

Design of Residential Hydrogen Fueling System in UB Bodine Hall

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Abstract

Pollution and emission from the burning fossil fuel already became a serious environmental issue. To solve this problem, more and more green energy or renewable energy has been used into and impact onto modern society. For instance, solar energy, hydrogen, and wind turbine gradually play an important role in manufactory industry. Using hydrogen fueling system for the residential is good for environments, because the students whose live in dormitory have their own cars. If those cars are hydrogen car, they can use the fueling system to supply the hydrogen to the cars. They do not have to go the hydrogen gas station to gas the hydrogen. And using hydrogen is more eco friendly than using the burning fossil. This design is to produce hydrogen for the hydrogen cars belonged to the residents of Bodine Hall, a dormitory at the UB, through a solar energy powered system. In this design, a Proton-Exchange-Membrane (PEM) eletrolyzer is used as a hydrogen generator, solar panels are used to convert solar energy to electricity for electrolyzer, and a hydrogen compressor system is used to compress hydrogen and store it.

UB Bodine Hall

Bodine Hall is the biggest dormitory in UB. There are 420 students live there and the surface area is 1256 square meters. The figures 1 and 2 are the model and basement of the Bodine Hall. The solar panels are set up on the roof of the Bodine Hall. And the fuel cell and compressor system are set up in the basement of the Bodine Hall.

