

## **INFORMATION ON RESEARCH RESULTS**

### **1. General information:**

Project title: Efficiency improvement of fault passage indicator in order to increase Danang power distribution system reliability

Code number: B2016-DNA-49-TT

Coordinator: Assoc.Prof.Dr. Dinh Thanh Viet

Implementing institution: The University of Danang

Duration: 24 months, from 12/2016 to 11/2018.

### **2. Objective(s):**

Propose solutions to improve the efficiency of the Fault Passage Indicator (FPI), improving the Danang power distribution system reliability.

### **3. Creativeness and innovativeness:**

At present, the development of Smart Grid in Vietnam should focus on promoting important work items such as increasing the reliability, increasing the efficiency of the power system, focusing on power distribution system. In order to achieve this, several solutions need to be implemented, including the use of FPI technology. However, cost of FPI equipment is quite high; and the question about the number and location to install in the distribution grid to achieve the highest efficiency has not been studied specifically. Excessive FPI installation can be a waste of investment, while too little installation may not be as effective. Installation in the most efficient way is also an issue to consider.

These are new issues arising in the deployment of smart grid in Vietnam. This research has studied and proposed methods to solve the problem on the basis of optimization methods. The research presented the mathematical model based on set theory and logic, and the binding relationships of segmentation devices such as circuit breakers, isolators, fuses, distribution power system, etc. to calculate reliability. The authors have researched, applied Pareto Optimization Theory and a multi-objective particle swarm optimization algorithm to build a program based on Matlab, which is called SmartFPI. This program can become a tool for electricity companies to evaluate and optimize the electricity supply reliability index for distribution networks.

### **4. Research results:**

The research has developed software, focusing on solving the above issues and proposing solutions to practical production for power companies.

This software has been applied to calculate the efficient use of FPI for 22kV feeder 471 Ngu Hanh Son - Da Nang Power Company. Calculation results are analyzed in detail for each specific case and perfectly match the actual operation of the grid.

## **5. Products:**

The research has high efficiency in the education and training, with the results of training 01 master. The research results will also be used to guide for graduates in the fields of smart grid, power distribution system automation and optimization.

In terms of science, this study has a scientific paper published in the science and technology journal - University of Da Nang.

In practical terms, the research proposed solutions for effective application of FPI technology to improve the reliability of power distribution grid, contributing to implementing the Vietnam smart grid development roadmap.

The research report will provide a source of reference for students of the University of Danang. At the same time, the results of the research applied in electricity utilities will contribute to reduce waste in investment and increase labor productivity.

## **6. Transfer alternatives, application institutions, impacts and benefits of research results:**

After completion of this project, the research results will be transferred directly to the units in Vietnam that have the need to apply the results of the project to effectively implement and develop smart grid.

In the short term, the research results have been applied directly at the Da Nang Power Company Limited. The results can be applied to all members of the Electricity of Vietnam, especially the power companies in the Central and Highlands area in Vietnam.