ABSTRACT

Along with the times, demand for electricity is increasing. As an important element in a cellular network, the Base Station (BS) consume most of the energy is needed, even when there is no traffic. The amount of electrical energy that is used directly proportional to the amount of CO$_2$ emissions produced. Integration of renewable energy sources into the power grid can reduce greenhouse gas emissions. The nature of renewable energy sources that are not always available and often uncontrolled cause significant fluctuations in the supply side.

This research will discuss the modeling of a system consisting of supply side, demand side, and unit commitment. Energy generated on the supply side is modeled using Hidden Markov Models (HMM). Traffic on the BS as demand side is modeled with Coordinate Multi Point (COMP) to reduce the amount of energy required. HMM is regarded as an efficient modeling for renewable energy systems. While COMP is a new method that dynamically coordinate BS, where changing conditions BS in sleep mode when traffic is low and expand the coverage of the active BS. The next step is to schedule production to meet the demand for electrical energy (unit commitment scheduling), so as to save the cost of electricity production.

The use of renewable energy sources have an average efficiency value of 55.67%, while the use of solar panels is modeled using HMM with the use of COMP method has an average efficiency value of 57% which affects improve energy efficiency. In addition to the amount of energy consumed is proportional to the amount of CO$_2$ emissions produced. During 24 hours of observation time of five BS, unit commitment scheduling resulted in an average total production cost of Rp 25,600,00 and experienced an average savings of 46.89%. Efforts to reduce CO$_2$ emissions and global warming is one form of communication support for the green communication.

Keywords: energy efficiency, unit commitment, green communication