


کد سند: RO-S-F-28-02	معاونت پژوهشی	
تاریخ صدور: ۱۳۹۹/۴/۲۲		
تاریخ ویرایش: ۱۳۹۹/۵/۱۵	فرم خلاصه انگلیسی طرح / پروژه	

**Project Title:**

Evaluation the effect of demand-side management on energy losses in distribution systems

<b>Department:</b>	Strategic studies program of electrical energy losses reduction in power distribution networks	<b>Employer:</b>	Niroo Research Institute
<b>Project Manager:</b>	Amir Moshari	<b>Executor:</b>	Mohammadreza Safari
<b>Project Financial Code:</b>	700037	<b>Project Quality Code:</b>	PDPN15-4
<b>Type of Project:</b>	Intra-organizational	<b>Assistant:</b>	Technology Affairs

**Project Staff:**

Seyed Mehdi Hakimi, Maedeh Yazdandoust, Amir Ali Dashtaki, Elnaz Shahrabi Farahani, Qasem Derakhshan Hooreh

**Keywords:**

Demand Response, Demand Side Management, Electricity Losses, Distribution Networks, Power System, Smart Grid

**Project Necessity:**

Today, demand-side solutions have been seriously considered in the world. One of the most important, effective, and at the same time, least costly tools to overcome the challenges facing power supply systems and, in particular, distribution networks is demand-side management (DSM). Usually, the primary purpose of implementing demand-side management programs in power grids is to save energy and reduce peak load, leading to improved power grid operating conditions and increased delivery system efficiency. In particular, reducing electrical energy losses will be one of the achievements that will be achieved by implementing DSM programs and increasing the efficiency of the power delivery system. On the other hand, due to the direct relationship between energy losses and costs, reducing losses can be one of the motivating factors for implementing demand-side management programs and justifying the costs required to implement them. Accordingly, the purpose of this project is to study and analyze the demand-side management programs from the perspective of reducing electrical energy losses in distribution networks and identify potentials that can be used to increase the efficiency of distribution networks in Iran.

**Project Goals:**

- Identify common features between demand-side management programs and loss reduction strategies;
- Provide a scientific framework for evaluating demand-side management programs to reduce electrical energy losses in distribution networks;

- Provide a realistic view of the impact of demand-side management programs on the electricity grid and the need for support studies to implement these programs better;

### **Abstract:**

The purpose of this project is to study and analyze the demand-side management programs from the perspective of reducing electrical energy losses in distribution networks and identify potentials that can be used to increase the efficiency of distribution networks in Iran. In the first phase of this project, different demand-side management programs at the distribution networks were studied. These studies have included learning global experiences in selected countries with different conditions, climates, and Iran experiences. At this stage, each of the demand side management programs was studied to identify and categorize their driving parameters such as climatic conditions, economic conditions, cultural and social conditions, land use conditions, etc. In the second stage, the study of loss reduction methods and DSM methods in Iran and other countries (target countries in the first stage) was considered. At this stage, various conventional methods of loss reduction in the world and Iran were studied. Then, by reviewing and feasibility of loss reduction strategies with employing DSM programs, the common needs of loss reduction and demand-side management were examined.

In the third and final stage, the studies conducted in the previous two phases were implemented on a real-world distribution network to provide a framework for such studies in the distribution network. At this stage, several Iran distribution networks were studied in terms of various parameters and the amount of loss. The demand-side management programs applicable in the sample distribution network based on DSM driver parameters were identified. Finally, detailed studies related to the implementation of DSM programs on this network and its impact analysis on the distribution network losses were performed.

### **Steps and Methodologies:**

- 1- Studying different types of demand-side management methods used in distribution networks
  - 1-1- Studying the world experiences in the implementation of demand-side management programs
  - 1-2- Study of Iran's experiences in implementing demand-side management programs
  - 1-3- Identifying and classifying the driving parameters of demand-side management programs
- 2- Comparative study of loss reduction methods and DSM methods
  - 2-1- Identifying various conventional methods of loss reduction in the world
  - 2-2- Identifying the common methods of loss reduction in Iran
  - 2-3- Feasibility study and providing solutions to reduce losses with employing DSM programs
  - 2-4- Identifying common needs for loss reduction and demand-side management
- 3- Analyzing the effect of applicable DSM programs on electrical energy losses in a real distribution network
  - 3-1- Selecting a sample distribution network to conduct detailed studies of loss reduction
  - 3-2- Identifying and introducing demand-side management programs applicable to the sample distribution network based on DSM driver parameters
  - 3-3- Collecting technical and statistical information of the sample distribution network and implementing it in the simulator software
  - 3-4- Estimating the cost of implementing the proposed DSM programs for the sample distribution network
  - 3-5- Technical and economic study and analysis of the effect of proposed DSM programs on reducing electrical energy losses in the sample network

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

- Study of different types of demand-side management methods used in distribution networks (technical report), Strategic studies program of electrical energy losses reduction in power distribution networks, August 2016
- Comparative study of loss reduction methods and DSM methods (technical report), Strategic studies program of electrical energy losses reduction in power distribution networks, May 1398
- Analysis of simulation results of DSM programs implementation on a sample distribution network from electrical energy losses point of view (technical report), Strategic studies program of electrical energy losses reduction in power distribution networks, May 2016
- Seyed Mehdi Hakimi, Elnaz Shahrabi Farahani, Maedeh Yazdandoust, Amir Ali Dashtaki, Amir Mashari, "Study of Iran and the world in the implementation of demand-side management programs," 33rd International Electricity Conference, October 20 to November 23, 2016