





**BACH KHOA**  
I N N O V A T I O N

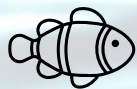


*from* **WASTES** *to*  
**BLUE ENERGY**

**BKTENG**



8,58 million aquaculture businesses in Vietnam



Aquaculture sector growth rate of 6,3% in 2022



Vietnam's 5 largest shrimp exporting markets: US, EU, Japan, Korea, and China



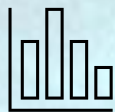
Product quality problems are hindering export value

*Source: Viet Nam Briefing*

THE PROBLEMS



# THE PROBLEMS



Latency of data obtained from traditional sensors



Demand for sustainable offshore electricity



IoT adoption rate steadily increases by 5% each year



Need for quick adaptation to environmental changes

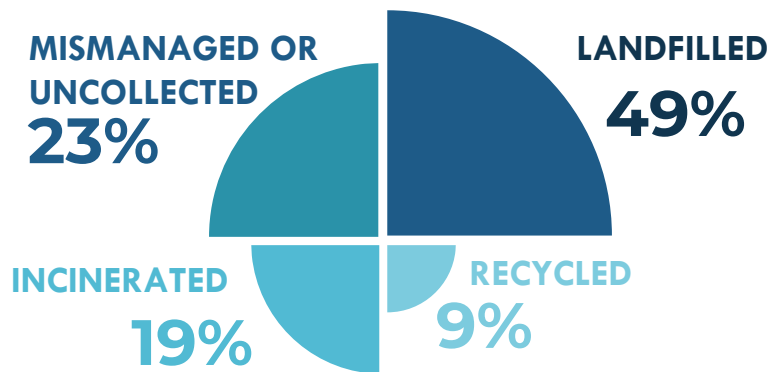
*Source: Viet Nam Energy Outlook Report 2021*







