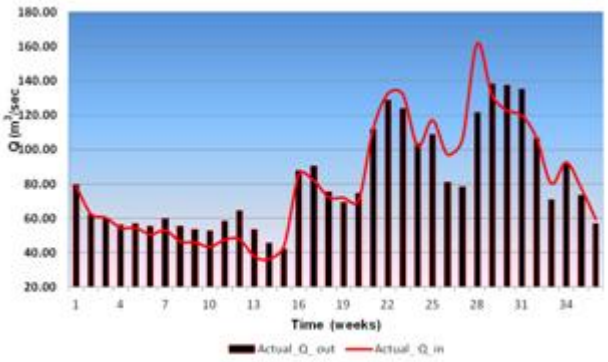

Figure 5: Actual of Qout an Qin

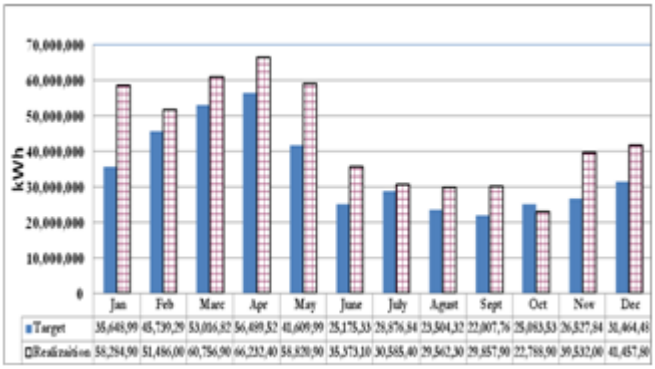

Figure 7: Target and realization of energy production 2012

The pattern of water management in 2011/2012 is shown to be effective, it can be seen from the production of electrical energy as in Figure 6 that the highest power production occurred at the height of the rainy season in March-April, production reached 60 million kWh of electrical energy and the lowest production occurred in August -September which is the peak of the dry season so the electric energy production is only about 20 million kWh – 25 million kWh

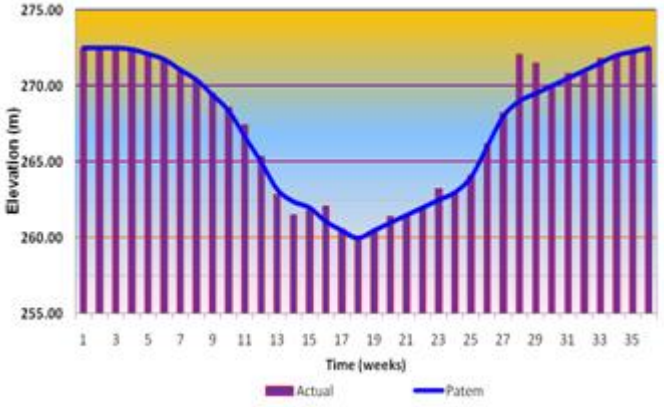

Figure 6: Actual and pattern of reservoir elevation

Achievement of production like this depends on the condition of availability of water in the reservoir, where the dry season water flow input is low, then the output is set to a low discharge, as the result, the production of electrical energy is not maximal. However, it remains to meet the peak load for 5 hours/day. Based on the existing data, it can be concluded that the performance of the operation of Sutami hydropower of electrical energy production indicator is still very productive. It is because the pattern of water in the reservoir settings can be managed consistently. Performance of Sutami hydropower evaluated in the time period 2003-2012. The purpose of the evaluation is to look at the effect of the rate of sedimentation of the amount of energy produced by hydropower. In general, the production of electrical energy by a hydroelectric power, influenced by the balance between incoming water discharge (Q_in) and regulation of water flow out (Q_out), so that the volume of the reservoir in optimal conditions to operate. Reservoir sedimentation rate in effect on the reduction of the volume of water in the reservoir. The higher the rate of sedimentation caused the higher the volume of water reservoirs which experienced a reduction.

Based on data collected over 10 years, the period from 2003 to 2012 in Figure 8 and Table 2 shows that the total production of electricity annually fluctuate or unstable. Lowest production occurred in 2003 amounted to 308,938,070.00 kWh and the highest occurred in 2010 amounted to 698,046,400.00 kWh. The maximum production capacity of Sutami hydropower is 900,000,000.00 kWh per year.

