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Project Title: Developing the implementation mechanisms of demand response programs for Iran's power industry

Department:	Document on the development of technologies related to smart grids in the electricity and energy industry	Employer:	Niroy Research Institute
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Keywords:

Demand Response (DR), DR challenges and barriers, DR requirements, DR aggregators, Preparing a regulation, Presenting the strategies.

Project Necessity:

Recently, due to the increasing electricity demand, the system planners should use all the available resources in an optimal way. Therefore, besides the generation units, demand side resources should be able to actively participate in the electricity delivery chain system. One of the main challenges of the operators is to provide the electricity demand in the peak load hours with an acceptable reliability level. Hence, Demand Response (DR) programs are introduced to enable the active participation of the demand side resources. DR programs could help the system operators to minimize the unplanned and costly curtailments during the peak hours or when the system reliability level is not well-satisfied. Nowadays, DR programs gain the commercial concepts and could be exchanged as a good in the electricity markets. Indeed, such programs are suitable tools to provide the required load and reserve of the system. Thence, introducing the possible ways to enable the DR programs based on the situation of the Iran's power industry is essential. In addition, since creating the DR market could be considered as the long-term goal, it is necessary to provide the required infrastructure for the participation of different customers. In this regard, it is needed to make it possible for the residential and commercial customers to be able to participate in DR programs. Consequently, preparing a regulation for the participation of the DR aggregators is necessary in which they could aggregate the DR potentials from the residential and commercial customers and participate in DR markets. Finally, after investigating the DR requirements and considering the situation of Iran's power industry, the effective and suitable strategies should be proposed to move from the current situation towards the desired situation.

Project Goals:

- 1- Recognizing the challenges, barriers, infrastructures and requirements of DR;
- 2- Preparing the regulation to increase the participation of the residential and commercial customers in load management programs in the presence of the DR aggregators;
- 3- Recognizing the current situation of the Iran's power industry, determining the desired situation, analyzing the difference between the current and desired situations and introducing the effective and suitable strategies to move towards the desired situation.

Abstract:

The first step of this project is to study the concepts and definitions of the DR and DRX. Indeed, at this stage, the definitions and procedures to execute the DR and DRX and to recognize the features of different DR programs are investigated. In addition, recognizing the advantages and problems to execute the DR and DRX, as well as the DR players and beneficiaries would be done. The second phase of the project is to identify the infrastructures and requirements to execute the DR and DRX. Legal, technological, infrastructural, social and cultural requirements are some of the aspects that should be investigated at this stage. The aim of the third phase of the project is to prepare a regulation to increase the participation of the residential and commercial customers in the DR programs. In the fourth stage, the existing reports regarding the DR programs would completely be studied. Investigating the DR and DRX experiences in different countries is a part of the studies of this phase of the project. In other words, the aim of this stage is to investigate the current situation of the Iran's power industry, determine the desired situation and analyze the difference among the current and desired situations. Finally, the fifth stage of the project is to introduce the possible strategies regarding the current situation of the Iran's power industry and revise the proposed regulation (if is needed and with the focus on the DR market requirements).

Steps and Methodologies:

- 1- Recognize the DR concepts;
- 2- Recognize the requirements of DR;
- 3- Prepare a regulation to increase the participation of the residential and commercial customers in load management programs in the presence of the DR aggregators;
- 4- Investigate the current situation of the Iran's power industry, recognize the desired situation, and analyze the difference among the current and desired situations;
- 5- Introduce the effective and suitable strategies to pass the current situation towards the desired situation.

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

- 1- Recognize the DR challenges and barriers;
- 2- Recognize the DR requirements from the several points of view, such as legal, infrastructural, technological, cultural and social aspects;
- 3- Prepare a regulation to increase the participation of the residential and commercial customers in load management programs in the presence of the DR aggregators;
- 4- Investigate the current situation of the Iran's power industry, recognize the desired situation, and analyze the difference among the current and desired situations;
- 5- Introduce the strategic themes, strategic goals, strategies, execution plans, and projects in order to achieve the objectives, introduce different packages and generations of the DR for the Iran's power industry, prioritize the proposed strategies, and revise the proposed regulation to highly include the DR market concepts.