# THE PROBLEMS



400 million tonnes of plastic waste are discarded every year

*Source: OECD*



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# Solution



**WAVE**

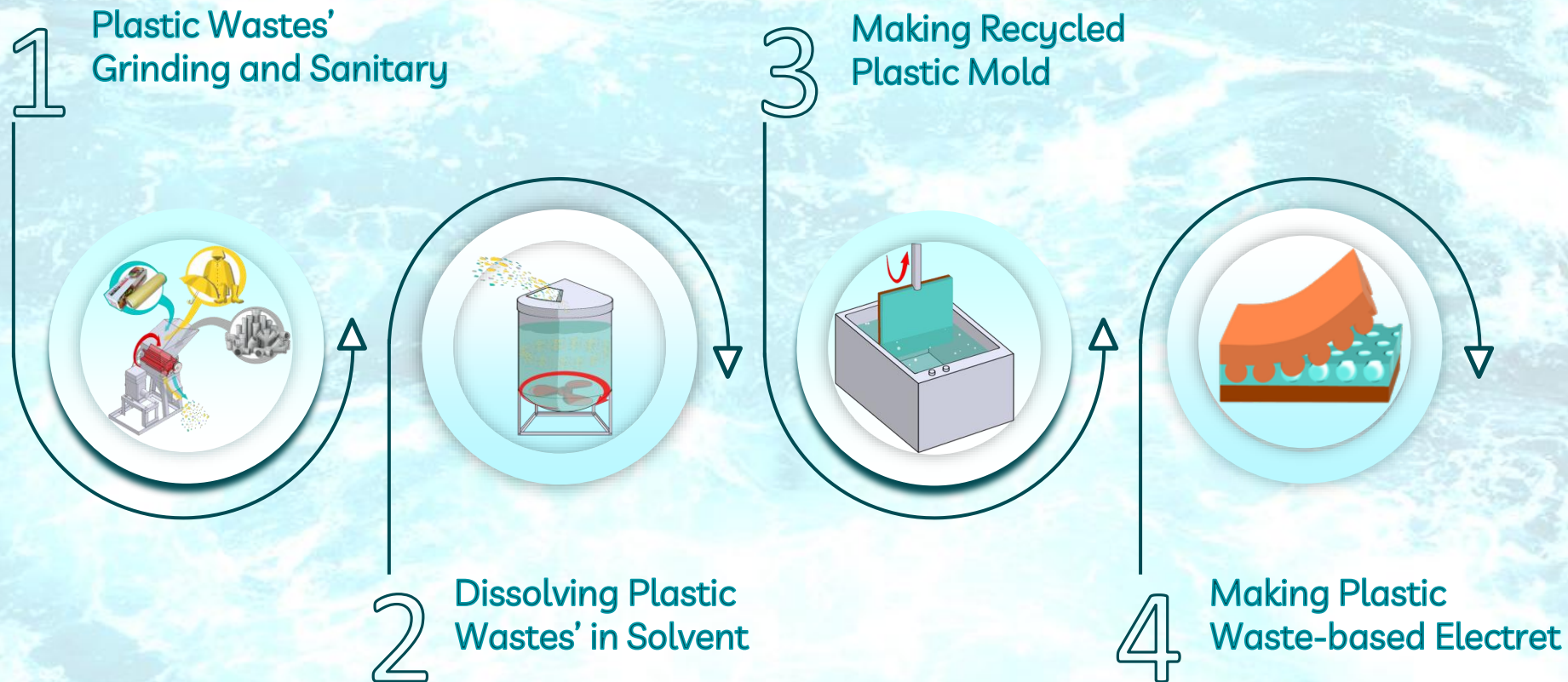


**PLASTIC**

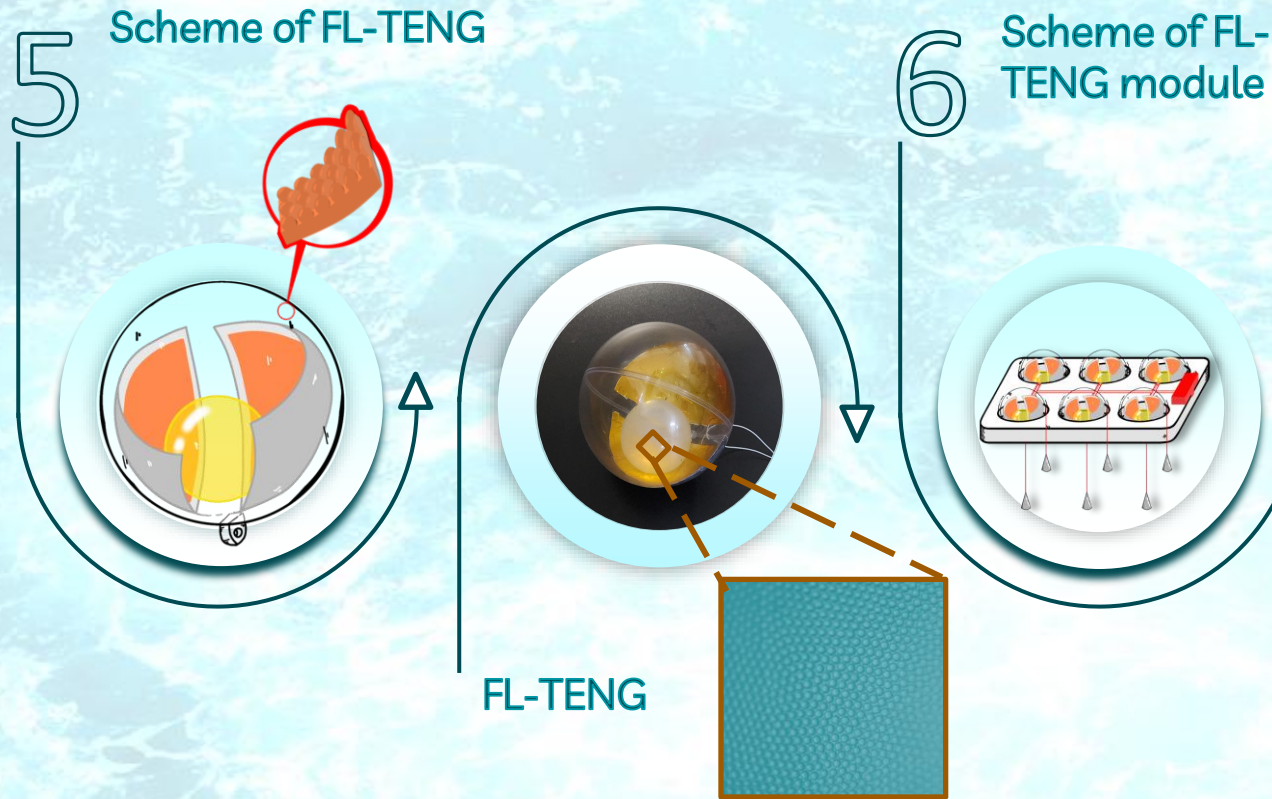


- Inexhaustible
- Environmental Friendly
- High potential

- Versatility
- Recyclability
- Environmental Protection



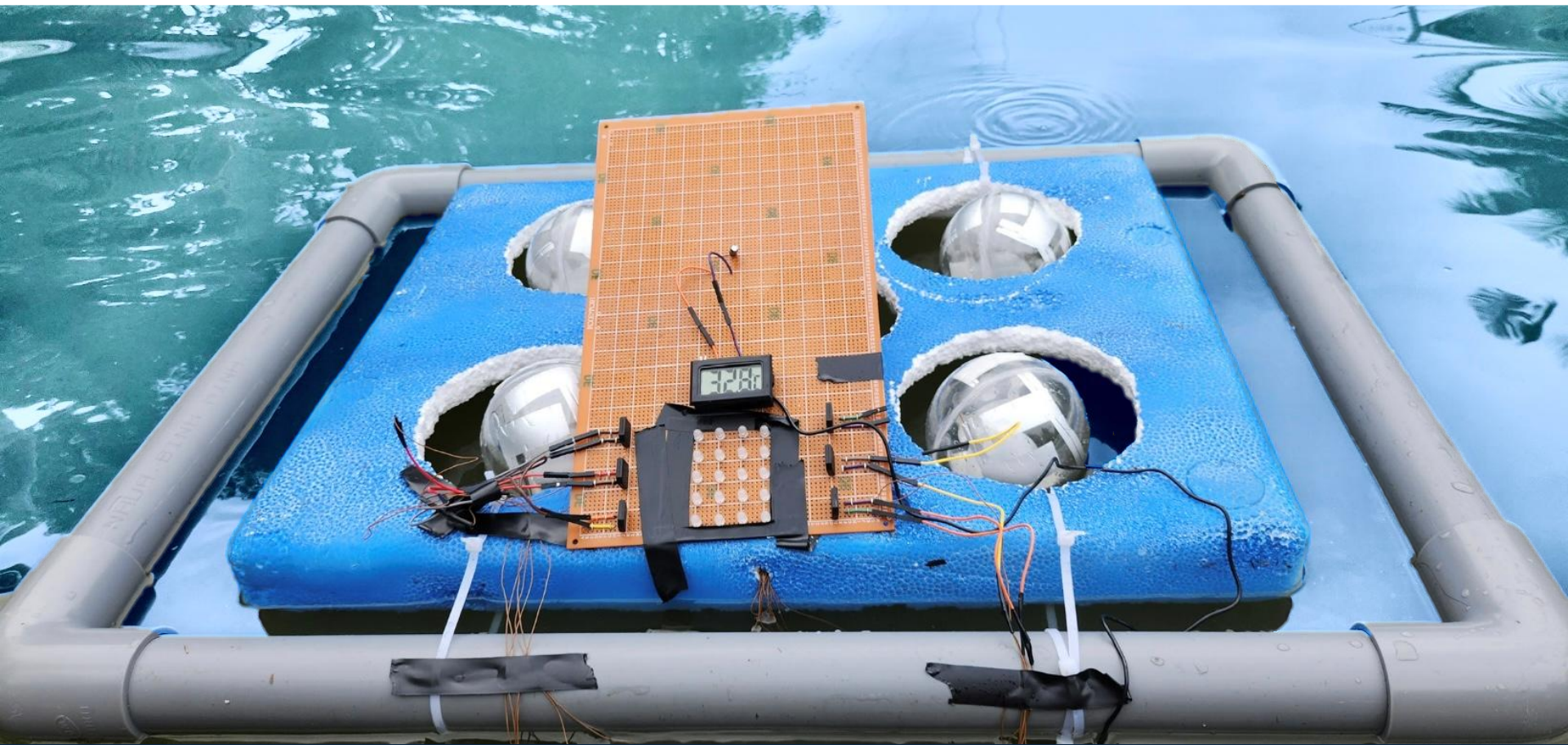




Network of FL-TENG

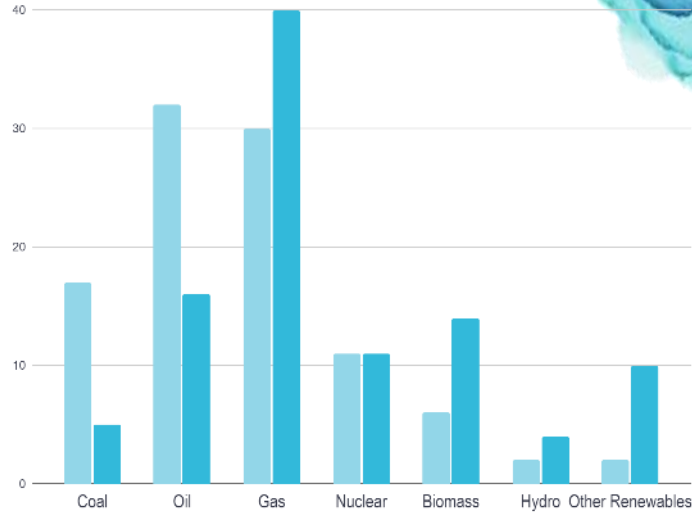


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# MARKET VALIDATION



Source: Statista, World Bank



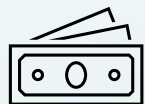
70% of total emissions come from a power system



Vietnam commits to be a net zero GHG emitter by 2050



Annual power demand steadily grow at 8%



By 2030, export revenue from aquatic products is expected to reach \$12 billion



By 2030, the growth rate of aquaculture value is expected to reach more than 4.5% a year.