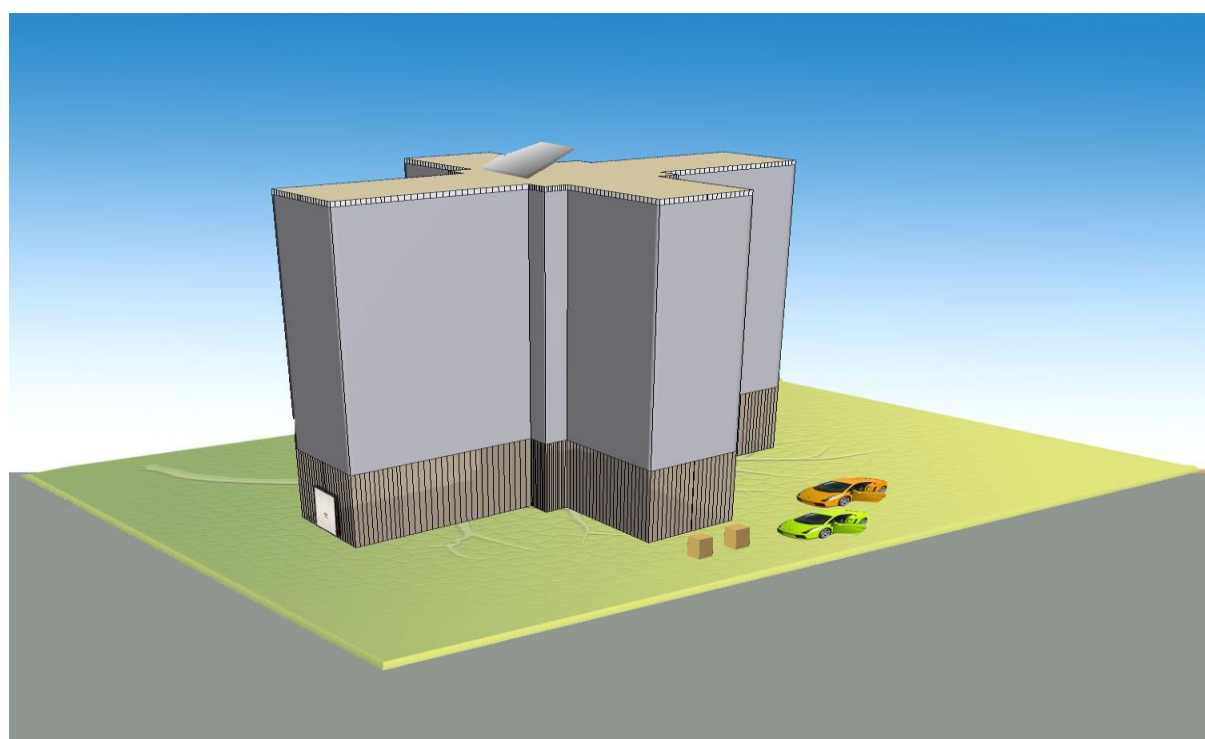


Figure 1. The structure of the Bodine Hall

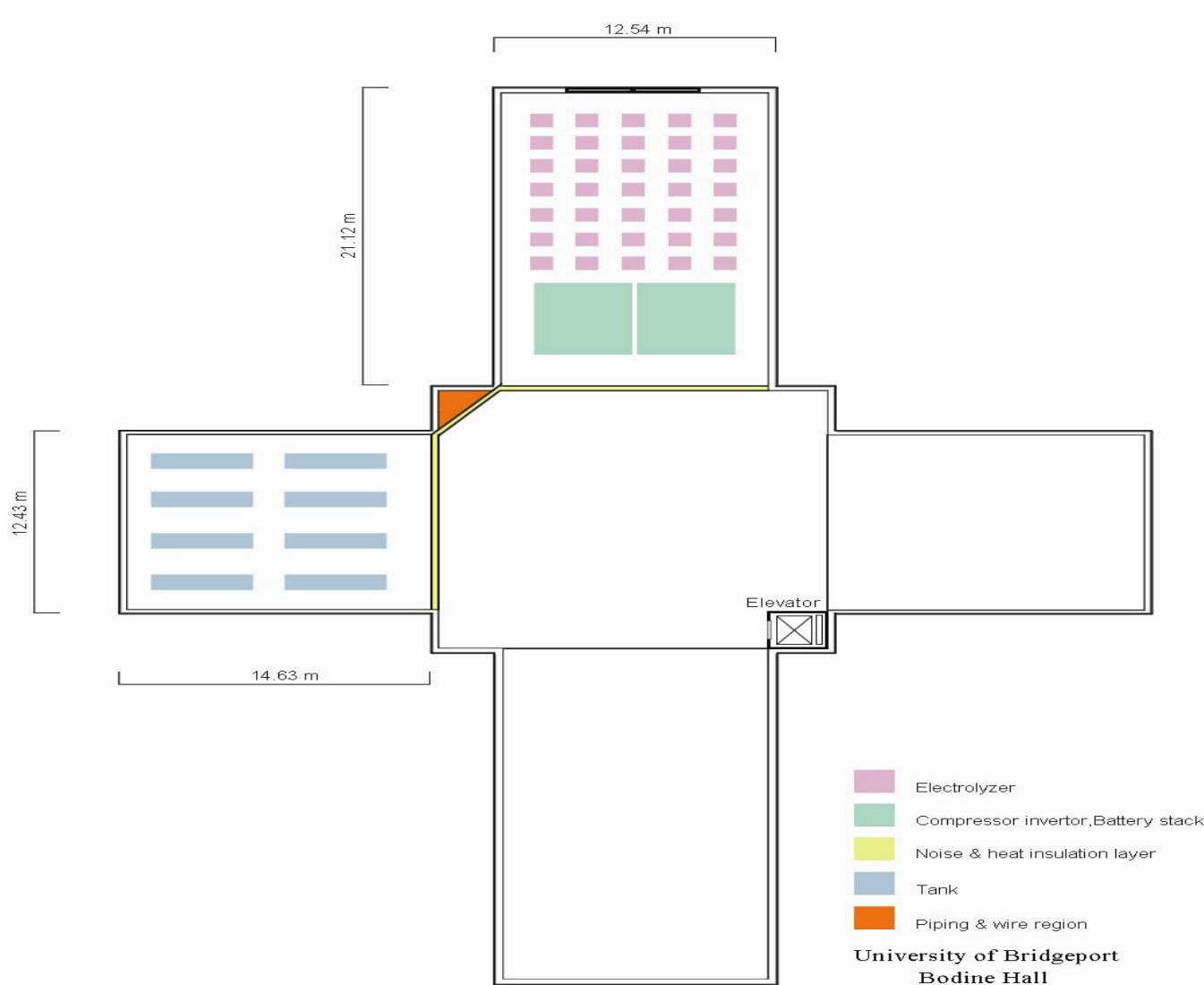
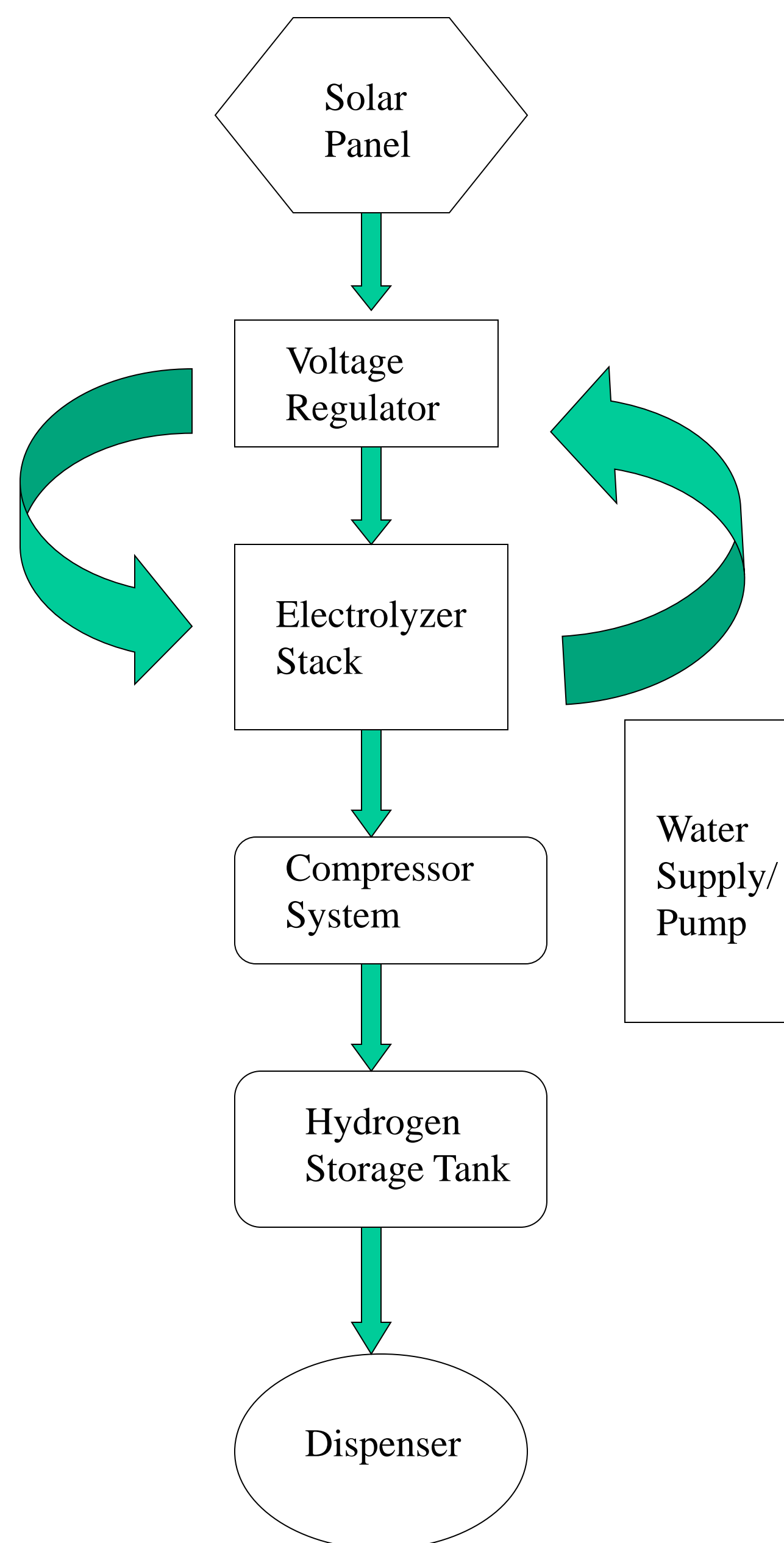


Figure 2. The basement of the Bodine Hall

System Design



Simulation Results and Discussion

In this design, we use the LabView software to simulate. We can easily find out the energy transmitted from solar panel to the system and the hydrogen generated by electrolyzer is stored into fuel tank. The figures as below are simulation steps.

