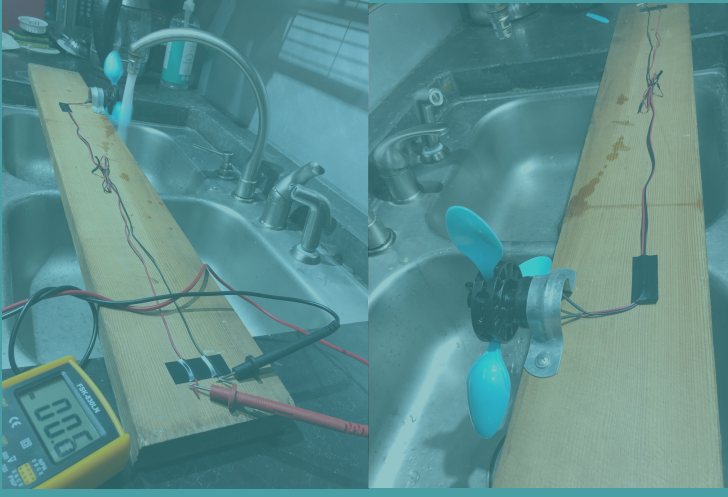


# CLEAN ENERGY OLYMPICS



## BUILDING A BASIC HYDRO SYSTEM

In School or at Home

### 1. FIND A SINK AND A BOARD

A hydro system can be messy. Find a good sink and board that is long enough to span.

