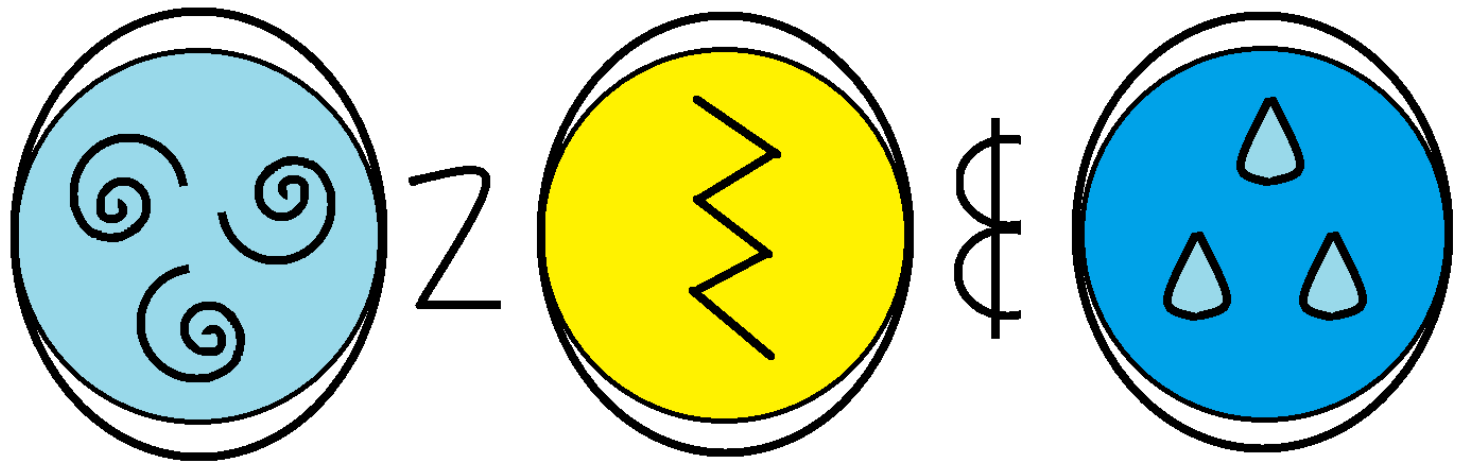
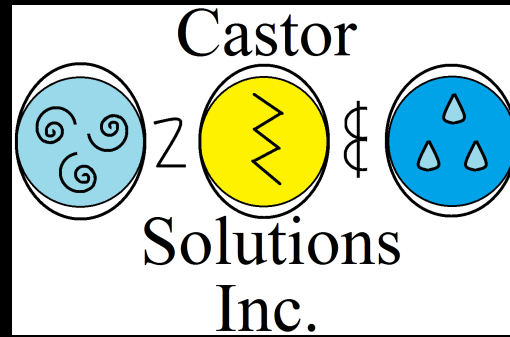


Air to Electricity & Water Microgrid



“The Power of Air Energizing & Hydrating Our Entire World”



Varnell Castor, President, Inventor



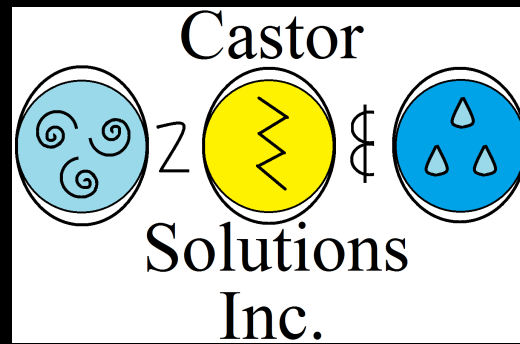
Jaimin Jha, Principal investigator



Suzi Peter, Secretary



Waleska Vazquez, Treasurer



- 501c3 nonprofit
- Minority Owned & Operated
- Research, develop, educate on, and implement off-grid energy and water solutions.
- Developed a 100% renewable, wireless meter-based, pressure conversion microgrid technology (utilizes air and other renewables to generate and store high-density electricity onsite)
- Core focus is the conversion of air (or ambient gas) into storable thermal energy for electrical production and water extraction purposes.
- Extensive research and development into air (as a storable thermal energy resource) showed that:
 - 1) Air is a 24/7-accessible resource on the surface of the Earth,
 - 2) Air stores water molecules that can be collected,
 - 3) Air can be converted into and stored as high-density pressurized gas,
 - 4) Pressurized gas can be recycled back into storage tank (increases volume of pressure),
 - 5) Air compressor systems can operate on renewables and batteries.



