# CHAPTER 5
# CONCLUSION

## 5.1 Conclusion

WPT is very useful for controlling circuit of hydrogen production process. Since hydrogen might be exploded, it is better to separate electricity generation and hydrogen generation. Another benefit is hydrogen generation operates inside house, while solar cell produces electricity outside.

There are many parameters in the WPT system. Each parameters causes the different value of power output. There should be the estimation to calculate the power output. With this consideration, the parameters, which is producing high power output, can be decided.

After doing many simulations in calculating power output from the chapter above, the initial parameters of coil are: H-turn = 5, V-turn = 4, Coil Cross Sectional Diameter = 1 mm, Coil Diameter = 2.5 cm, distance z = 5 cm, Copper resistivity $\rho = 1.68 \times 10^{-8}$ Ωm, Coil length = 3.25 m. With these parameters, the coil parameters can be obtained as in Table 5.1.

Table 5. 1
*Value of Coil's Parameters*

| Component | Value | Component | Value |
|---|---|---|---|
| $R_1$ | 50 Ω | $L_1=L_2$ | 41 μH |
| $R_2$ | 0.4 Ω | $M_1=M_2$ | 1.7 μH |
| $R_3$ | 0.4 Ω | $C_1$ | 1 nF |
| $R_4$ | 50 Ω | $C_2$ | 1 nF |

Resonance frequency can be decided at where WPT produce high power output. Also numerical value of coil parameters is used to obtain average power output, average power input, and efficiency while resonance happens as in Table 5.2.

Table 5. 2
*WPT's Parameters*

| WPT Parameters | Value |
|---|---|
| ω | 5 x $10^6$ rad/s |
| $P_1$ | 0.335851 mW |
| $P_4$ | 0.25994 mW |
| η | 77.3975 % |

Power input from solar cell should be enough as long as there is sun light at any moment. Power output should be adequate to generate small amount of hydrogen which need voltage 1.229 V.

Different parameter value causes the changes of the power output as well as the efficiency of the WPT. If the value in distance z is increasing, then the power output is decreasing. This is corresponding with Equation (2-14). This equation also explains about the change of the coil size. If the value of coil size is increasing, then power output is decreasing. The different medium between two coils makes change in power output too. If the medium has more permeability constant than free air has, then the power output is greater.

## 5.2 Future Work

Since electricity from solar cell is DC, there should be inverter applied between solar cell and WPT. This inverter converts DC to AC with variable frequency. Output of WPT need to be converted back into DC. There should be rectifier connected between WPT and Electrodes for water electrolysis. Square waves WPT can also be implemented, but it still need buck-boost converter between solar cell and WPT.