Some of the proposed concepts and principles are already been used in the project management work and they have already proven their efficiency.

*Conclusions*

1. Information technology projects require established and strictly followed uncertainty management framework.
2. In scope of this framework both positive and negative factors of uncertainty shall be considered to enhance the project outcomes.
3. Influence of human psychology shall be minimized.

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## METHODS FOR FORECASTING AND PREVENTING ICE AND FROST DEPOSITS ON POWER LINES

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## Abstract

The means and technologies for predicting and preventing frost and ice deposits on the wires of overhead power lines in the power grids of foreign countries are presented. The focus is on such systems as Meteo, dynamic thermal rating (DTR), online monitoring of China Southern Power Grid, Variable resistan cecable (VRC) deicing system and mobile ice melting units.. The advantages and disadvantages of these systems are analyzed and it is found that such approaches require energy consumption and are relevant only for the relevant region of the power grid, depending on weather conditions and the distance of electricity transmission.

**Keywords**: overheadline, powergrid, iceandfrostdeposition, meteorologicalconditions

## Introduction

Today, there is virtually no departmental service for operational and forecast monitoring of meteorological parameters, which excludes the introduction of an automated subsystem for operational control in the event of accidents caused by ice and frost deposits, which, in turn, significantly reduces the effectiveness of preventive measures, including melting ice on the wires of overhead lines of all voltage classes. The above determines the relevance of the research and applied task, which is aimed at improving the methodology for assessing ice and frost deposits in distribution power grids based on monitoring of meteorological parameters to ensure reliable and uninterrupted power supply to consumers.

## Purpose of the study

The purpose of this study is to familiarize ourselves with the power systems of leading countries, search for power systems with similar problems of severe weather conditions, analyze the experience of solving problems and the possibility of adopting problem-solving methods in our conditions.

## Objective

To analyze the existing approaches to assessing ice and frost deposits in distribution power grids and to investigate the possibility of integrating them into the Ukrainian power system.

## Main research methods

The trend toward worsening extreme weather conditions has become a significant factor threatening the smooth operation of power grids and is gradually increasing. According to statistics of historical failures, snow, ice

and strong winds have caused far more power system failures than other extreme weather events. The effects of snow and ice on the power grid fall into two main categories. First, the weight of ice on a transmission line exceeds its load-bearing capacity and causes the line to break or a pole to collapse, resulting in a line outage and loss of power transmission. Secondly, when the insulator is covered with ice, the insulation tolerance and performance are reduced or even lost, resulting in a single-phase to ground fault.

The Dynamic Thermal Rating (DTR) system has been used to improve overhead line ratings. The DTR system deploys sensors to record real-time weather data and uses it to determine and predict actual line performance, which can improve the ability of the power grid to withstand extreme weather conditions. The consideration of dynamic processes is essential and effective in the study of power systems in extreme weather conditions." [1]

Power line icing is a common natural phenomenon, but it is the most dangerous factor that seriously threatens the safety and stability of power grids. Thus, there is an urgent need for real-time, multidimensional monitoring of power line icing conditions and more accurate icing forecasting to ensure the safety of power lines and the reliability of the power grid.

Since 2008, China Southern Power Grid has established an online monitoring system to ensure its safe and stable operation. The system collects a large amount of unstructured and structured data. Unstructured data includes image data. Structured data includes meteorological data and mechanical data such as temperature, humidity, wind speed, wind direction, precipitation, light intensity and maximum-minimum traction, wind angle under maximum-minimum traction, etc.

Currently, working with complex multimodal ice coverage data faces the following challenges:

a) In line with the development trend, data related to ice cover thickness is showing a geometric increase, and the dimensionality of the data is getting bigger and bigger.
b) Non-linearity, multimodality, and heterogeneity of data make traditional prediction models inadequate for sequence analysis.
c) The data contains unstructured data (image data) and structured data (meteorological data and mechanical data). Traditional feature extraction methods cannot effectively handle multimodal data.

The Ensemble Empirical Mode Decomposition (EEMD) method, adapted from the time-domain analysis method, is increasingly used to adaptively decompose nonlinear and multimodal ice-covered sequences and explore its implicit modes to improve the anti-noise capability." [2]

In Italy, EGÚ Brno, in cooperation with energy companies, is involved in solving the problem of icing on overhead lines. In the late 90s, they installed the first prototype for measuring the amount of ice and frost deposits called Meteo, and later new functions were installed on the device. It was now possible to process metrological data affecting the reliability of overhead power lines.

## Conclusion

To prevent power outages caused by atmospheric phenomena, it is necessary to determine where such phenomena occur and to investigate the extent of their impact on individual elements of the grid infrastructure. It is important to create IT systems that automate the process of assessing the current state of a power line based on historical data. During the preparation of the dissertation, an extended analysis of historical meteorological data will be conducted to investigate the conditions favorable for the adhesion and growth of ice on power lines, which is one of the most common causes of breakdowns caused by wet snow and ice precipitation. Additionally, previous studies will be detailed and verified. To this end, the amount of information received and analyzed at the measurement sites where favorable conditions were investigated was significantly increased.

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