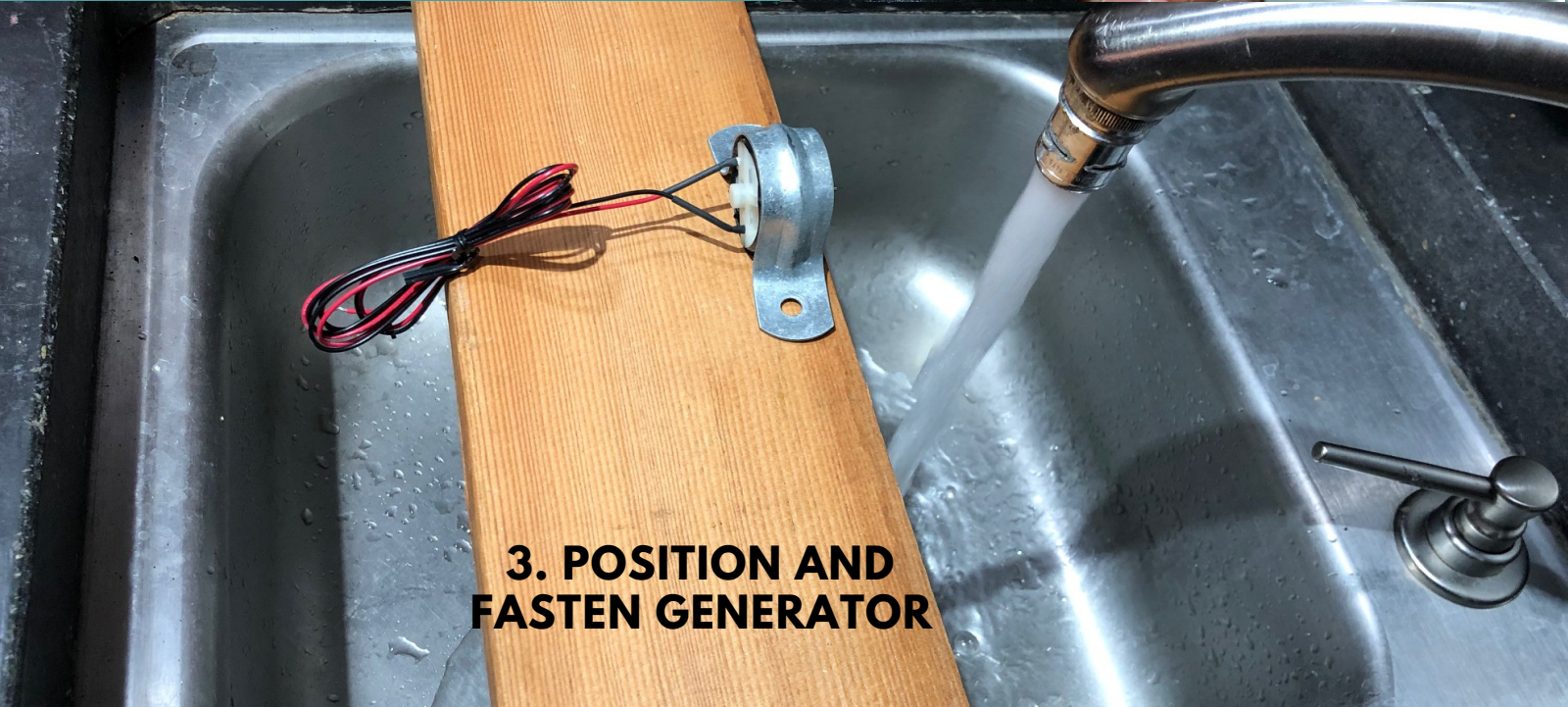


## WATER PROOFING



### 2. PROTECTING THE GENERATOR

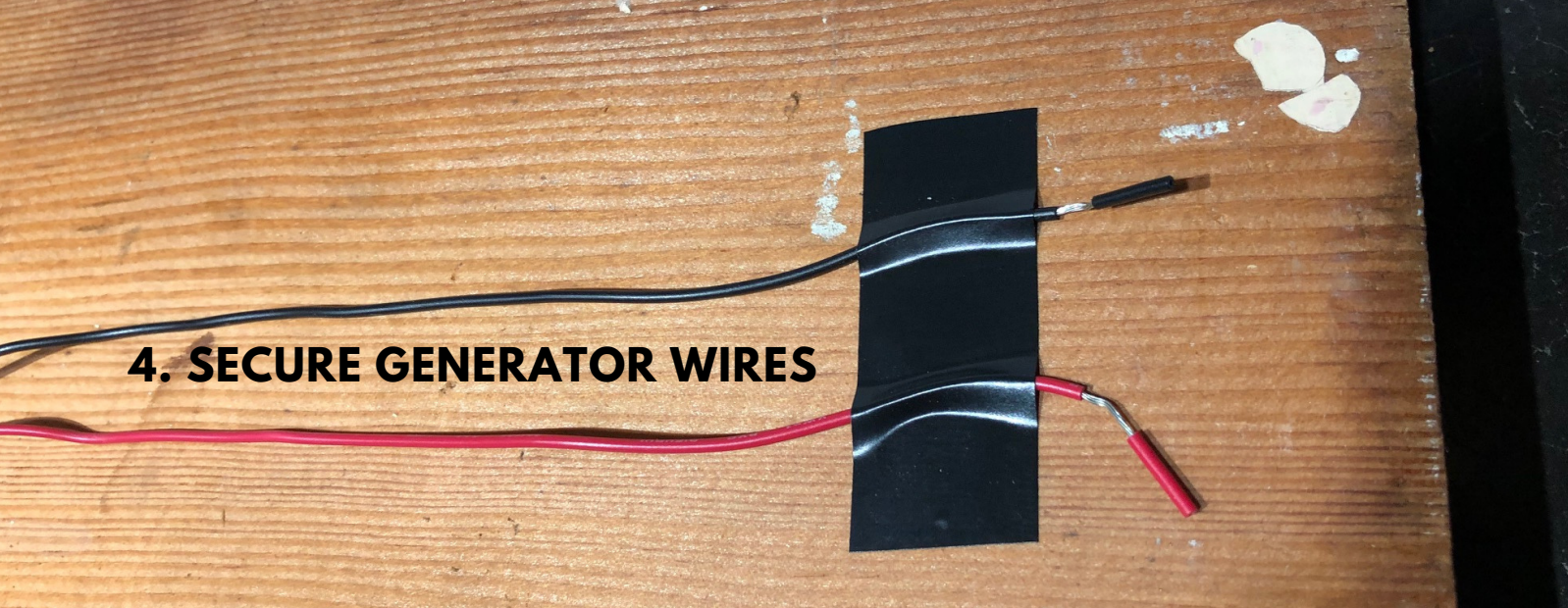
- Cover surfaces with vinyl tape.