Viet Nam is the third largest seafood exporter in the world

Source: VASEP

MARKET VALIDATION



# OUR CUSTOMER

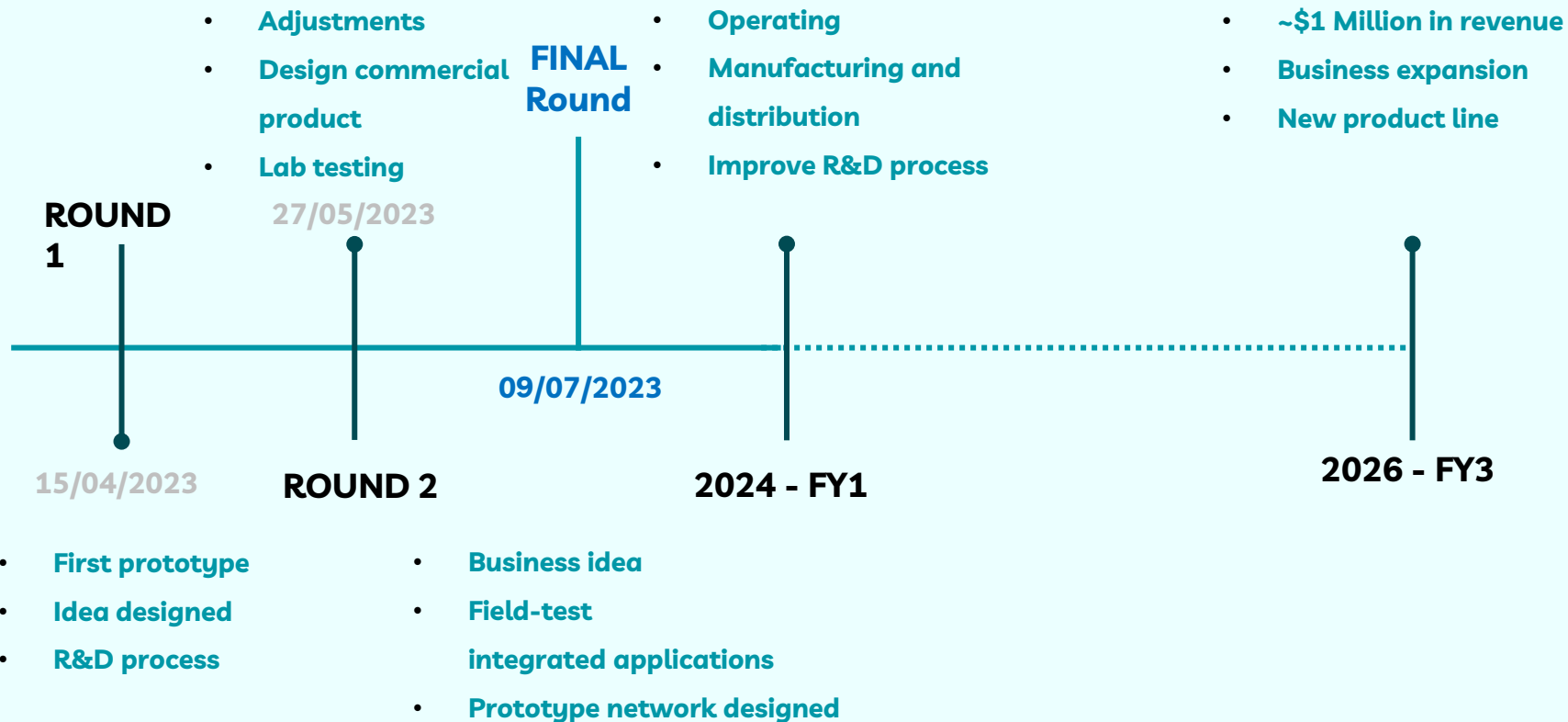


## Aquaculture businesses:

- Accurate real-time information
- Sustainable source of energy for monitoring services
- Immediate respond
- Total of 8,58 million businesses
- IoT adoption rate of 5%/year



<div> <div> <div>BACH KHOA</div> <div>INNOVATION</div> </div> <div>GENERAL MODULE</div> </div>		SELF-POWER SENSORS MODULE				
Components	Quantity	Unit Price	Price	Quantity	Unit Price	Price
Device (TENG system)	50	\$1.13	\$57	50	\$1.31	\$57
Charge Controller	1	\$21	\$21	1	\$21	\$21
Monitor				1	\$42	\$42
Inverter	1	\$339	\$339			
Battery	1	\$339	\$339	1	\$339	\$339
Monitoring sensors package				1	\$424	\$424
Total Cost			\$756			\$883
Selling Price (120% COGS)			\$907			\$1060