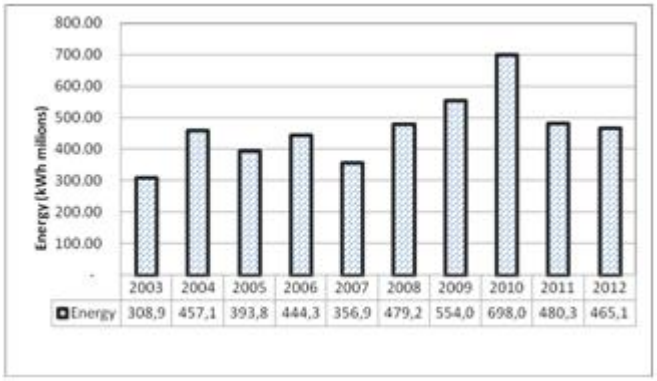

Figure 8: Energy production 2003-2012

Discharge water that drives the turbine or debit lowest output in 2003 the maximum 145, 44 m^3/sec and at a minimum of 92.10 m^3/sec and average discharge of 125, 89 m^3/sec. In 2010 the flow of water that moves highest turbine namely; maximum and minimum 153.70 128.41 m^3/sec and the mean discharge 144.76 m^3/sec.

The highest water level input for ten years was 320.38 m^3 /sec occurred in 2010 and the lowest discharge was 205.48 m^3 /sec, occurred in 2003. The highest input Debit minimum was 135.27 m^3/ sec, occurred in 2010 and the lowest age was 95.36 m^3/sec, there happen to know debit 2007. The highest average output was 182.44 m^3/sec occurred in 2004 or 2010 more than the 182.34 m^3/sec in 2010. Although debit the highest rates in 2004, but the production of electrical energy was only 447.2 million kWh, compared to the 2010 production reached 698.1 million kWh. Thus the average discharge high output is not similar to high energy output.

The maximum output of the highest water level was 162.75 m^3/sec in 2004, the lowest 145.44 m^3/sec in 2003. Debit highest minimum output was 128.41 m^3 / sec in 2010 and the lowest was 92.01 m^3/sec occurred in 2003. The highest average water flow output was 144.76 m^3/sec occurred in 2010 and the lowest mean water level was 122.15 m^3 / sec in

2007. These results indicate a peculiarity because water discharge lowest output, should produce a number of lowest production. The fact that the energy production in 2007 amounted to 356.9 million kWh entering the second-lowest category, because the lowest was in 2003 that 308.9 million kWh. This is possible because the operation hours in 2007were longer than 2003 or in 2003 the operation hours were shorter due to the repair and maintenance of hydropower equipment.

Performance of hydropower generating electricity may be indicated by fluctuations in reservoir elevation and the elevation of the tail race. As the table shows that the elevation of the reservoir average in ten years ranging from 266.64 m - 269.46 m. The highest elevation is in 2010 which amounted to 269.46 m, it is in line with the highest amount of electricity production in 2010 and the lowest water elevation occurred in 2009. This condition shows discrepancy between the results and the production of high water in the reservoir elevation. Indeed lowest elevation reservoirs produce low production, high effective as experienced reductions.

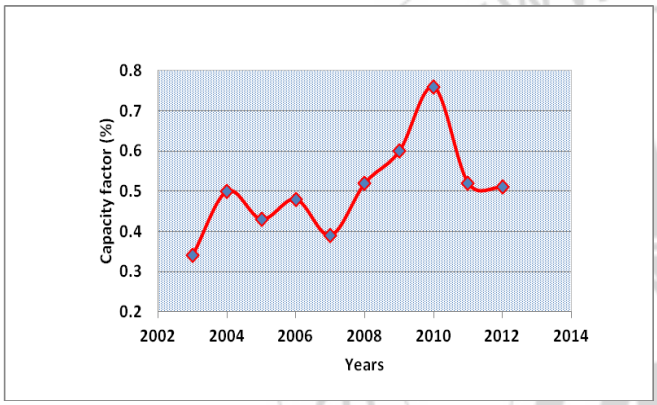

Figure 8: Capacity factor of Sutami Hydropower

One indicator to determine the importance of a hydropower plant operating performance is a factor of power generation capacity. Capacity factor is the ability of plants produce energy in one year based on the power capable owned [11]. In other words, the annual capacity factor is the total energy production in one year divided by the power capable multiplied by the number of hours (8670 hours) for one year.

Based on this formula, the Sutami hydropower capacity factor has been calculated and is listed in Figure 8. Based on the calculations, the performance of Sutami hydropower in ten years has been very well because of the capacity that ranges from 34% -76% and if the average reached 50.5%, the condition is well above the standard of the hydropower capacity factor of 30% [11]. When the average capacity factor is 50.5%, the production of Sutami hydroelectric kWh per year may reach 464.5 million each year.

4. Conclusions

1. Sedimentation in Sutami reservoirs increased from planning targets since functioned in 1972 and in 2011 has undergone a volume loss of 46% at an elevation of 272.5 m and a surface area shrinkage of 45% -46%. Depreciation area and volume evenly in all elevations.
2. The increase in the volume of sediment in the reservoir has not had a significant impact on the production of electrical energy Sutami hydropower. Sutami Hydropower Performance in ten years has been very well because of the capacity that ranges from 34% -76% and if averaged reached 50.5%. Electric energy production in 2012 exceeded the target. This achievement is because of the pattern of reservoir operation that has been established to regulate the use of water and sediment distribution pattern horizontally

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