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**Project Title:** Review of Technology Roadmapping of Power Electronic Devices in power system

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|---------------------------------|--|------------------------------|--------------------------|
| <b>Department:</b>              | Technology Roadmapping of Power Electronic Devices in power system | <b>Employer:</b>             | Niroo Research Institute |
| <b>Project/Program Manager:</b> | Saeed Hatami   | <b>Executor:</b>             | Ahmad Esmaili            |
| <b>Project Financial Code:</b>  | 146104   | <b>Project Quality Code:</b> | NPPEEPN01                |
| <b>Type of Project/Program:</b> | Applied and developmental  | <b>Assistant:</b>            | Technology               |

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**Keywords:** Technology Roadmapping of Power Electronic Devices, Technology Roadmapping, Power Electronic, Roadmap, technology vision, Technology development goals

### Project Necessity:

The Technology development document of power electronics equipment in the power system was prepared in 1394. The roadmap is a living and dynamic document for the movements of different parts of the country's electricity industry to achieve goals in this industry, and due to the uncertainties that usually exist in technology development analysis, it is necessary to evaluate the policies and programs of the document after implementation. This evaluation and update can either be cross-sectional as necessary or review the goals set for each technology, or it can occur regularly every 3 or 5 years to review and modify these goals. Therefore, in order to update the document and after reviewing the existing needs and shortcomings, review of action planning section, budgeting, scheduling, and redesign of roadmap was on the agenda.

### Project Goals:

This project identifies the areas of application and perspective of using power electronics equipment in the country with the approach of economic strength and expresses the executive measures to achieve them accurately and in short, medium and long term intervals. This report also draws the desired situation and analyzes the distance and introduces the desired and effective strategies for moving from the current situation to the desired situation. At the end of this project, a roadmap for the development of power electronic equipments technology in the electricity network has been developed. This roadmap outlines what projects In the time horizon of analysis should be undertaken each year

in the power grid, and which projects serve to implement which policies and actions, micro and macro goals, and strategies.

### **Abstract:**

This report is based on studies and expert opinions to determine what project or set of projects and with what priority should be implemented in different years in order to move towards achieving the goals and operational actions of technology vision document. Due to possible resource constraints, a portfolio of projects is provided. Also, considering the comprehensiveness of technology roadmapping of power electronic devices and in order to avoid duplication of activities of different units, it has been tried to hold negotiations and meetings with the heads of related centers and projects and those in charge and the necessary coordination to be done to clarify and avoid parallel activities, which is also included in the roadmap of the technology vision.

According to the guidelines of the project committee and interviews with experts in the field of power electronics technology, vision and priorities for the country's power electronics applications in a 10-year horizon were extracted.

In the final part of the report, the the proposed projects along with prioritization and a schedule is presented. By implementing these projects, it can be ensured to some extent that the operational measures discussed in the field of power electronic equipment technology in the power grid have been taken and the objectives of the technology roadmap have been achieved.

In order to optimally achieve all the planned activities, the projects under this technology roadmap were divided into four areas included generation, transmission, distribution and power quality as follows:

- 1- power electronics equipment used in the field of transmission
- 2- power electronics equipment used in the field of distribution
- 3- power electronics equipment used in the field of generation
- 4- power quality

According to studies, first technology development priorities include the development of:

- Solar cell Power Conditioning system
- Wind turbine Power Conditioning system

### **Power electronics technology vision in the national power system**

With reliance on God, in order to fulfill the major orientations of the electric power industry in the development of renewable energy, reducing energy losses, improve efficiency, reliability and grid stability and increased electricity exports to neighboring countries, power electronics technology with Reliance on local experts, will be hub of middle-east power electronics technology in 1404.

### **Steps and Methodologies:**

The project was defined in four stages as follows:

- 1- Review of the basics of the power electronics technology development document
- 2- Updating technology topics
- 3- Review of action plan and policies
- 4- Updating roadmap and action plan

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

Technical reports, updated roadmap for the development of power electronics equipment technology in the power grid