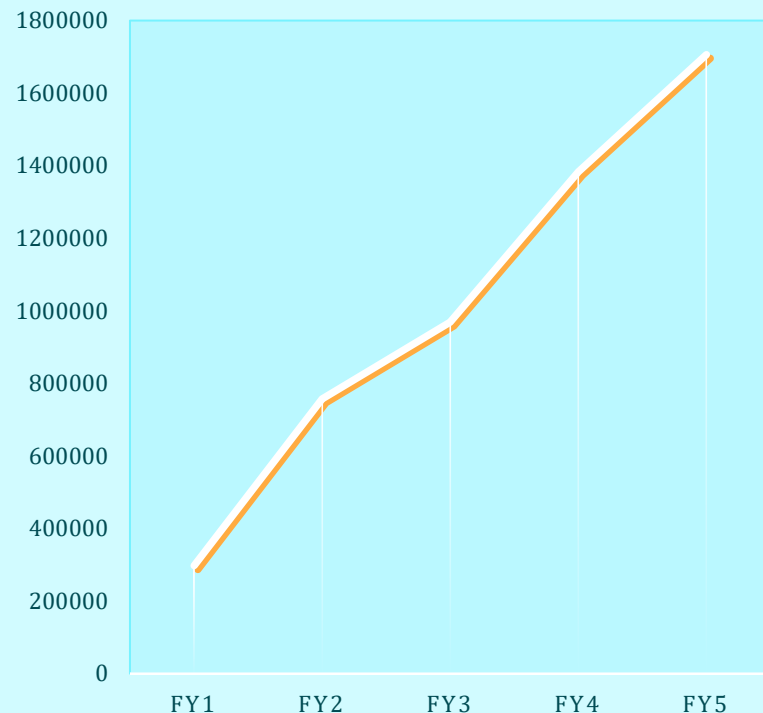
# REMARKS

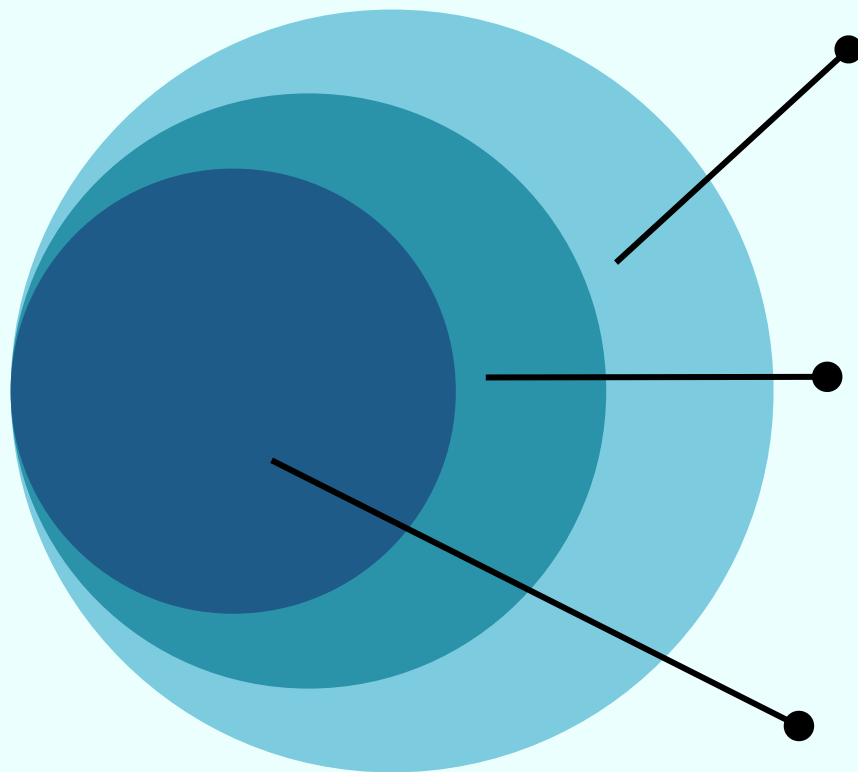
8 m<sup>2</sup> of FL-TENG can generate power to supply 2 standard households

Guaranteed for 5 years maximum efficiency up to 98.6%

Profit in 4 years is expected to reach ~50% ROI

**REVENUE**





**TAM ~ \$10 Billion**

8,58 million aquaculture businesses

**SAM ~ \$1,85 Billion**

Aquaculture farmer adoption rate of IoT into business of 5% in the next 5 years

**SOM ~ \$360 Million**

10% of the monitoring sensor market

**MARKET SIZE**

# COMPETITORS & POTENTIAL PARTNERS



**SENSORS VIỆT NAM**  
Cảm biến & Điều khiển



Energy efficiency

Cheap in price





# BK TENG'S MENTOR



**Dr. Van Tien Bui**

- Developed exclusive innovative technique
- Leading in TENG technology in Vietnam



**Ms. NGOC-MAI CHAU**

- MSI in Environment Engineering
- Ph.D. Candidate in Materials Science and Engineering



LEADER

*Tuan Dinh*



*Mai Tran*



*Huy Nguyen*



*Quoc Pham*



*Binh Nguyen*



TECHNICIANS



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**US \$43,000**





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# APPENDIX

# The Business Model Canvas of BKTENG

## Key partners

What are your key partners to get competitive advantage?

Government  
(Incentive, policies)

Angel Investors  
(Energy sector, Electrical companies)

Materials suppliers  
(wasted PVC, polymer manufacturers)

Energy provider (giants in the industry, such as EVN, working with R&D projects)

Essential equipment mediums business  
(Inverter, Charge controller, Battery)

## Key activities

What are the key steps to move ahead to your customers?

Marketing

Manufacturing

Long-distance installation

Product R&D process

Transportation/ Shipping

Market investigation

## Key resources

What resources Initial investment form angel investors (~43000\$)

Waste distributors (discarded PVC)

Operation facility (warehouse, manufacturing facility, transports vehicles,...)

Government incentive policies for renewable energy businesses

R&D divisions from energy, electrical partners

## Key propositions

How will you make your customers' life happier?