Alamy

- Of the 1.2 billion global citizens who live in the dark, around 550 million live in Sub-Saharan Africa
- In developing countries, only 75% of citizens have access to power.
- Even for the wealthy, the limited supply makes power access unreliable and frequent power outages are a reality for residents.



- Due to climate change, hurricanes have been stronger and more frequent
- Category 4 hurricanes have graduated to Category 5 and will continue to graduate



- Transmission lines across the country are vulnerable to hurricanes (National Energy Security issue).
- Fallen transmission lines like in Puerto Rico result in blackouts for months and cost hundreds of millions per hurricane season to repair

Air-to-Electricity and Water Microgrid (TRL 4)



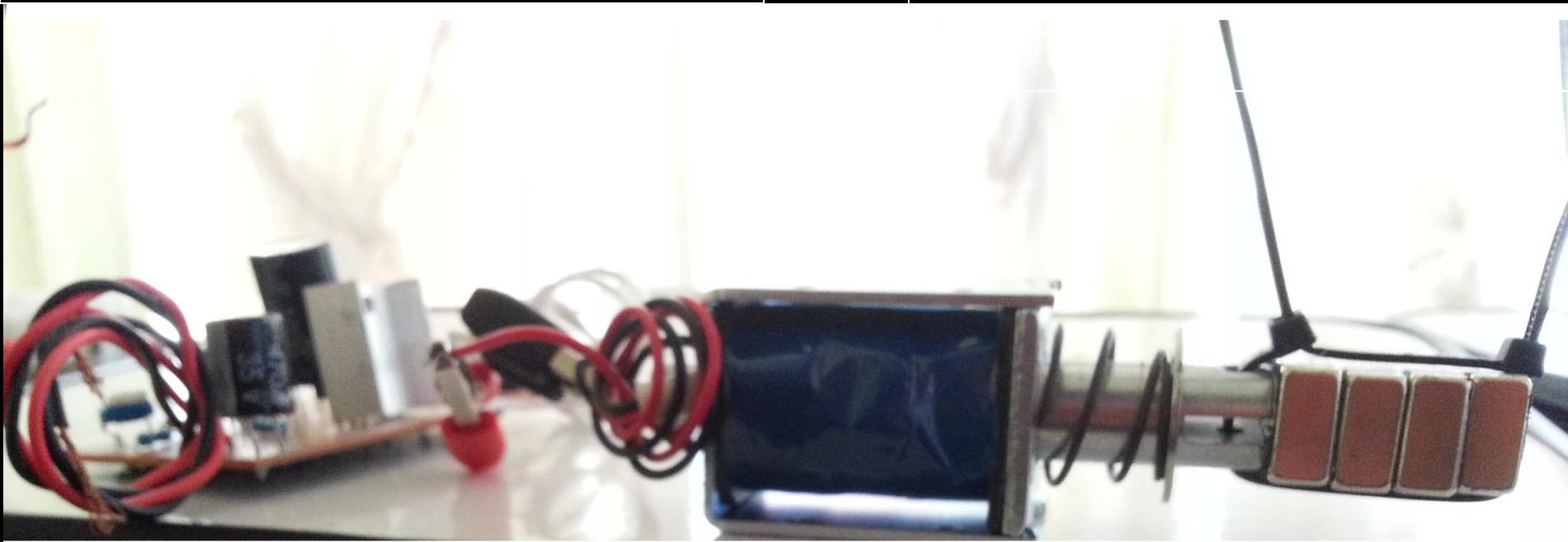
- Self-Sustaining pressure conversion energy system
- Uses renewables and air as a storable resource to generate and store electricity
- Meter-based onsite energy harvester (personalized access to power)
- Doubles as meter-based onsite water harvester (personalized access to water)

Prototype Videos

- Prototype Video –Novel Generator – V2 (John) - 2018 - URL - <https://youtu.be/33QlvPIR6sQ>

Linear Generator (Prototype Model)

- Palm-size
- Energy Output: 12V 6W Total
- 40 Generators simultaneously triggered to generate 240W