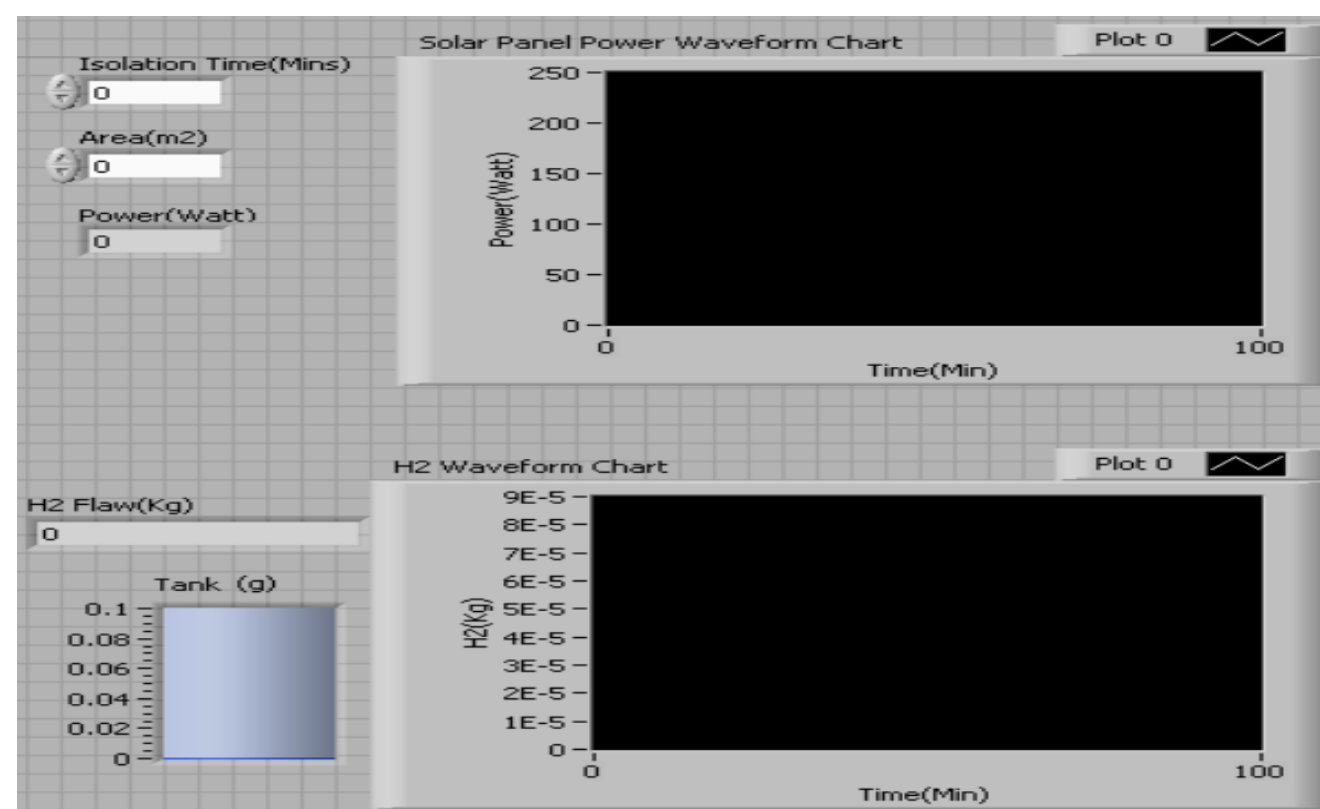


Figure 3. Initial Stage

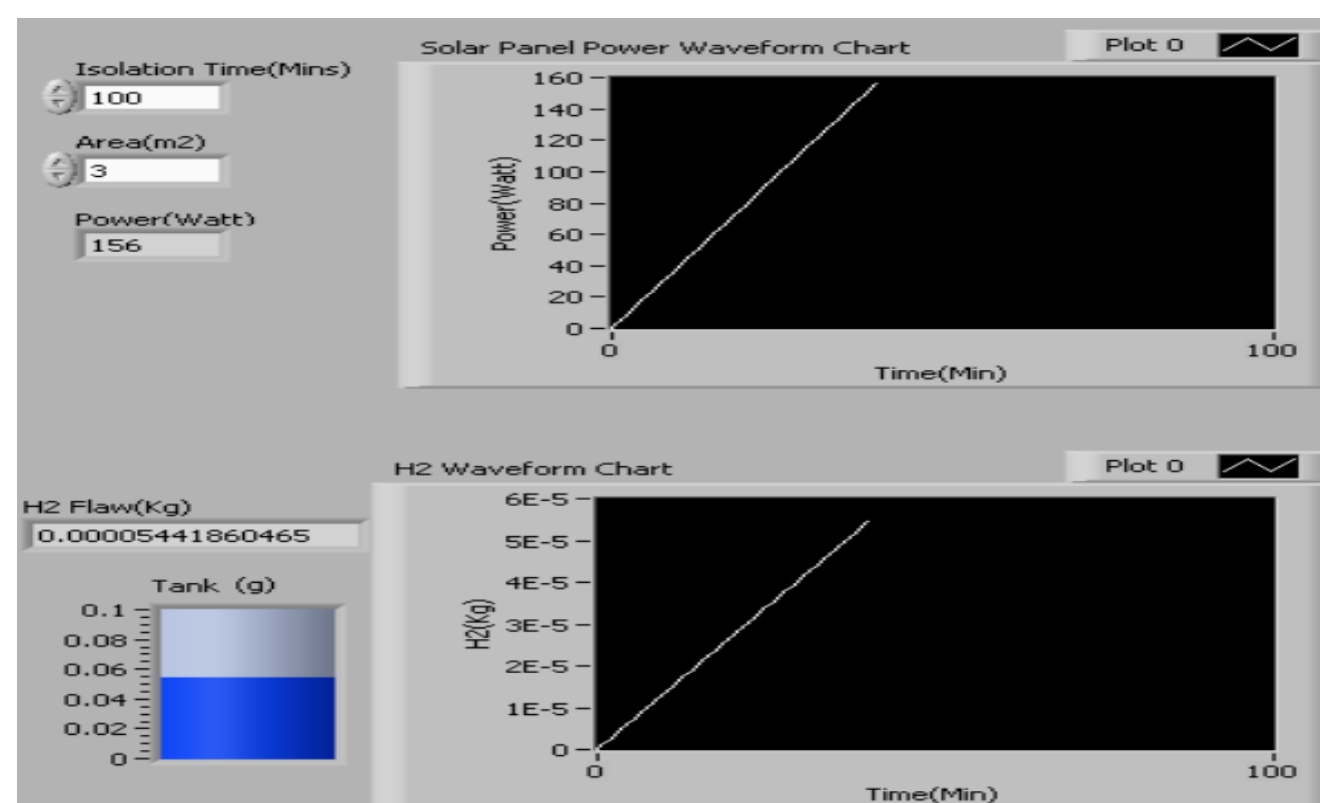


Figure 4. Slope Stage

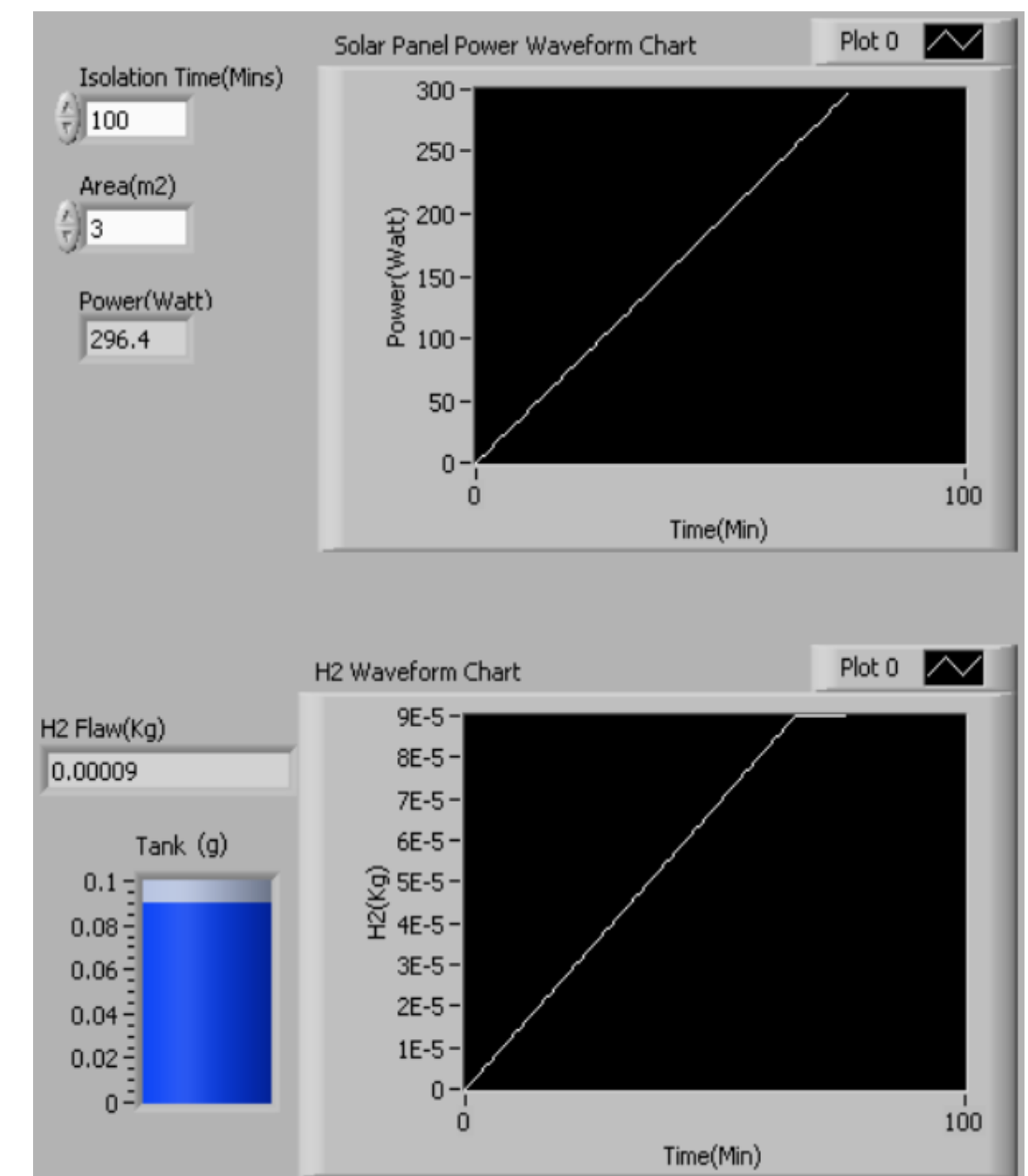


Figure 5. Shift stage

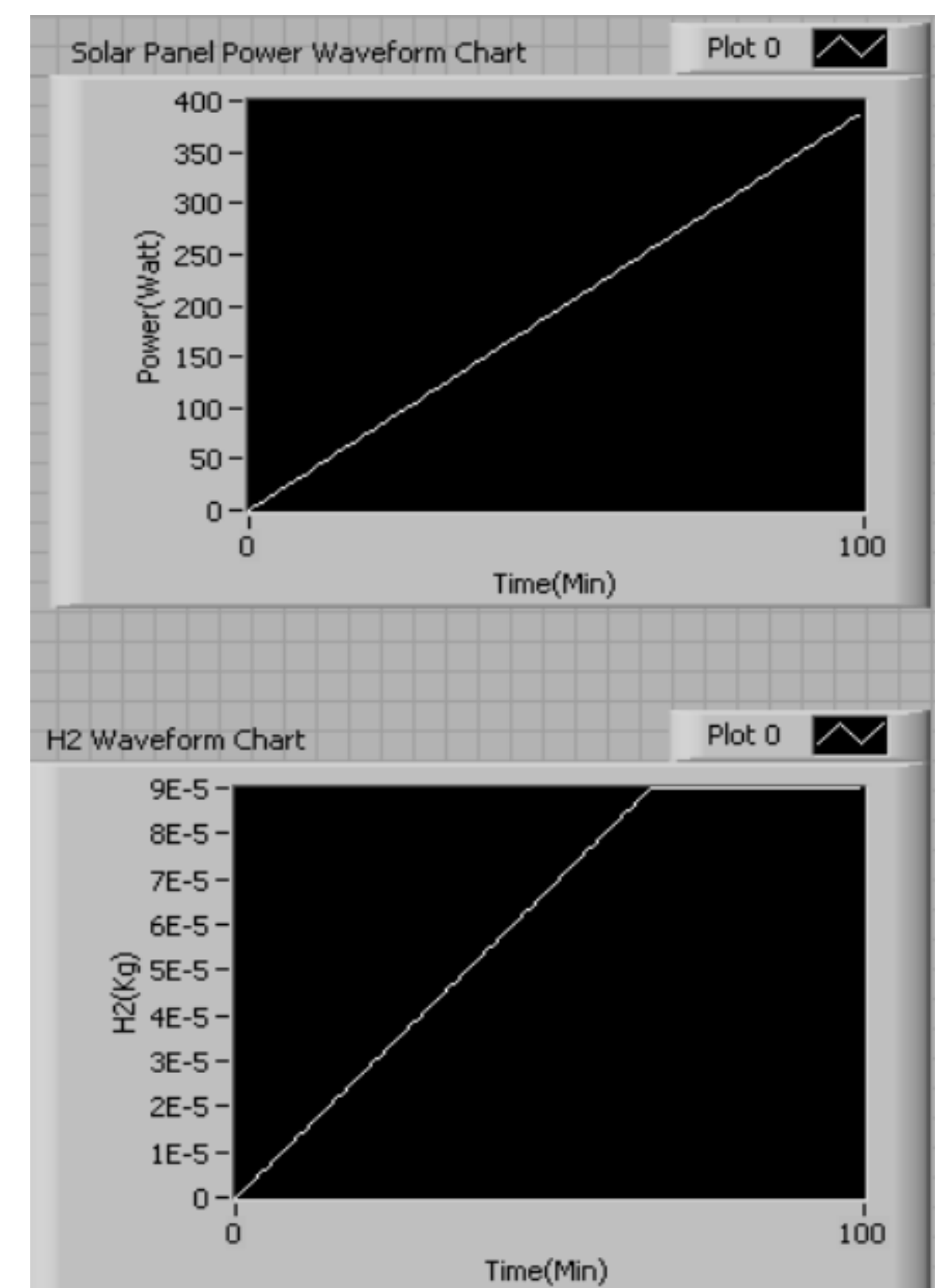


Figure 6. Final stage

The result of the simulation shows the hydrogen has been started to produced in figure 3. And in figure 5., it shows the shift point of the hydrogen. It means when the hydrogen tank is almost full, the electrolyzer system will stop.

Conclusion

In this design, it explains the solar energy and hydrogen energy are useful to supply the hydrogen car. In the future, if the solar panel system and electrolyzer system can generate more energy for the power applications field, it also can supply the whole Bodine Hall's power system. Even if those energies can solve these problems, we still need to find another energy to keep the environment clean.