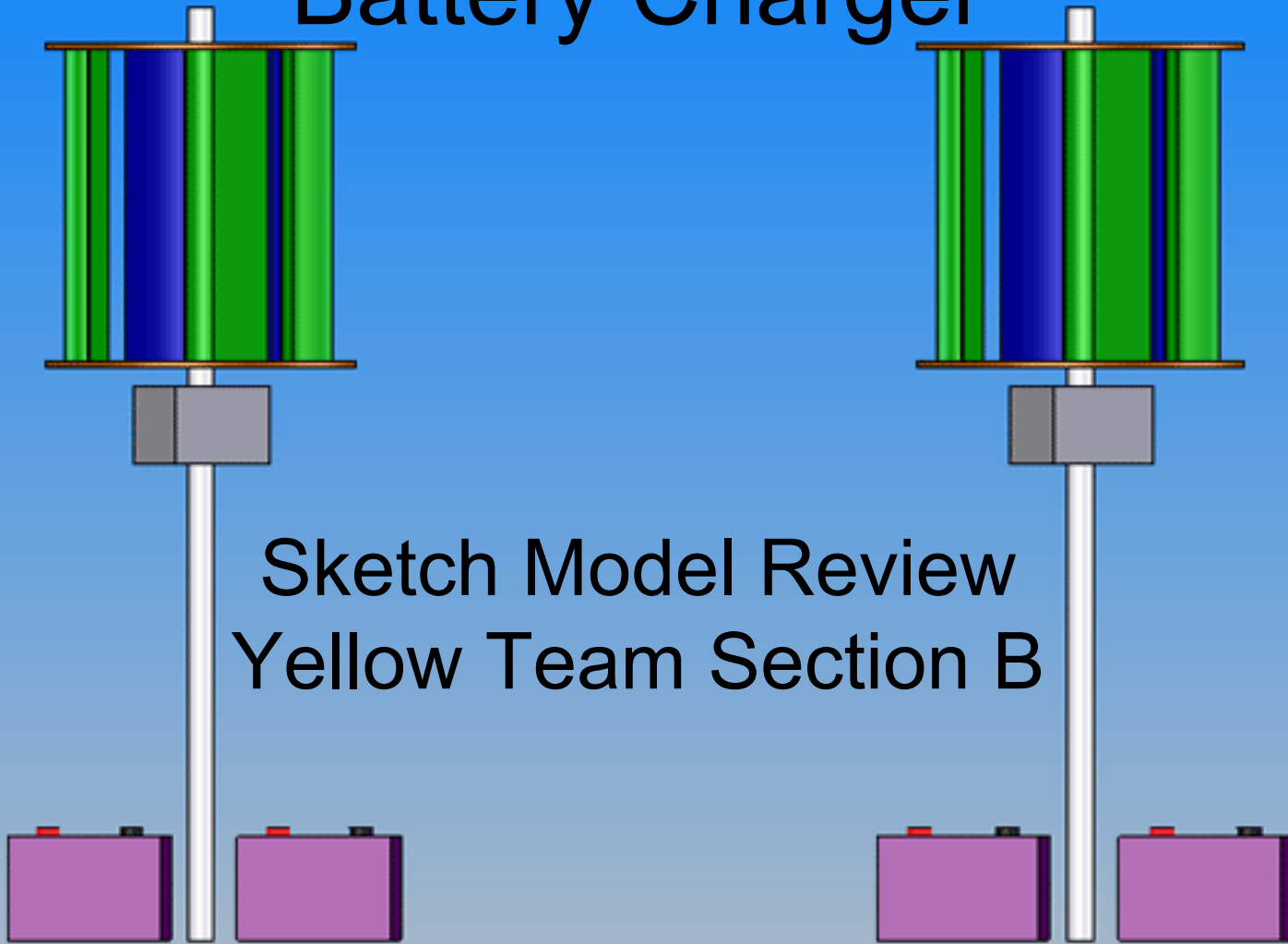


Small Scale Wind Powered Battery Charger

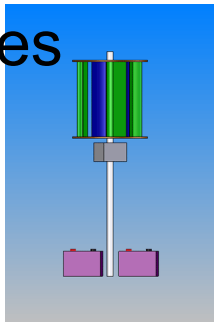


Market and Customer Needs

2 billion people worldwide without access to electricity

Car Battery Usage

- Zimbabwe – 14.5% of rural households ~230,000 batteries
 - average monthly expenditure: \$5-\$15
 - charging stations 7-10 km away
- Sri Lanka – 50% of rural households ~300,000 batteries
 - needs recharging twice a month
 - charging stations 6 km away