Prototype Videos

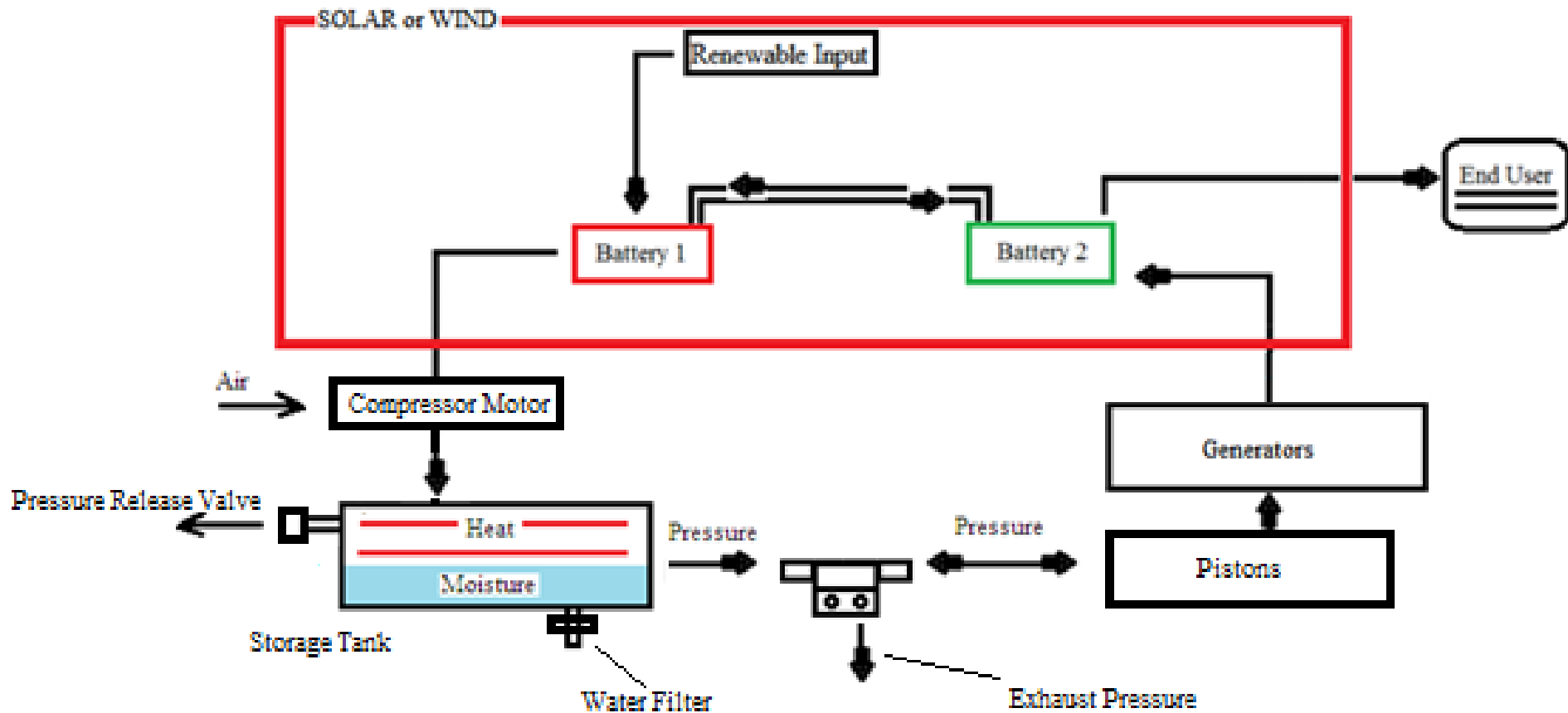
Desktop Microgrid (Prototype Model)

- Energy Output: 340W Total
(100W Renewable + 240W CHP)
- Electrical Battery Storage: 576Wh
- Compressor Motor Kwh usage: \$.05 (-93W)
- Functionality:
 1. Water Extraction Mode;
 2. High-Density Electricity Mode