### 3. POSITION AND FASTEN GENERATOR



#### 4. SECURE GENERATOR WIRES



#### 5. BUILD THE PROPULSION HUB

This is where creativity comes in!

- What materials do you have?
- How can you adapt them?
- What factors limit performance?
- What factors improve performance?

#### THE HUB MECHANISM

- The hub comes apart by loosening the thumbscrew.
- Many materials can be adapted to fit.
- Secure materials by tightening thumbscrew.

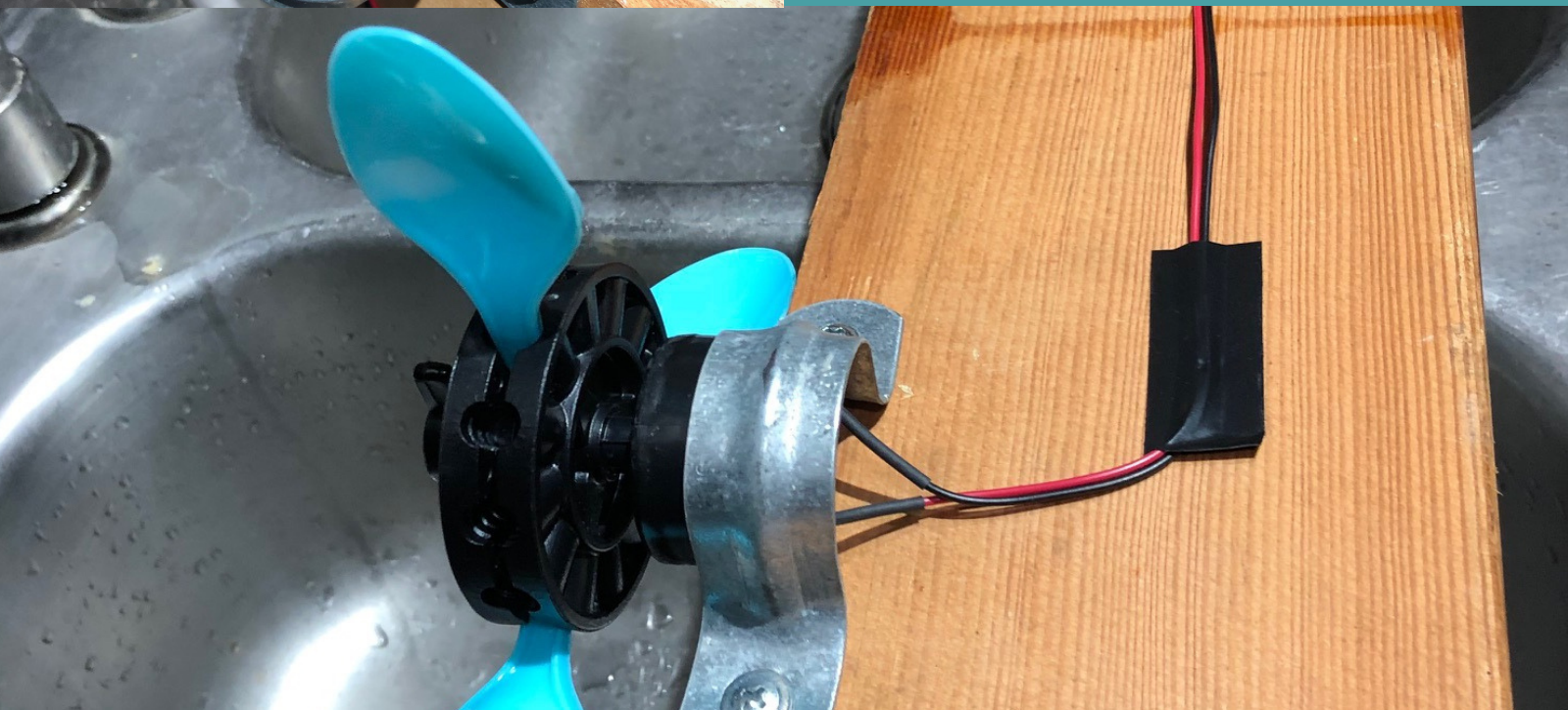


## INSTALLING THE HUB



#### 6. INSTALL HUB

- Press hub onto generator shaft
- Check for smooth rotation
- Make any adjustments to hub and bracket