Design Goals

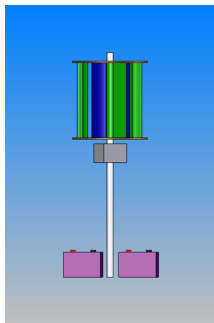
Small: less than 1 m³ in size

Reliable: able to run at low wind speeds of 5-10 m/s

Able to be manufactured locally: using local materials, tools and labor, easy technology transfer

Low maintenance: able to withstand climate, can be maintained by local residents

Cheap: less than \$50 per turbine COGS

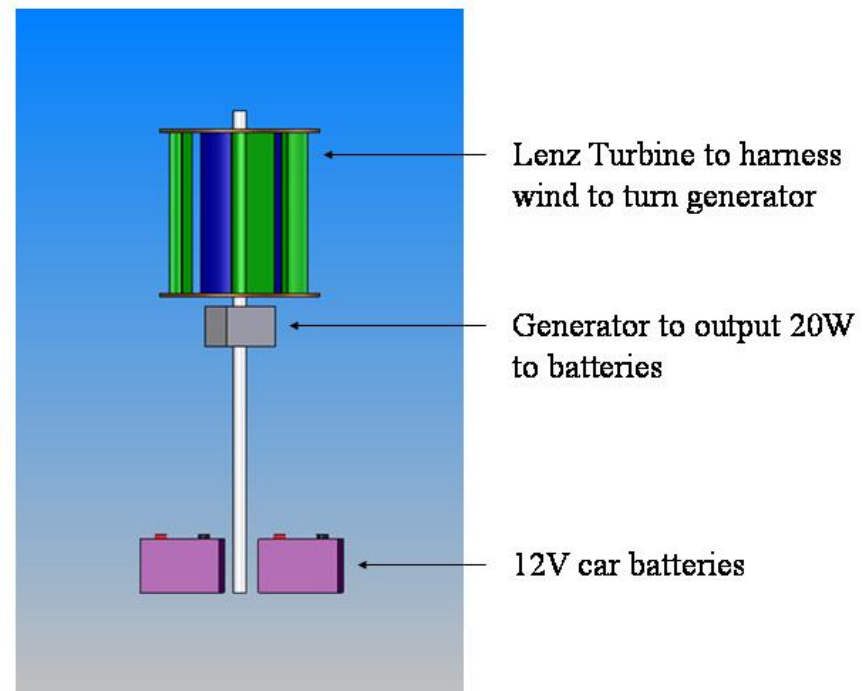


Lenz Turbine

Three blade vertical axis
wind turbine: more
efficient than most
VAWT

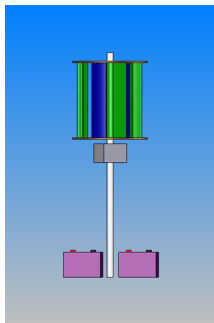
In 6 m/s wind

- turbine achieves 240 rpm
- alternator outputs 1.5A at 14V
- charges a 12V car battery in 8 hours



Learned from Sketch Model

- Easy to manufacture and assemble
- More knowledge to optimize the process
- Reasonable in size and appearance
- Could see where improvement Lenz suggested could be applied



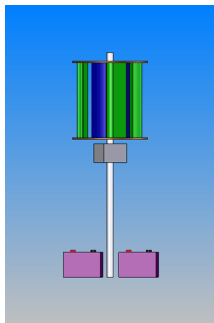
Implementation

Private company concessions

- Argentina: aims to electrify 1.4 million rural residents
- Cape Verde

Micro-enterprises

- Peru: subsidized by Ministry of Energy and Mines



Conclusion

- Inexpensive, clean and local power
- A simple and feasible technology
- Can be reproduced locally in developing countries