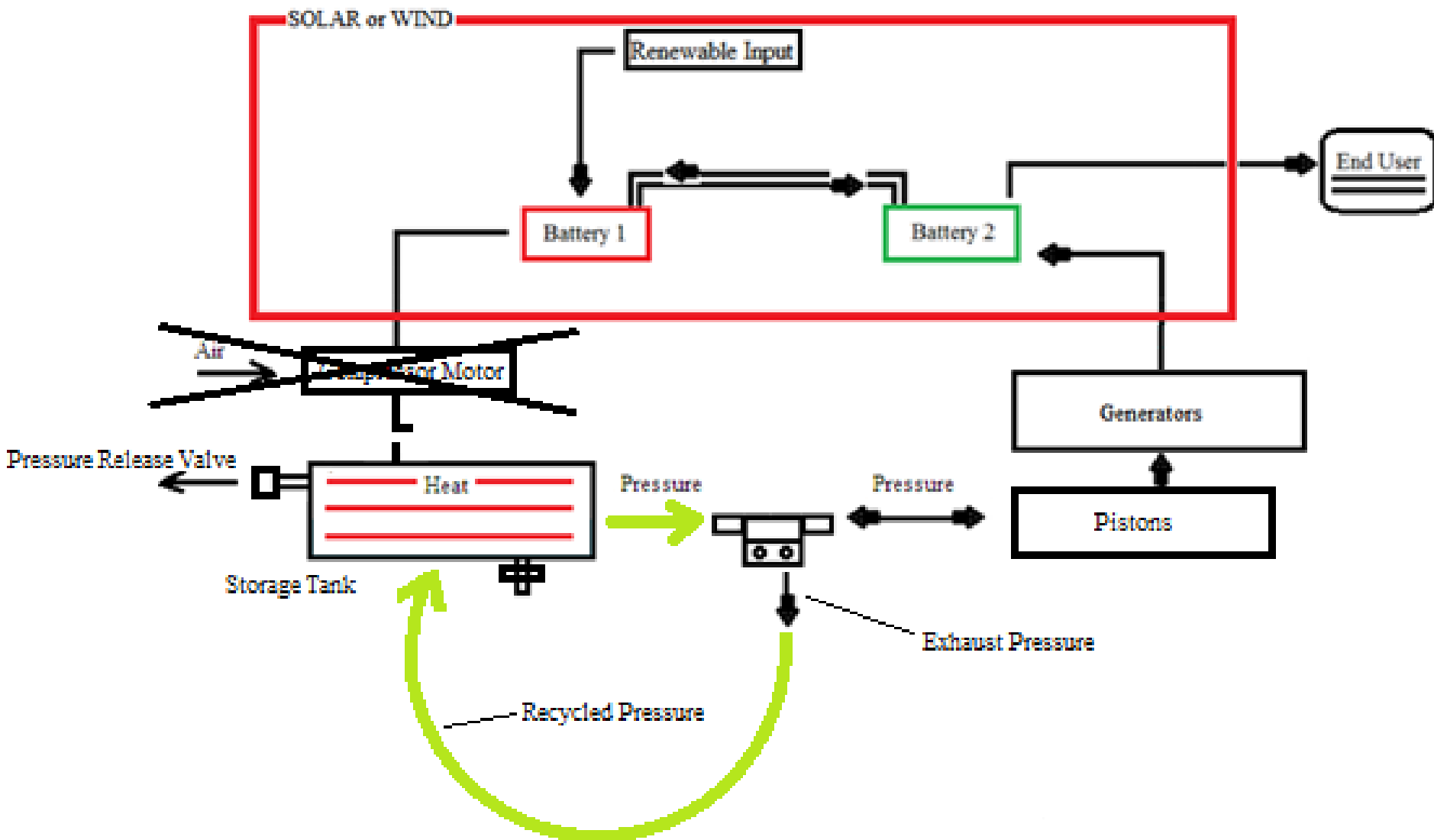
- Prototype Video - Air-to-Electricity Mobile Microgrid
- 2018 – URL - <https://youtu.be/x3FLJN5uUgw>



