

# Energy Audit of Fabrication of Electrodeposited Solar Cells at Fresno State

Mechanical Engineering

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### Abstract

The Electrodeposition (ED) process of fabricating solar cells uses lesser energy due to the lower temperature and shorter time it takes to manufacture solar cells. With the audit of the manufacturing process, the EPBT is the lowest in the market.

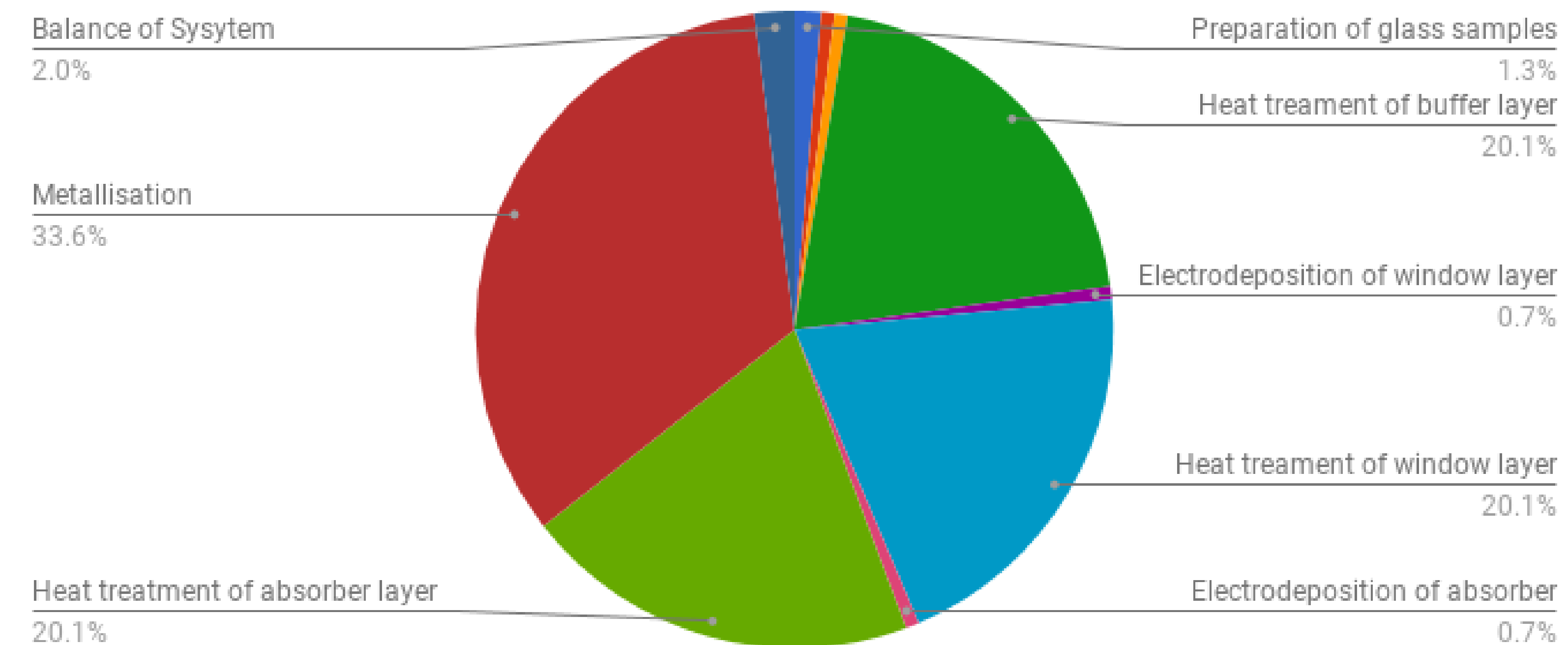
### Introduction

While a good majority of industry focus on improving the efficiency of the solar cells, it is important to examine the manufacturing process and identify areas to optimize. All energy producing devices have an Energy Payback Time (EPBT), this is the measure of how long it takes that device to produce as much energy as was needed to manufacture.

With an Energy Audit utilizing ISO50002, the EPBT can be lowered even more, causing solar panels to be more cost effective.

### Findings

Percentage of Energy consumption per process



The best EPBT on the market comes from First Solar (6 months). Their method uses a portion of ED, but not entirely. Here on campus using only ED, after a linear extrapolation we can predict and EPBT of roughly 2 years due to the 8.47 kWh needed to produce one cell of 100 cm<sup>2</sup>. With further investigation into the manufacturing process, the EPBT should be able to rival that of First Solar.

### Future Work

- Moving forward, this study will examine which steps can be optimized; such as heat recovery and process efficiency.
- Solar powered synthesis of semiconductors and heat treatment due to this lower consumption during the fabrication process.

### Sponsors

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