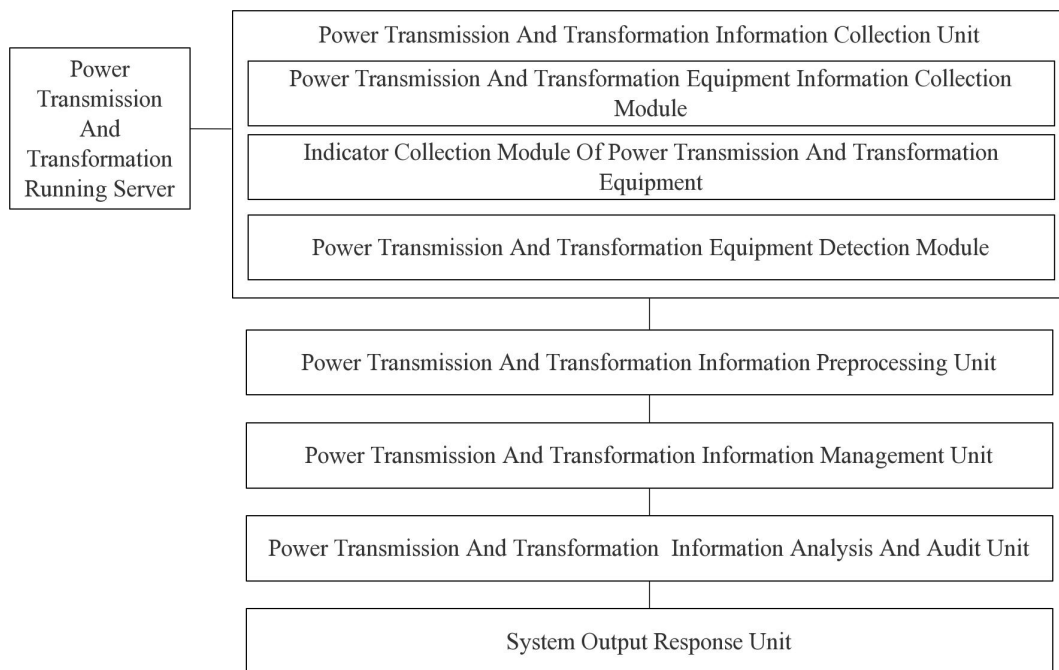


FIG. 3 Intelligent construction structure of the project

### 3. Result analysis

According to the above research, the influence of power transmission and transformation project on ecological composition is mainly reflected in two aspects: on the one hand, vegetation destruction; on the other hand, soil and water loss. According to the analysis of the engineering evaluation system as shown in the following figure, on the basis of drawing on the existing engineering experience, I shall define the base restoration methods of power transmission and transformation projects according to different battlefield types, so as to successively provide effective basis for the subsequent construction management. The specific contents are as follows:

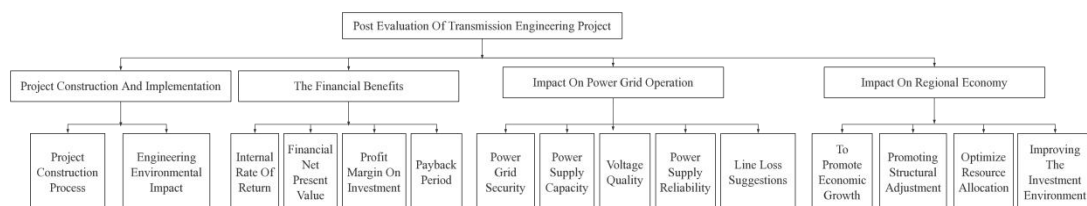


FIG. 4 Structure diagram of engineering evaluation system

First, open space. According to the analysis of various requirements put forward by China's resource department, the use of unused vacant land should at least restore the topography, and encourage the combination of land reclamation to improve the function of the ecosystem. Therefore, in the case of temporary land occupation belongs to open space, the ecosystem function should be optimized through land reclamation after the end of use. Secondly, arable land and gardens. Both planting vegetation can be unified consideration, should restore the original planting conditions and vegetation conditions, truly meet the needs of practical construction. Finally, the arbor woodland. This kind of vegetation restoration should be processed by artificial seedling planting, artificial live broadcasting, UAV seeding and other methods.

### 4. Conclusion

In conclusion, combined with the case analysis of this paper, we can see that the vegetation restoration technology of the power transmission and transformation project can ensure that all

regions have achieved good ecological restoration effects, and obtain more social and economic benefits. Therefore, Chinese electric power industry and scientific research scholars should fully consider the construction and management requirements of power transmission and transformation projects in different regions while strengthening the research on vegetation restoration technology, so as to build a scientific and standardized ecological environment.

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