HYBRID KINETIC TILE

SUSTAINABLE SOLUTION TOWARDS FOOTSTEP ENERGY GENERATION

Team

Shaik Althaf
B.E EEE

Nafisa B
B.E Aerspace

Mathlin Sarorai
B.E CSE

Need Gaps of Hybrid Kinetic Tile

Kinetic tiles with Crankshaft and rack and pinion mechanisms suffer from poor energy conversion efficiency, hindering optimal performance and requiring design improvements.

Low power output and a complex mechanism hinder sustainability development, necessitating efficient and simplified designs for meaningful contributions to sustainability.

Existing kinetic tiles lack real-time monitoring such as no.of footsteps, and power generated limiting user awareness and hindering optimization.

High material costs, especially in piezoelectric tiles, hinder affordability, impeding broad adoption in large-scale urban projects.

Our Hybrid Kinetic Tile

Design & Innovation

Hybrid Kinetic Tiles, embracing Faraday's law, provide space efficiency, easy maintenance, and adaptability. Lightweight, customizable, and durable, incorporating solar panels ensures sustainable energy generation.

Sustainablity & Safety

Hybrid Kinetic Tiles support sustainable urban development, benefiting spaces like transportation hubs and malls. The manufacturing prioritizes environmental compatibility and safety.

Qualitiy & Functionality

Hybrid Kinetic Tile ensures durability, enhancing aesthetics and functionality with simultaneous energy generation. High-performance metrics make it ideal for various spaces.

Hybrid Kinetic Tile

- Hybrid Kinetic Tile harnesses the principles of **Faraday's Law of Electromagnetic Induction.**
- **A solar panel** embedded in the tile's top cover ensures continuous energy production.
- From each coil, the voltage output stood at **12V AC,** a current draw of **2.2A,** resulting in power consumption of **23 watts per coil,** leading to an impressive total power generation of **98 watts.**
- The system integrates sensors capturing **footsteps, foot traffic, power output,** and **environmental conditions.**

Key Components

- High recycled content (up to 85%), minimizes environmental impact.
- LEED certification makes it a sustainable choice.

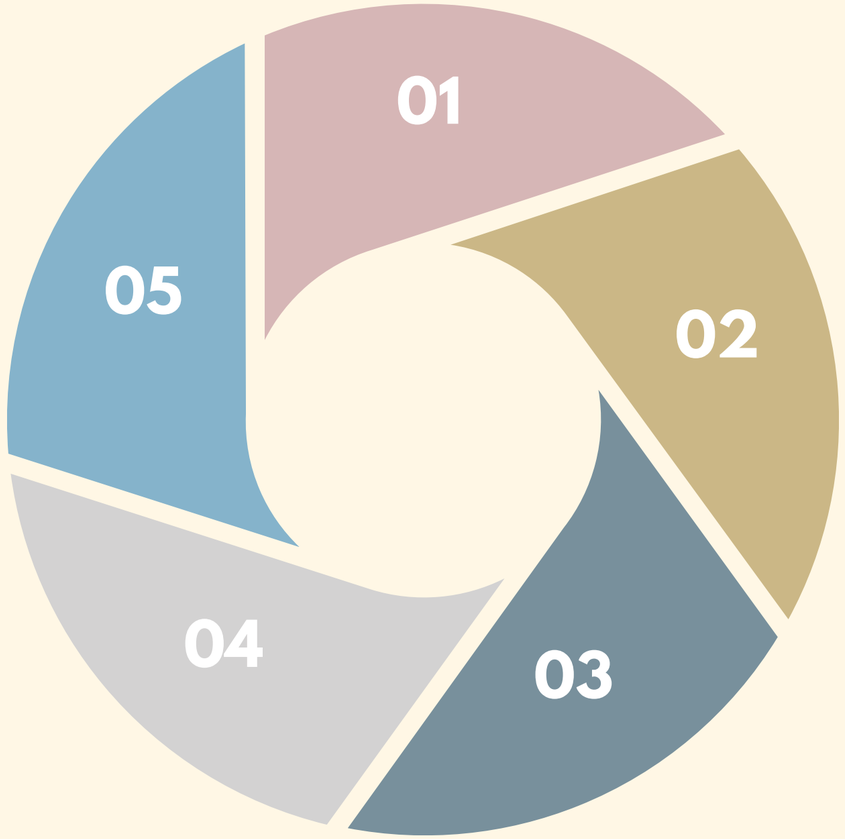
- N52 neodymium magnets are among the strongest permanent magnets.
- Utilized to generate magnetic flux during movement

- 24 AWG Copper coil offers a balance between flexibility and current capacity.
- Forms the core of the electromagnetic induction system.