**Now Get Ready to Test the Hydro System**

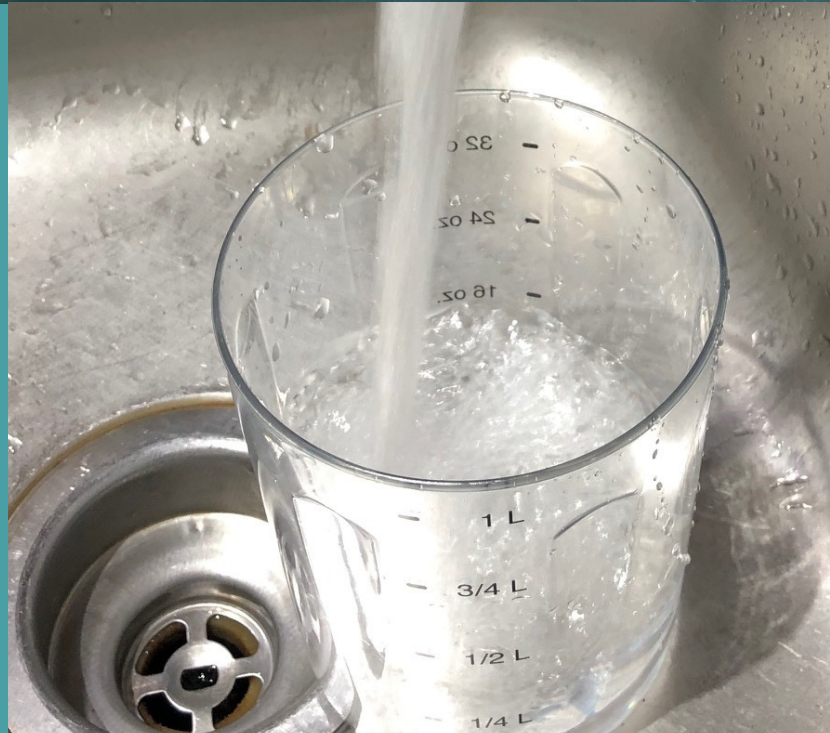
*Record data in journal and with photos.*

# Hydro Generating System

## MEASURING ENERGY

### 7. MEASURE FLOW RATE

- Use cold water on full-force.
- Use a stop watch to measure the time to fill a known volume container.
- Run more than one trial for accuracy.
- Record all data on a table in your journal.

