SUMMARY

Beside the power quality problems, the limited nonrenewable energy reserves triggering many countries made a number of policies to improve energy efficiency and seek alternative energy sources beyond oil and gas with economically feasible. Electrical efficiency is generally done by creating an integrated system (interconnection) is accompanied by regulation, both in the supply system and the tariff system. As for alternative sources of primary energy, is done by using renewable forms of energy such as water energy, wind, solar, ocean wave, biomass, fuel cells and others.

There are three main groups for the purpose of the study. First, to know how the characteristics of electric power at this time and effort can be done to overcome the weaknesses that occur in order to guarantee the system and combined system will not experience problems. Second, must be guaranteed that the source of electrical energy generated by renewable energy has quantities still in tolerance limits are permitted, so that when combined with existing electrical systems do not cause problems. Third, although the network has done business as required achieving quality and the plant has done the same thing, but still allows the dynamics of electrical quantities of electrical variations that can cause problems, either in the form of disruption or failure.

Based on these groups, then in the first and second year, is expected to obtain research and prototype methods to handle the weaknesses in the quality of electric power by using power electronics technology and artificial intelligence that can power the system in accordance with applicable provisions of the money and IEEE PUIIL) so that the system of renewable energy power plants can diinterkoneksikan easily. In the same year, the research will also be expected to have a method and prototype synchronization system interconnection between the power of renewable energy sources with electrical systems that already there is a variation of electrical quantities in a certain limit, so the system does not cause problems during interconected. Intellectual property rights (patent) is expected to be found in this second year.

In the third year, is expected to obtain research and prototype method to overcome the weaknesses in the form of an unstable power in electricity generation and renewable energy sources with the grid mengintegrasikananya (grid) power electronics technology and artificial intelligence that can interconnected in the system with existing electrical systems without having trouble. At this stage, is expected also obtained a patent right. Getting algorithms and computational model of the interconnection system between the power of renewable energy sources with electrical systems that already exist, the ultimate goal of a multi-year study. In year three, the goal will be verified in a laboratory scale and in the field, so that the whole series of studies involving both models, prototif, algorithms and computational programs actually tested its validity and is expected to provide a real contribution to the implementation of energy electricity generation mix (energy mix) in order to achieve electrical energy supply systems are not only efficient but also able to maintain environmental sustainability.
The results of the first and second shows that to improve the quality of electric power, mainly because of the harmonics distortion and voltage flicker, to consider and where possible meet the inverter or converter system is partially to have low distortion and control wherever possible to have high flexibility and rapid response. With the system used in the form of active filter, for handling harmonics, and to blink and used DVR-based control using artificial neural net (NN) has been able to produce distortions harmonics lower than the previous system. If used multilevel inverter, the system will provide better performance again.

In the study has also been successful used a new method called multi-level inverter with sinusoidal quantization, with a smaller THD than other inverter systems. Inverter is in the third year will be used for system interconnection and power quality improvement. In terms of control, then the artificial intelligence-based control is a control system that provides better performance when compared with other controls, such as PI or PID, for more accurate and faster. This control system will also development in the next year despite having a limited working area on the area in training.