Unique Features

Compact, cost-effective Hybrid Kinetic Tile adaptable to smart cities and rural areas. Easy replacement, **minimal environmental impact**, and versatile use in pavements.

Potential Applications: Versatile applications include charging stations, street lighting, and public seating with USB ports.



Sustainable Optimal Output: Hybrid Tile's cover is made of AISI 304 and has efficient dual energy output. Energy losses are minimized using the electromagnetic induction concept.

Hybrid Tile produces additional energy generation through solar panels when less foot traffic is measured.

Data-Driven Optimization: ThingSpeak-enabled system tracks foot traffic and environmental data, optimizing public spaces, educating users, and contributing to green city goals.

Renewable Energy Source

Hybrid kinetic tiles generate clean energy, contributing significantly to decarbonization efforts and promoting sustainable solutions for a greener future.

Emission Offset

Offset emissions by redirecting generated energy to the grid or powering devices.

Enhanced Energy Output

Even when footfall is scarce, the solar panels continue to capture sunlight and produce electricity, maximizing Hybrid Kinetic Tile's overall energy generation potential.

Scalability & Potential Impact

Hybrid Kinetic tiles are ideal for emission reduction in public spaces like sidewalks, transportation hubs, dance clubs, and shopping centers.

Circular Economy

Leverage AISI 304 stainless steel in tile production, emphasizing recyclability at the end of their lifespan to support a circular economy and reduce waste generation.

Energy Conversion Efficiency

Current kinetic tiles, employing mechanisms like crankshafts and rack and pinion, face challenges in energy conversion inefficiencies.

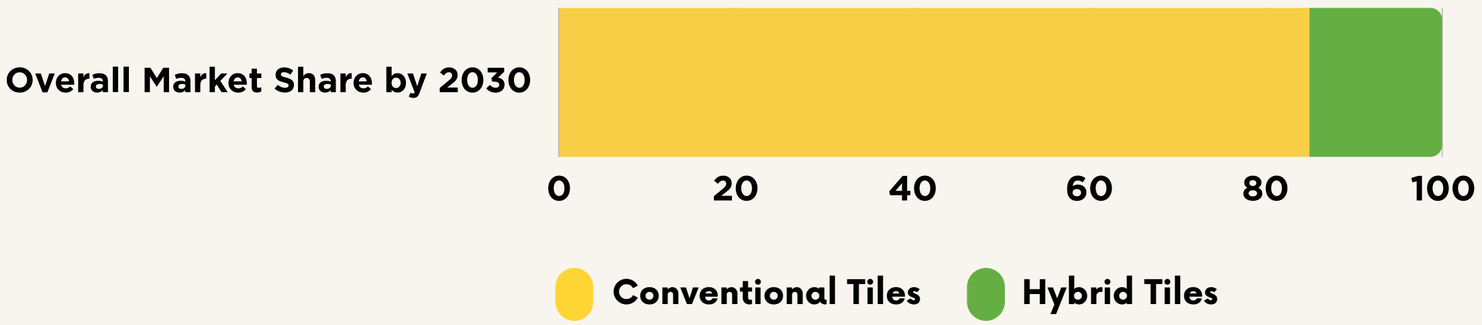
Durable & Long Lasting

Utilizing AISI 304 stainless steel ensures durability and longevity, minimizing replacements, resource depletion, and promoting sustainability with low cost.

Data-Driven Approach

Sensors track footsteps, foot traffic, power output, and environmental conditions. The system assesses environmental impact, revealing tile energy generation potential for ongoing green urban development.

