The Research of Demand Response Market Potential in Taiwan

（**Load Management Research Laboratory :Yang, Shin-Chuan、Wang, Wen-Ching、 Wang, Chin-Tun**）

Part I. Background & Objectives

Taiwan Power Company (TPC or Taipower) has been highly effective in promoting customer participation in demand response (DR) measures, in recent years, and has made significant contributions to mitigating the situation of power supply shortage. To cope with government policy of energy transition, participation rate and peak load reduction of DR remain our primary concern. Therefore, suitable models to measure effects of DR measures have been sought by conducting market surveys and in-depth interviews with our ultra-high-voltage and high-voltage customers; at the same time, Taipower existing Meter Data Management System (MDMS), New Billing System (NBS), demand response measure statistics system, external databases (temperature, sales revenue index, production volume index…), AI technology such as machine learning and deep learning algorithms have also been utilized, as shown in Figure 1~3, to help estimate TPCs sales volume and draft coping strategies.

Part II. Platform Interface of Customer Service Big Data & Research Procedure

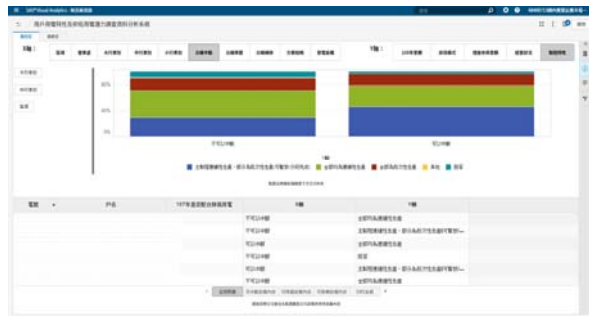Figure 1. Customer Service Big Data Platform Interface— market potential estimation model for demand response

Figure 2. Customer Service Big Data Platform Interface—survey data of customers' power consumption characteristics
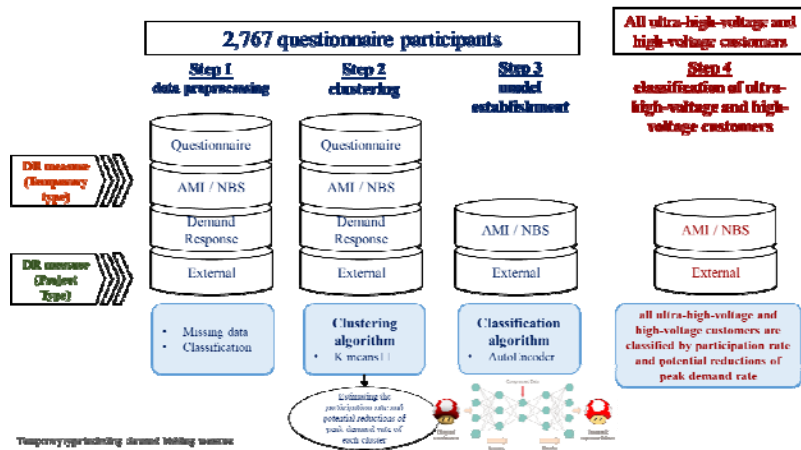

Figure 3. Research procedure

Part III. Concluding Observations and Recommendations

<u>Concluding Observations:</u>

We utilize Big Data, AI methods, internal/external databases, and results of market surveys to estimate the participation rate of ultra-high-voltage and high-voltage customers and their corresponding peak load reduction. The afore-said system is very helpful for our related departments, e.g. Distribution and Sales Division and Service Centers, to identify potential DR customers and peak load reduction opportunities.

In the future, with the help of energy services companies (aka ESCOs), the system may further provide customers required consultancy services.

<u>Recommendations:</u>

1. **Strengthen propaganda and reinforcement of demand response measures**

   Generally customers are not quite aware of the technical meaning of DR. Therefore, we need to study the electricity consumption characteristics of the target customers, e.g. ultra-high-voltage and high-voltage customers. What is more, we need to visit and convince them to participate in DR measures.

2. **Draft propaganda strategy to promote customer participation in DR measures**

   According to the results of the surveys, the willingness of ultra-high-voltage and high-voltage customers to participate in DR measures is mainly affected by 4 factors as follows. Therefore the future reinforcement strategies shall focus on removing obstacles and developing support measures:

(1). **Operation factor:** Some customers feel that their operations are not adjustable. When provided with cases of other industries and information about how to make good use of demand control equipment, the barriers may be removed.

(2). **Power factor:** Power consumption is not the primary business concern for some customers. It is not easy to change the inherent behaviors for these customers by rebates or incentive of energy saving. The solutions include customer education, encouragement, e.g. to treat DR as a way to fulfill social responsibility.

(3). **Technical factor:** This refers to deficiency of necessary manpower and skills to execute DR measures. The solutions include (a) provide technical supports such as real-time information disclosure and warning reminder, (b) help customers conduct energy management and provide consultancy services, (3)provide technical support or equipment deployment, e.g. automation or intellectual.

(4). **Plan factor:** Some customers have questions about DR designs, e.g. low reduction amount, minimum reduction capacity requirement, execution duration, and measurement of customer base line (CBL). We need to modify the current design of DR measures according to customer characteristics.