

Storm Energy: A Solution

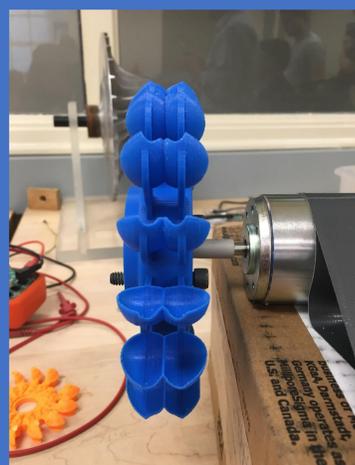
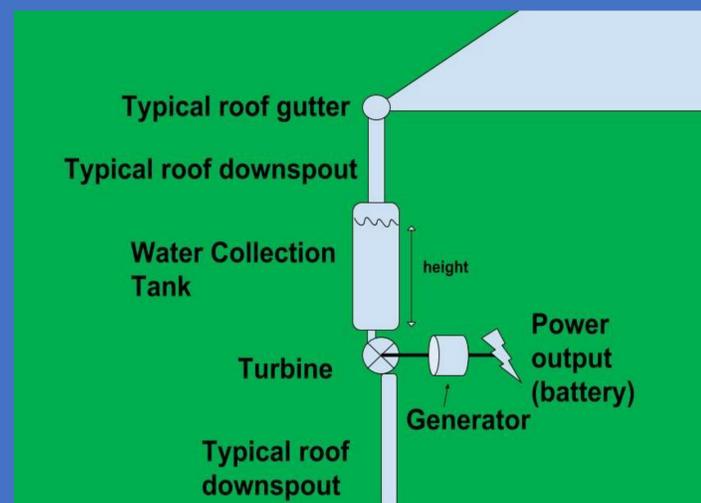


Intro & General Concept

Driving Goal and Concept:

Create in-home renewable energy from stormwater to balance storm-related or other power loss.
Context: increasing storm severity

How: Collect rooftop gutter-guided rainwater into catchment basin, release onto turbine to charge battery



3D-printed Turbine Mounted on Motor

Technical Design

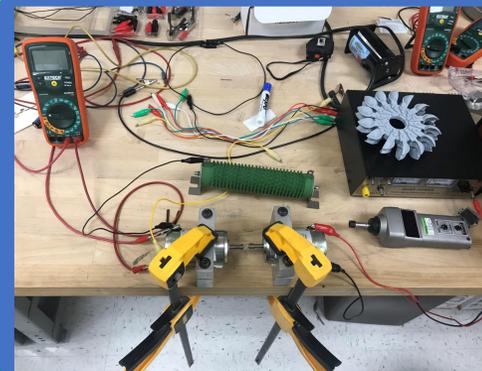
Overall Efficiency Factors

Fluids

- Efficient Pelton Water Wheel
- Catchment Basin-water hits Pelton Wheel

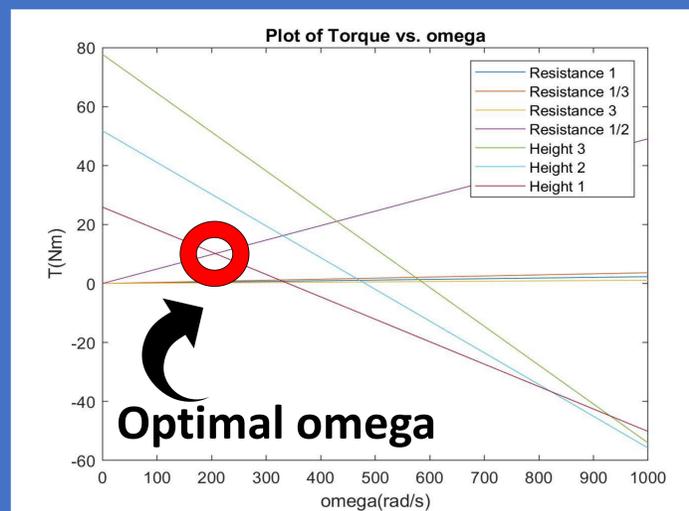
Electrical

- Motor: efficiency dictates electricity generation



Testing Equip. Produces Omega Plot Below

- Resistors (green)
- Voltmeter (orange)
- Motors (Clamped)



Optimal omega (angular velocity: speed of motor shaft) is the value shown on the lowest intersection point (between omega & resistances). Lower angular velocity means our catchment basin isn't as tall, making it more practical.

Analyses: Market, Social, Env.

Target Markets Analysis: US

- Rural/removed populaces that could suffer 4-day+ outages
- General populace: Survey of 59 Duke Parent homeowners wanted product



Target Markets Analysis: Developing Countries

- Any populace w/o reliable energy access
- PAYGO payment models



Social Benefit Analysis: Safety

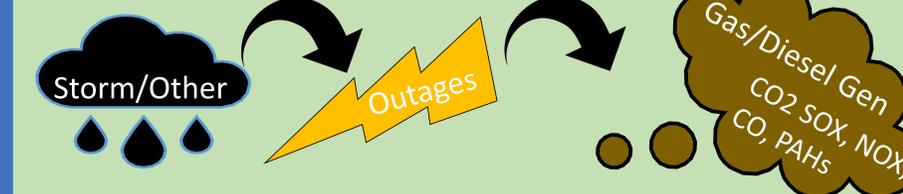
- Charge small devices: phones, wifi routers, lamps
- Refill water manually if necessary—reliability of communication improves safety



Social Benefit Analysis: Convenience

- In developing countries, people travel very far to charge phones. Our cheap, customizable product offers a solution

Env. Benefit Analysis: Emissions



- Cutting gas/diesel backup benefits climate & health

Env. Benefit Analysis: Water Pollution



- Mitigating Storm Runoff Helps Prevent Nearby River & Stream Urban Heat and Toxics Pollution