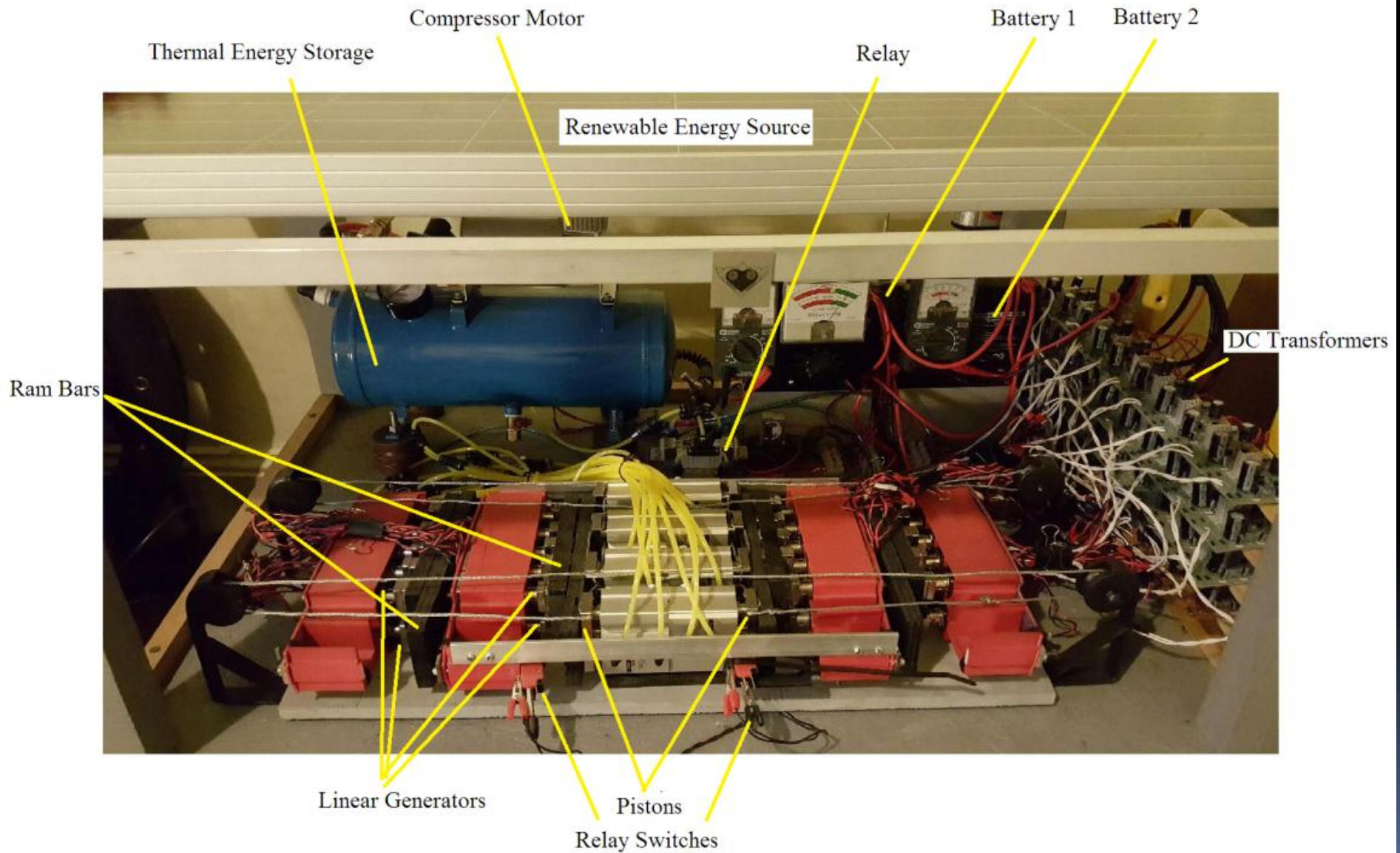
Air-to-Water Mode



Air-to-Electricity Mode



Air-to-Electricity Microgrid



Impact

- Intermittent-free, 24/7-accessible energy
- Cheaper, high density energy alternative to combustibles (In the East, National Grid /Eversource → fluctuates rates charges \$.07 from July to December and \$.11 from January to June, with fixed being \$.097; in the West, the average delivered minimum bill for PG&E is \$.32, with the average total rate being \$.22 per kwh)
- Saves consumers around \$60,000 in supply costs passed down by utility service providers within a 40-year period
- Personal energy can be generated and stored anywhere
- 1.2 Billion global citizens would no longer have to live in the dark
- 500 Million citizens in Africa would be able to access 24/7 energy
- Collects airborne water, even in arid regions
- US Military would save \$20 Billion in annual spending of oil and natural gas
- Ideal power for global relief efforts and impoverished regions
- Ideal for multiple applications needing onboard battery recharging capabilities
- Can be interconnected with pre-existing renewable systems in the field

Scalable Models

1. handheld power (70W 140WH)
2. low residential power (1KW 2KWH)
3. electric vehicle power (2.5KW 5KWH)
4. high residential power (5KW 10KWH)
5. residential power (100MW+)

Applications

Military & Defense Applications

- ☐ Base power
- ☐ Handheld power for Warfighter equipment
- ☐ Electric vehicle power
- ☐ Space (Pressurized gas energy converter)



