CHAPTER 5

Conclusions and Recommendation

5.2 Conclusions

This thesis presents a study the generation development plan of Electricité du Laos (EDL) in the north and central 1 region of the Lao People's Democratic Republic (Lao PDR). The aims to plan the hydropower plant, which will be connected to the EDL grid for finding the suitable case under fundamental technical criteria of EDL. This study considered the 12 hydropower development plan projects such a Nam Khan 3, Nam Long 2, Nam Ou 2, Nam Ou 6, Nam Ou 5, Nam Sim, Nam Phagnai, Nam Chien, Nam San 3A, Nam Lik 1, Nam Tha 1, and Nam Phai. The research was created to find the generation planning and improving the reliability of power system, which is an important purpose to get the most benefit for the power system planning.

The research is analyzed by DIgSILENT PowerFactory V.15 software for simulating the operation process, which uses technical data of EDL. The data used consists of power development plan and the load demand forecast. The theories are using the power flow analysis (voltage, loading, and power loss) and system reliability assessments. The power flow analysis and reliability assessment are important for planning and design the power system in the future. Which can be predicate equipment of power systems.

The simulation and result of the case A, case M, and case N. Case A is the base case of EDL, which follows the existing generation planning of EDL. Case M is simulation model of the overloading minimum, which use the analysis result of each hydropower plant connected to EDL grid, that initially from the overloading value minimum until the maximum of each project. The result of this case is the suitable case for generation planning in consideration of overloading. When compares result between case M and base case of EDL. Which the overloading is decreased because the connected transmission line can be supported the more generated capacity. Case N is simulation model of the power

loss minimum case which uses the analysis result of each hydropower plant connected to EDL grid, that initially from minimum power loss until the maximum power loss of each project. The result of this case is the suitable case for generation planning in consideration of power loss. When compares result between case N and the base case of EDL. Which the power loss is decreased because the generators are connected close to the loads. And the result of reliability assessment is also decreased as shown in Table 5.1 and 5.2.

Table 5. 1 The simulation result of overloading and power loss minimum case.

Name	Base Case or Case A	Case M	Case N
The overloading minimum case (Times)	17	10	15
The power loss minimum case (MW)	708	513	507

Table 5. 2 The simulation result of SAIFI, SAIDI, and ENS.

Name	Base Case or Case A	Case M	Case N
SAIFI (Times/year)	0.04646	0.046358	0.046018
SAIDI (Hour/year)	0.288	0.259	0.246
ENS (MWh/year)	98.492	87.346	82.469

5.2 Recommendation and Further Study

The thesis was studied the generation planning for improving the reliability of power system in the north and central 1 region of Lao PDR. This research recommends the power system planning in future. So the further study in the future should be considered the suggestion as follows:

1) The research can be used as a guideline for the power system planning and generation system expansion. The power flow analysis has applied the condition of the

generation planning such as the overloading, voltage, and power loss. The calculation value of SAIFI, SAIDI, and ENS are compared with the base case and the selection case.

2) This research considers especially of 12 hydropower plants only, which in the future will have the many construction plans. If hydropower projects constructed, the model should be modified the new model by following new constraints of those hydropower plants.

3) The further study should include transmission expansion plan for effective planning.

4) The further study of the generation planning should be considered the stability, dynamic and the investment of each project to factor in the decision.

5) There are several methods for solving the generation development planning of power system. The further study should be considered the method such as the optimization model, the Monte Carlo etc. Then select the best result.