Value for businesses

Adopt novel technology into their energy business. Contributing to the energy security in the country. Ensure the aim to 0% emissions.

Utilizing latest technology to lead the market

Value for customers

An additional independent source of electricity

Multiple-in-one monitoring sensors solution

Longlasting durability (5yrs+) and reduce maintenance cost

Adopt IoT into the business and easy to scale up, meet the demand of the market

## Customer relationships

How often will you interact with your customers?

Enroll into exhibitions that help promote new startups about technology

Customer survey

Conference and forum for product marketing

Join a community of fishermen, business in the energy sector to cultivate IoT applications into their businesses through social media: FB groups, telegram group,....

Establish a customer service hotline/email

## Channels

Social Media

Facebook

Twitter

Newsletter

VN express

Twitter

Ad Campaign

Social activities

Networking with communities

Television

Promote knowledge about renewable energy

## Customer segments

Who are your customers? Who is your target audience?

People who live in the coastline area that are willing to pay to adopt new idea about renewable energy

- About 20m residents along the coastline of Vietnam
- Approximately 4 people/households.
- Average consumption of 130 kWh/month/household
- Middle - High income group comprised of 10% of the population in these areas.
- With their living conditions, they are willing to pay to transition from conventional energy to renewable energy such as blue energy.

Fishermen, who carrying about feeding their aquatic animals with modern technique, involve in using monitoring sensors to control the quality of their product

- About ~ 8,58 million aquaculture businesses in Vietnam
- Energy adopting rate of 5%, the demand for energy steadily increase from 300 billion kWh to 511 billion kWh
- Digital transforming rate of

Offshore island districts, that they have difficulties accessing conventional sources of electricity, willing to purchase an autonomous system could sustainably provide energy from ambient conditions.

## Cost Structure

Indirect

General Operation

Administrative

Customer service (Installation, check ups,...)

R&D

Marketing

Direct

Manufacturing

Module's equipments

Miscellaneous (wire, tape, electrodes,...)

Labor

Raw materials (PVC waste)

## Revenue Stream

Steady growth of 20%/yr

Sensor & IoT system

~ 25,000,000 VND/module  
Included full pack system

Sales of the monitoring sensor system

Estimated TAM: >20,000 billion VND  
\$1M revenue after 4 years

Sales of the electricity generator system

~ 21,000,000 VND/module  
Included full pack system

Steady growth of 20%/yr

Providing offshore sustainable energy





**Table 1. BKTENG Financial Projection**

	FY1	FY2	FY3	FY4	FY5
Product 1 sales	135	250	300	500	600
Product 2 sales	165	500	600	800	1,000
Revenue	\$297,315	\$756,635	\$968,979	\$1,382,687	\$1,705,680
Rev Growth %		154%	28%	43%	23%
Cost of Goods Sold 1	\$102,055	\$188,990	\$226,788	\$377,980	\$453,576
Cost of Goods Sold 2	\$159,691	\$483,912	\$580,694	\$774,259	\$967,824
Gross Profit*	\$35,569	\$567,645	\$742,191	\$1,004,707	\$1,252,104
Gross Margin %	86%	1496%	31%	35%	25%
Operating Expenses	\$135,038	\$143,485	\$154,964	\$167,361	\$180,750
Investment	\$42,372				
Net Profit	-\$38,135	-\$59,752	\$6,533	\$63,087	\$103,530
Net Present Value (NPV)	\$21,906	\$62,921	\$143,394	\$238,417	\$313,027
Internal Rate of Return (IRR)	19.71%	32.59%	37.09%	39.76%	42.78%
Return On Investment (ROI)	-190%	-241.02%	-84.58%	48.88%	144.33%
Cashflow (End of Period)	\$73,772	\$14,020	\$20,552	\$83,639	\$187,169

