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**Project Title:** A Future study on utilizing industrial oils and lubricant in power industry

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### Project Necessity:

Industrial oils are commonly used as lubricants and thermal conductors in various branches of the power industry. Transformer insulation oil, turbine oil, hydraulic oil and motor oil are among the most widely used industrial oils. The improvement of their quality will undoubtedly play an important role in increasing the efficiency of industries. Improving the quality of the mentioned oils can be achieved in order to quickly and accurately achieving the expected viscosity and stable heat transfer in the system. In this regard, various activities are underway in developed countries in order to achieve additives to improve oil quality as well as the production of new oils; Therefore, careful study of different angles of the issue in the country, usable solutions, practical and new ideas as well as obstacles ahead is of great importance. To this end, the results of this project can provide a clear horizon for the power industry in order to achieve optimal conditions, both technically and economically, to guide the policies adopted by the power industry to improve quality as well as reduce costs.

### Project Goals:

The objectives of the project can be summarized as follows:

- Clarification of the movement of developed countries in improving the quality of oils widely used in the power and energy industry
- Investigating the possibility of applying modern knowledge and new technologies in the field of industrial oils in the country (technically and economically)
- Developing an operational vision for optimizing the production of oils used in the power industry and presenting priority goals
- Providing technical solutions to those in charge of the power and energy industry to review and implement new policies

### Abstract:

In this project, the study of practical solutions to improve the quality of oils used in the power industry has been on the agenda. In general, in this project, the research of methods to improve the quality of oils widely used in the power industry, which can include the addition of quality enhancers or the production of biocompatible oils, was done. Extensive use, different types, extensive studies in this field, the introduction of new technologies in

the field of improved oil production, economic efficiency, technical efficiency and longevity, as well as the direct relationship of the power industry with the subject clarify the need for future research. Also, negotiating with the elites in the country, correspondence and consulting with domestic and foreign companies active in this field, as well as studying reports received from developed countries in this field, are undoubtedly acceptable results in achieving the macro policies of the Ministry of Energy in the use of new technologies. By examining the attractiveness and capability of different scenarios for improving the performance of industrial oils and lubricants used in the power industry, priority goals were set in this area and an introduction to roadmap was made.

### **Steps and Methodologies:**

In the first phase of the project, after setting general time and space constraints, comprehensive studies on common and practical methods of improving the quality of transformer, turbine and hydraulic oils as well as other oils used in auxiliary parts of power plants (Lubricating Oil for Auxiliary Power Plant Equipment) include: Gear oil, diesel engine oil, pump oil, compressor oil and also oils used in electro-hydraulic control systems were performed. These studies included the study of articles, guidelines, brochures and negotiations with domestic and foreign companies active in the field of production of oils used in the electricity industry, as well as discussions with researchers and experts. In the next stage, the vision and roadmap proposed in developed countries (for example, Sweden, the Netherlands and the United Kingdom) were evaluated. Thus, comparative studies were conducted and the general national vision was developed. Then, the various methods obtained from the support studies as well as negotiations with experts to improve the quality of consumable oils were reviewed and among the technologically and economically determined technologies, the correct choice was made for the country's power industry. The technology was selected based on the evaluation of different uncertainties in each field and the analysis of effective parameters. Therefore, the main purpose of this project was to formulate the vision and priority goals of using improved industrial oils (including transformer oil, turbine oil, etc.) used in the power industry, the results of which can be used in future policies in this area.

The steps of this project were as follows:

- Determining the spatial and temporal limits of the project and studying common methods of improving the quality of oils used in the electricity industry
- Comparative studies and review of perspectives and roadmaps of developed countries on improving the quality of oils used in the electricity industry
- Scriptwriting and negotiation with experts
- Formulation of national priority goals to improve the quality of oils used in the electricity industry

### **Main Results (technical outputs, patents, papers, books, reports, etc.):**

The achievements of this project will be announced as follows:

- Technical report including 4 chapters: determining the spatial and temporal limits of the project and studying common methods of improving the quality of oils used in the electricity industry, comparative studies and review of perspectives and roadmaps of developed countries on improving the quality of oils used in the power industry. Writing and negotiating with experts (and completing the list of expert networks), updating the vision and formulating national priority goals to improve the quality of oils used in the electricity industry.
- Paper "Lubricants and bio-based industrial oils: Challenges and solutions" in the National Conference on Knowledge-Based Research in Oil, Gas, Refining and Petrochemical Industries, Ahwaz Faculty of Petroleum.