MARKET SIZE IN INDIA



2024-2025: Initial rollout of hybrid tiles

- Potential replacement rates: **5-10%**

2026-2030: Maturing technology

- Potential stabilization in replacement rates: **1-5%**
- Advances in durability and efficiency

Cost of 1 tile: 4000 INR

Conventional Tile's Market Size		Hybrid Kinetic Tile's Market Size			Tata Steel's Potential
INR 50000 CR in 2023	390 CR Sq. m	**INR 1.14 Lakh CR in 2024**	43 CR Sq. m	3000 CR tiles	3% [4000 CR]
INR 1.16 Lakh CR by 2030	900 CR Sq. m	**INR 3.67 Lakh CR in 2030**	135 CR Sq. m	9375 CR tiles	2% [7000 CR]
CAGR 9.1%					

9375 CRORE HYBRID KINETIC TILES

9,000 GIGAWATTS

14 BILLION TONNES OF CO_2 EMISSION REDUCTION/YEAR

Market Strategy.

Marketing and Sales Plan:

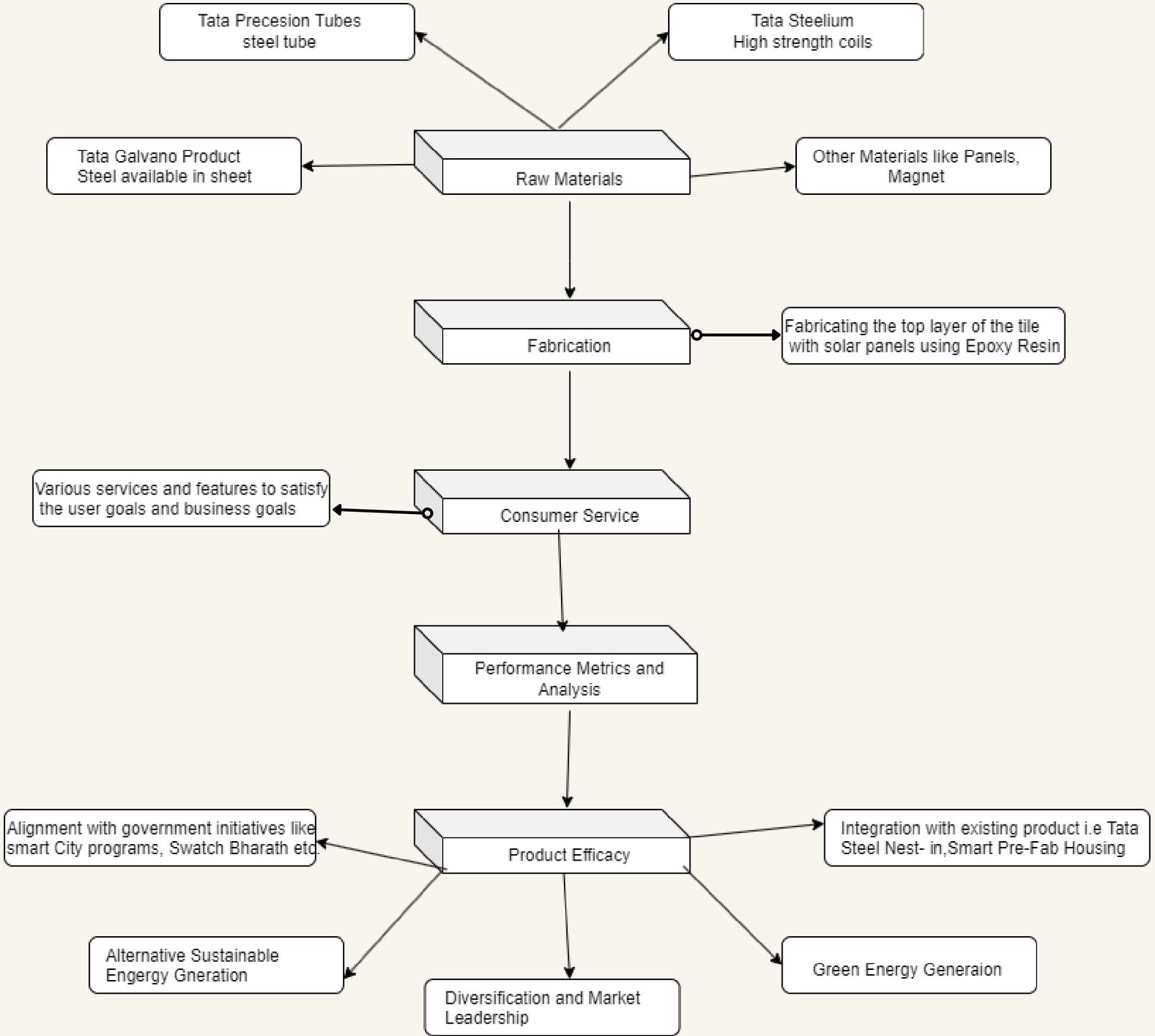
- Launching Programs and campaigns in Industries and Urban Areas to demonstrate the efficiency and adaptability of the Hybrid Kinetic Tile.
- Partnership with Urban Infrastructure and government-specific planners to achieve sustainable green cities.
- Online Webstore and Marketing via online platforms, social media, and digital marketing to reach a wider audience.
- Collaboration with renewable energy initiatives and organizations.