Aerospace Applications

- ☐ Battery-Powered aircraft
- ☐ Drones
- ☐ The International Space Station



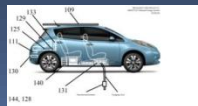
Green Building Applications

- ☐ Disaster Relief
- ☐ Residential power
- ☐ Commercial/Industrial power
- ☐ Utility-Scaled Power
- ☐ Backup for Existing Solar or Wind
- ☐ Standalone power for campaigns



Transportation Applications

- ☐ EV-to-Grid applications
- ☐ Battery-Operated transportations
- ☐ Mars explorer vehicles

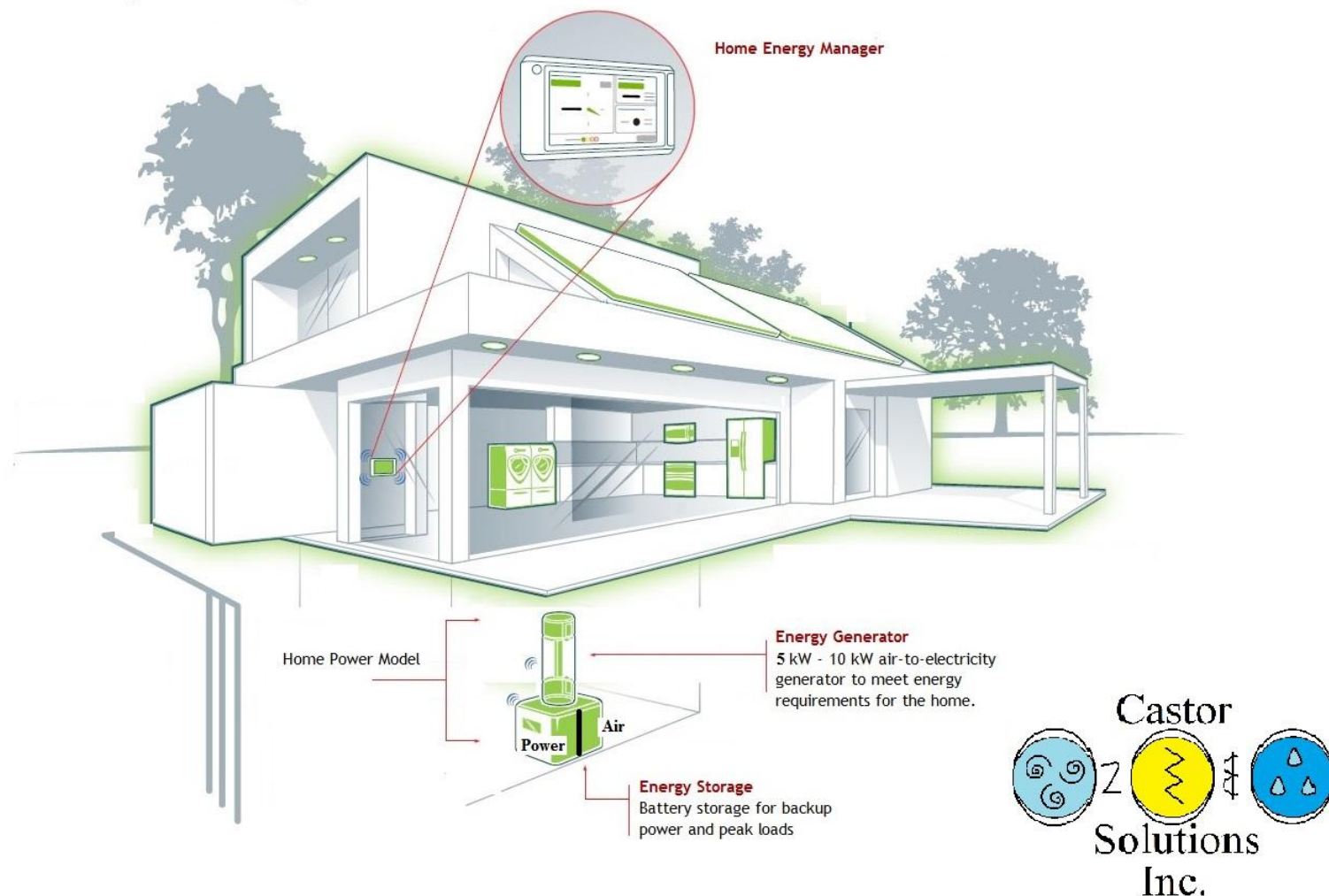


PROJECTED MANUFACTURING COST – MODELS VS. COST (RETAIL AND ONE-PIECE PARTS):

