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Project Title: Future studies on the development of technology of solar thermal power generation systems in Iran

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Keywords: Concentrating solar Power(CSP), Linear parabolic, Fresnel, Tower, Dish Sterling, CSP Non Power Plant Application, Future Studies in The Field of CSP

Project Necessity:

Various methods have been proposed for the use of solar energy. These methods convert solar energy directly into electrical energy, Such as Photovoltaics or convert the sun's energy into thermal energy first and They then convert heat into electricity with the help of converters. Development of solar thermal power plant technology in Iran has been neglected despite Iran's high potential for these technologies. There is not even a fully active solar thermal power plant in the country. There are five major technologies in solar thermal, including linear parabolic, sterling dish, Fresnel, solar tower and solar chimney. Therefore, The path of their technology development in the country and determining the share of each technology and prioritizing their development requires a comprehensive study. Also, Prioritizing the appropriate solar thermal technology based on the country's potential requires a future study in this field. As a matter of fact, Recognizing the different solar thermal technologies in the world and the growing trend of each others can help us that we can Decide based on internal capabilities for technology development in this country. In Niroo research Institute, we have worked in The field of designing and manufacturing Dish Sterling and linear parabolic projects and other studies projects in the field of CSP, and Also we have plan for developing strategic roadmap "the development of technologies related to solar energy in Iran". As a result, these activities showed that Defining a future studies project is essential to prioritizing the development of appropriate solar thermal technologies and also showing appropriate strategies in this area to achieve the goal of technology development in Iran.

Project Goals:

- Futuristic research methods and methods suitable for entering the subject of solar thermal
- Future research technology development of various solar thermal power generation systems.
- Technology intelligence and technology tree extraction and industry value chain for a variety of solar thermal power plants.
- Investigating the need to develop the use of solar-thermal power plants in the country.
- identify and analyze the country's progress scenarios in the face of developing the use of solar thermal power plants in the country and provide policy proposals.

Abstract:

Given the potential of solar radiation in Iran, There is a lot of technical knowledge and experience in the field of construction of major parts of solar thermal power plants in Iran. Such as power generation, solar collectors, dynamics, control and structure, as well as heat generation and transmission in connection with power plants can be named. It can be said that by solving a few challenges, this industry can be localized and developed in the country. Benefited from research, economic, environmental, diversification of energy portfolio and employment creation can be used. Firstly, use the upstream documents and the thermal development document, which was previously set in general, to focus specifically on the solar thermal position in Iran. For this purpose, it is possible to have comprehensive studies with a future study view on the subject of solar heat in the world. And Also, Leading international authorities and companies in this field and programs of leading countries in this field have been used. Adaptation to the conditions of the country in relation to the issue of solar thermal and economic and environmental studies, and finally by comprehensively reviewing the views of experts and analyzing their views to a conclusion, presenting policy proposals to enter the issue of solar thermal with prioritization in power plants and Non-power plant industries are covered.

Steps and Methodologies: The stages of the project in 4 phases are summarized as follows:

Phase1: A review of the document on the development of solar technology and technology intelligence in selected technologies

- Review of supporting studies of the solar technology development document.
- Detailed study of technology tree in selected technologies.
- Investigating the capacities and potentials of the country in different circles of the value chain.
- Investigating the life cycle of the technology market for the two selected technologies.
- Investigation of two technologies of solar thermal power plant from the technical perspective of the Minister
- Investigating the future trend of solar thermal power plant technology from an economic perspective.
- Investigating the future trend of solar thermal power plant technology from a market perspective
- Investigating the future trend of solar thermal power plant technology from the perspective of ancillary applications(Non-power plant)

Phase2: Comparative studies and future study of two selected technologies (Futurology studies)

- Browse the futures literature and select the appropriate method
- Review of current and future programs of selected countries in the field of solar thermal
- Review of current and future plans of selected companies in the field of solar heating.
- Review of studies and forecasts of reputable international authorities and organizations
- Summary of futures research on the development process of solar thermal technology using the studies of previous stages

Phase3: Investigating the need to develop the use of solar-thermal power plants in Iran.

- Investigating the need to develop the use of solar-thermal power plants in Iran from an economic perspective and predict the future.
- Investigating the need to develop the use of thermal-solar power plants in the country from environmental, national and other perspectives

Phase4: Identification and analysis of scenarios facing the country in the face of the development of the use of solar thermal power plants in Iran.

- Presenting various scenarios and analyzing them to enter the subject of solar thermal power plants.
- Analysis of Expert Opinions in Upcoming Scenarios on Solar Thermal Subject.

- Final summary and policy suggestions.

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

The results of this research are in the form of four reports and a Cumulative report under the following headings:

Report1:

A review of the document on the development of solar technology and technology intelligence in selected technologies.

Report2:

Comparative studies and future study of two selected technologies (Futurology studies).

Report3:

Investigating the need to develop the use of solar-thermal power plants in Iran.

Report4:

Identification and analysis of scenarios facing the country in the face of the development of the use of solar thermal power plants in Iran.

Report5:

Future studies on the development of technology of solar thermal power generation systems in Iran

Papers:(Submitted)

- 1) S.Ziaei Tabatabaei , Ali Fatemi, Shahriar Bozorgmehri, Mohammad Zabetian, Ala Sadoghi” Calculation of balanced cost for solar thermal power plant in Iran” 35th, International Power System Conference (PSC) Nov 2021, Tehran, Iran.
- 2) S.Ziaei Tabatabaei , Ala Sadoghi, Shahriar Bozorgmehri, Mohammad Zabetian, Ali Fatemi “Investigation of solar thermal technology in three sections: types of technology and its conditions, leading countries in this field and providing a suitable combined cycle with Iran's climate” 35th, International Power System Conference (PSC) Nov 2021, Tehran, Iran.