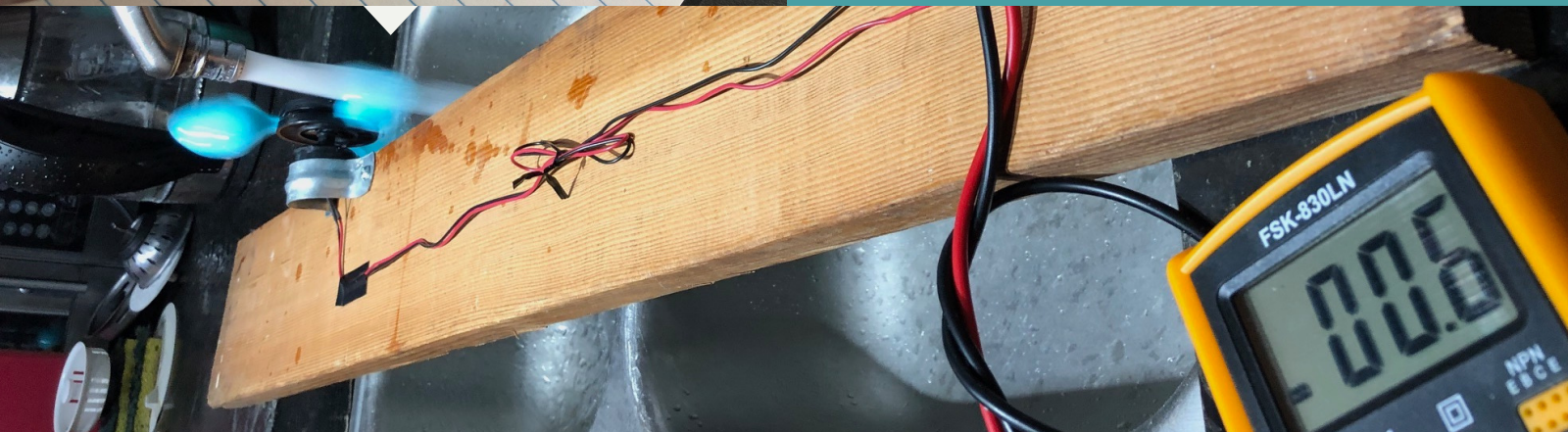
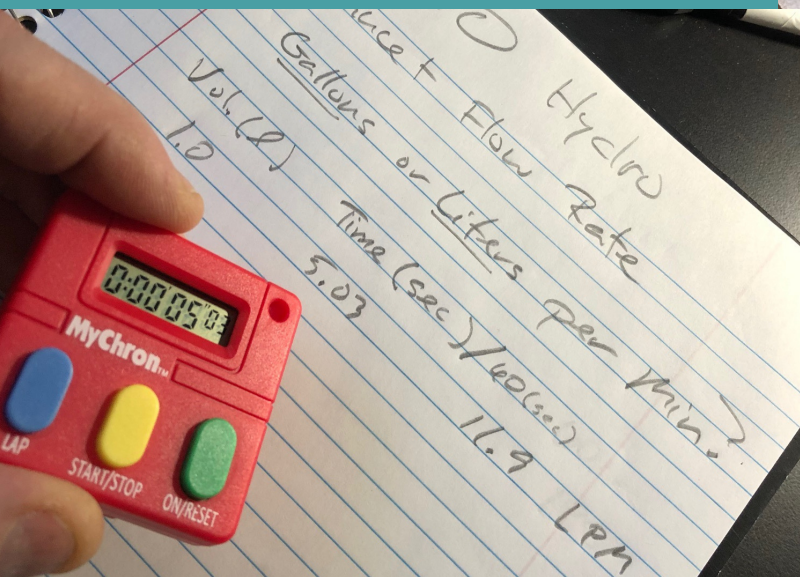


### 8. DO THE MATH!

- Divide the fill time into 60 seconds

Example: It takes 5 seconds to fill a 1 liter beaker. ( $60 \text{ secs} / 5 \text{ secs} = 12 \text{ LPM}$ )

- This is the unrestricted flow rate in *liters per minute*. (LPM)



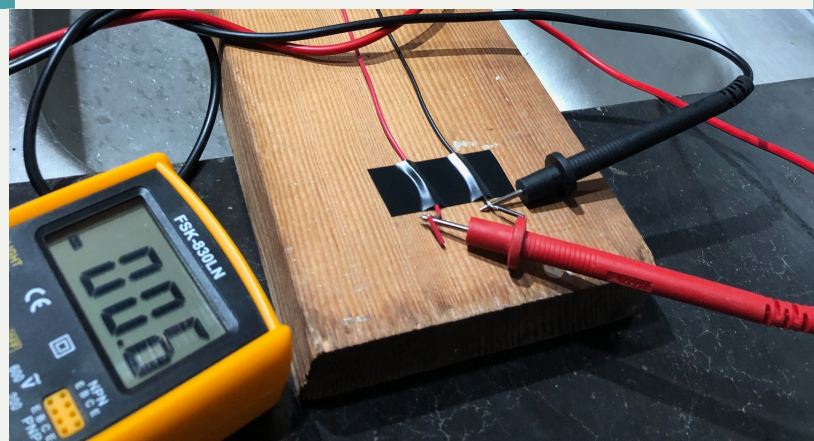
### 9. MEASURE THE ENERGY

- Set multimeter to appropriate voltage range
- Attach + and - probes to generator wires.
- Turn cold water on full force.
- Record voltage in data table and with photos.

### 10. MAKE ADJUSTMENTS

- What variables can you change to maximize energy output?
- Position? Hub? Flow? Other?

**CONGRATULATIONS!**  
**YOU'RE MAKING ENERGY**



### ORGANIZE YOUR DATA

- Use tables and graphs to present data.
- Include all appropriate units of measure.

### DESCRIBE YOUR RESULTS

- Describe your results in writing.
- What variables affected your results?
- How could you improve generator performance?

**Get ready to present your results to CEO judges!**