The following reflects manufacturing costs in the United States. Manufacturing parts in China would be more cost efficient. Parts can be shipped and assembled in the United States, creating jobs:

<u>Model</u>	<u>Estimated U.S. Manufacturing Cost</u>	<u>Lease Price</u>
*70W 140WH - Handheld	\$100-170.86	\$350
340W 576 WH - Desktop	\$500-838.75	\$1,200
*1KW 2KWH Low Residential Power	\$1,505.57	\$3,511.15
2.5KW 5KWH - Medium Residential Power - Electric Vehicle	\$3,011.15	\$8,500.00
*5KW 10KWH – High Residential	\$7,527.85	\$20,000.00

Air-to-Electricity Homes by 2020



Utility Sales Strategies (Both Electricity & Water):

Model 1 – Renewable Energy Utility Contract, where microgrid is off-base generation or outside of installations but installation procures and consumes all energy and water.

Model 2 – Real Estate outgrant, where microgrid is on-base generation, installation consumes no energy and 3rd party exports all energy and water.

Model 3 – Traditional PPA or Power Purchasing Agreement, where microgrid is on-base generation, installation consumes all

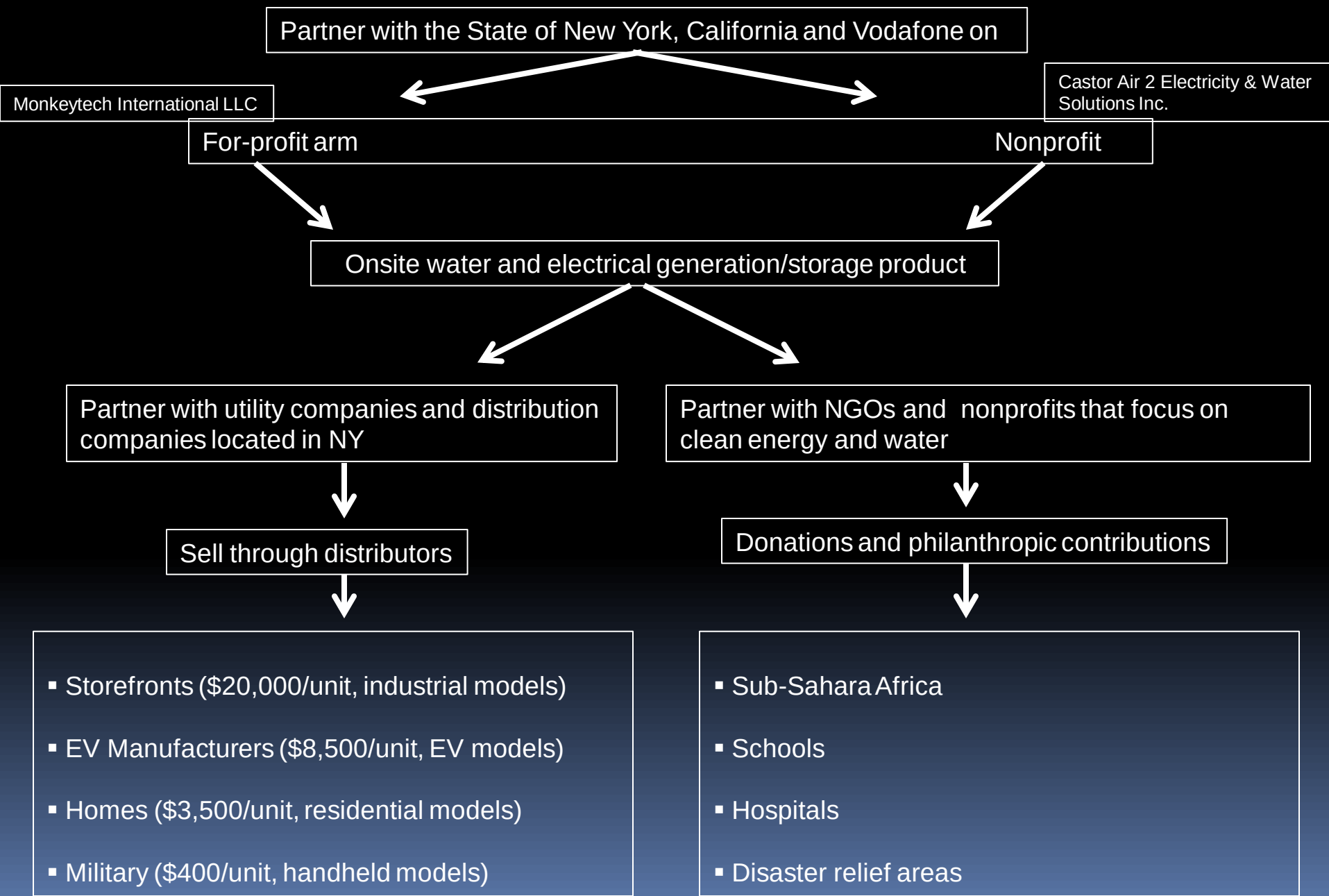
Proposed Budget