**Table 3. Detail of manufacturing cost for generator module**

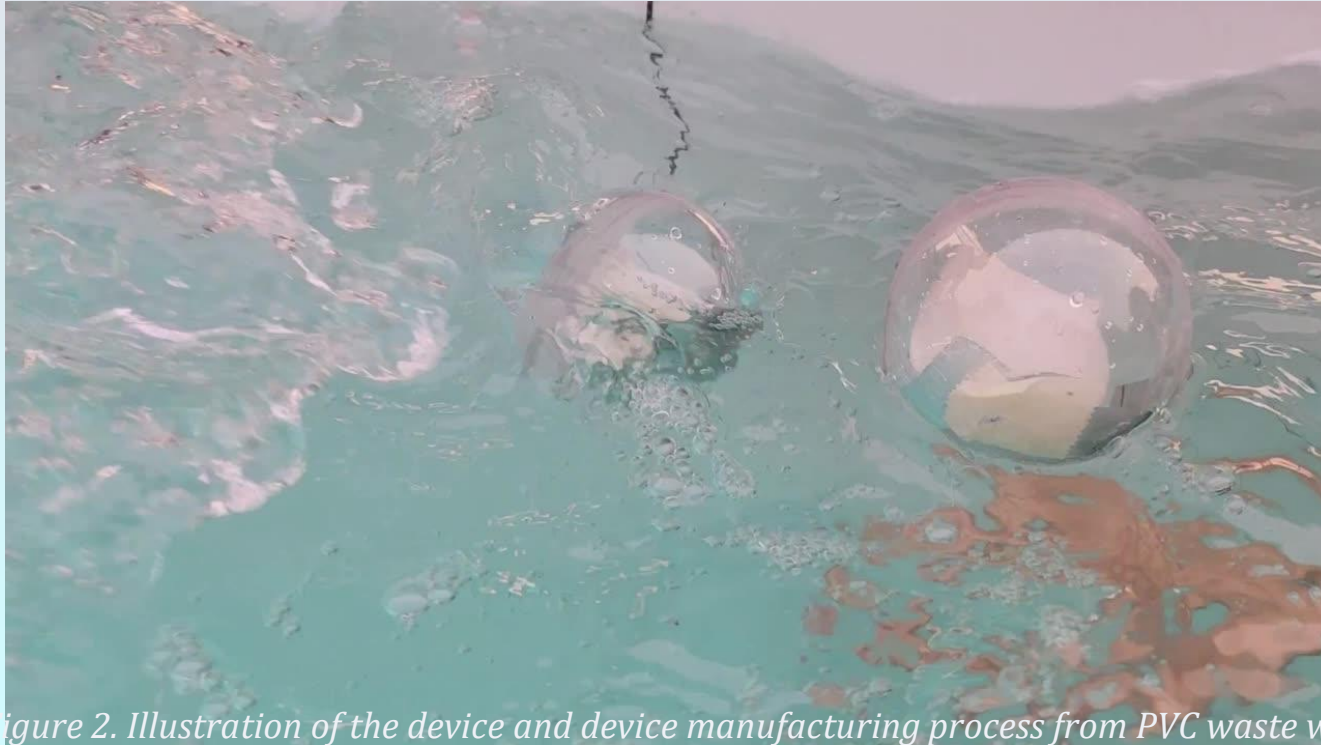
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Inverter	1	\$339	\$339
Battery	1	\$339	\$339
Total cost			<b>\$756</b>
Selling Price (120% COGS)			<b>\$907</b>

**Table 4. Detail of manufacturing cost for self-powered sensors module**

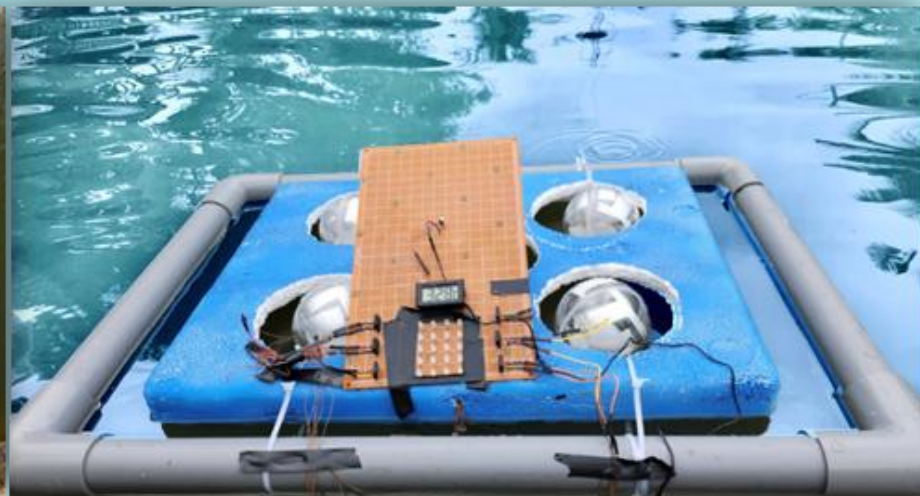
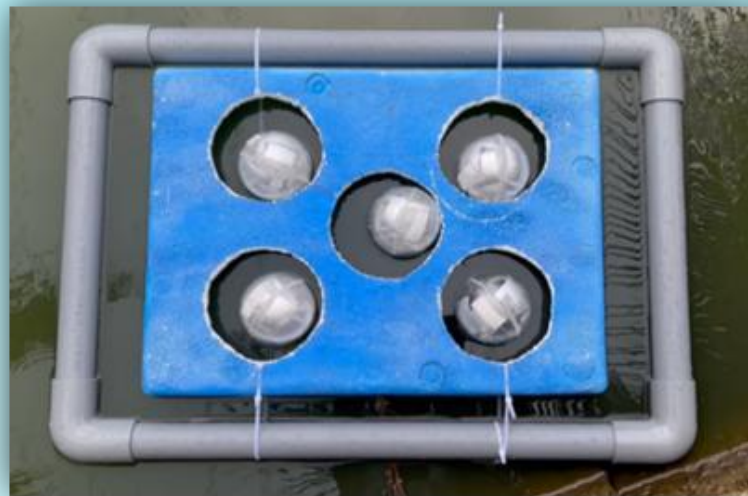
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Charge controller	1	\$21	\$21
Monitoring sensors package	1	\$424	\$424
Monitor	1	\$42	\$42
Battery	1	\$339	\$339
Total cost			<b>\$883</b>
Selling Price (120% COGS)			<b>\$1.060</b>