- We will utilize the funds to rent headquarters, develop in-house lab, payroll for team, lab consultants, legal consultants, engineers, laborers, and scale and test our 340W 576Wh prototype model.
- Funds will cover manufacturing costs of 5kW 10kWh residential models.
- Funds will be utilized for future R&D of scaled models – handheld, EV, residential, commercial and regional models

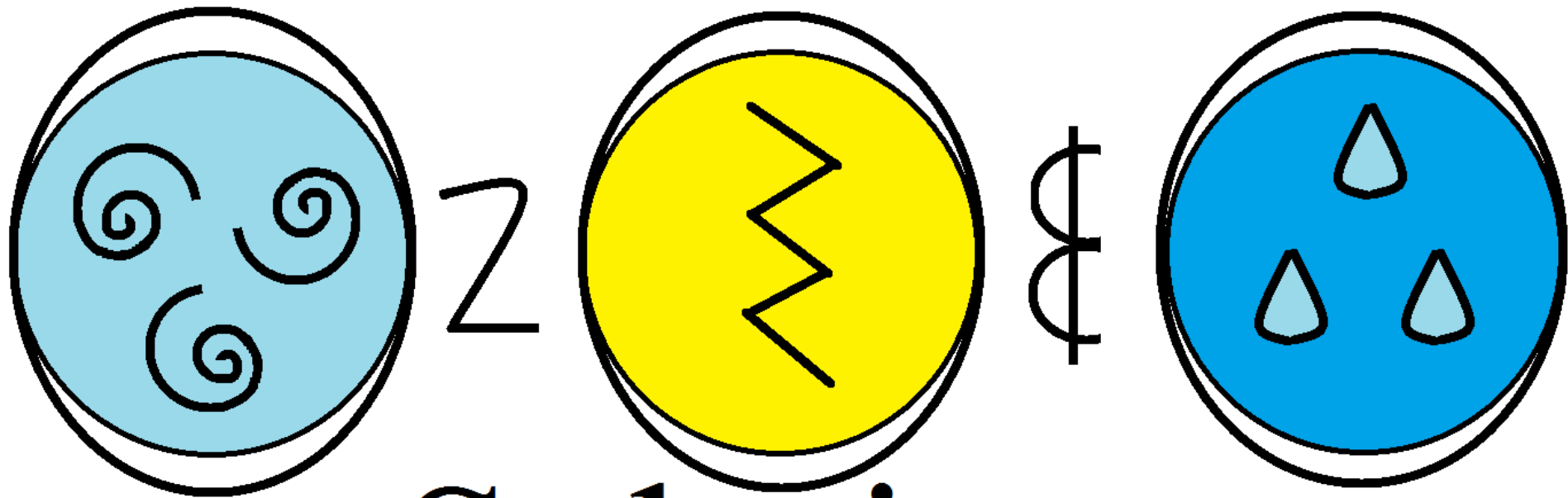
Item/4Name	Cost
Principle Investigator (Jaimin Jha)	\$80,000
Castor Air 2 Electricity & Water Solutions Inc.	\$100,000
Material Costs	\$50,000
Travel	\$10,000
Sub-award (New York University)	\$150,000
TOTAL	\$340,000

	Goals
<u>Milestone 1</u>	Collaborate with Vodafone partners as well as R&D partner NYU
<u>Milestone 2</u>	Analytical models and simulations of desktop prototype must be conducted.
<u>Milestone 3</u>	Data analysis and analysis of superior materials analysis must be executed to further refine the product.
<u>Milestone 4</u>	Finalized testing of the desktop model can be executed, and necessary data can be collected for future use.
<u>Milestone 5</u>	Research and development of scaled models in CAD.

Plans to Scale Up



Castor



Solutions Inc.

A 501c3 Nonprofit

End