**Table 2. FL-TENG cost structure**

Components	Unit	Price/Unit	Quantity	Cost
Acrylic sphere	Sphere	\$0,5	1	\$0,5
Aluminum foil	Roll	\$2,12	0,15 m	\$0,01
Coil	Roll	\$0,85	2 m	\$0,08
PDMS	Can	\$16,95	0,015 kg	\$0,25
Process				\$0,29
<b>Total</b>				<b>\$1,13</b>



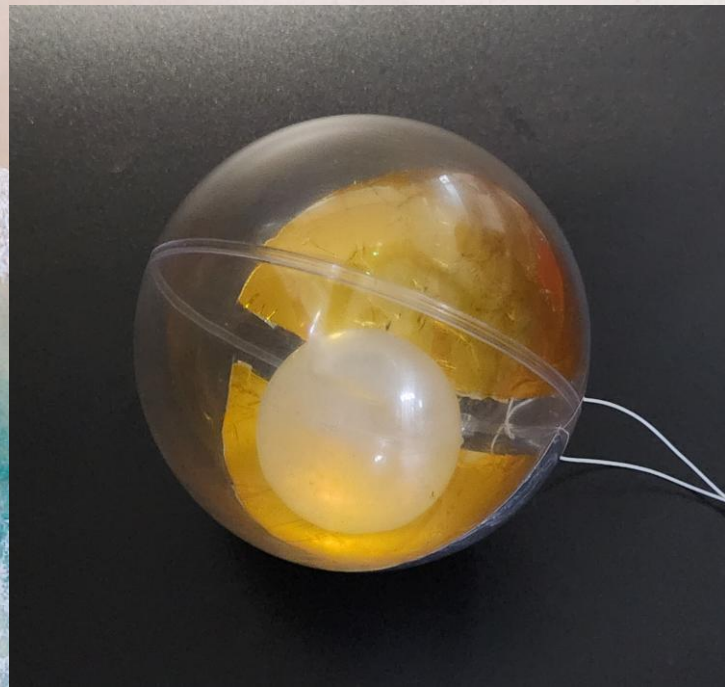
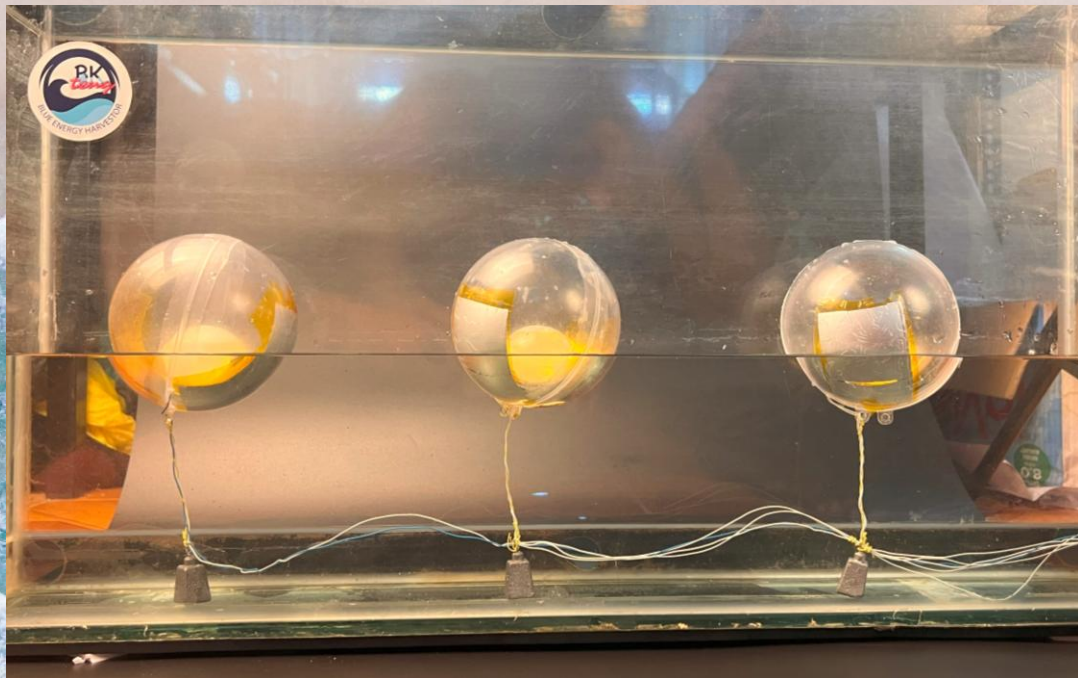
*Figure 2. Illustration of the device and device manufacturing process from PVC waste with working mechanism*







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INNOVATION







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**THE END,  
THANK YOU FOR  
YOUR ATTENTION**