Customer Acquisition Strategies:

- Social Media Marketting.
- Targeted Marketing Campaigns.
- Collaboration with Urban Development Authorities.
- Government Aided Projects.
- Community Building in Urban localities
- E-commerce Platform

Each tile, measuring 12x12x5 cm, is built of AISI 304 steel, neodymium magnets, and copper coils. The floor area for one tile is 144 cm^2.

Material	Description	Quantity	Value
AISI 304 Structural Streel	Raw material weight	1	2.1952 Kg/tile
		1 billion	2.2 billion Kg
24 Guage Copper Coil	Length of the coil for the tile	1	4*207 = 830 m
		1 billion	830 billion m
N52 Neodymium Magnets	Raw material Weight	1	4*88.35 = 353.4 gm
		1 billion	35.34 billion kg



Benefits

- **Diversification and Market Leadership.**
- **Alignment with Government Initiatives.**
- **Integration with existing products of Tata like Tata Nest-In and pre-fab Tata solutions.**
- **Seamless Supply Chain leading to cost efficiences and optimized manufacturing process**
- **Green Energy Generation.**
- **Resource Optimization.**

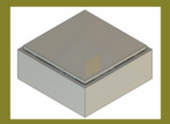
IMAGES

CAD MODEL

SIDE VIEW

TOP VIEW

TOP VIEW

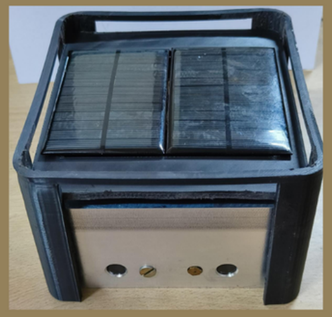


SIDE VIEW

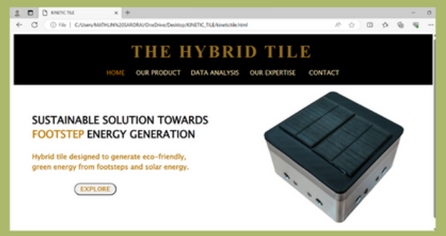
SUPPORTIVE REISIN COVER

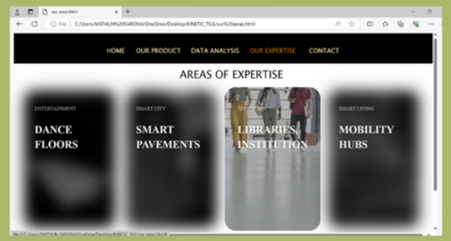
MODEL OF TILE

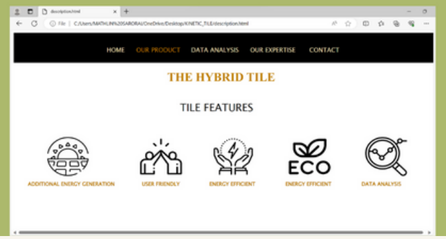
WORKING MODEL

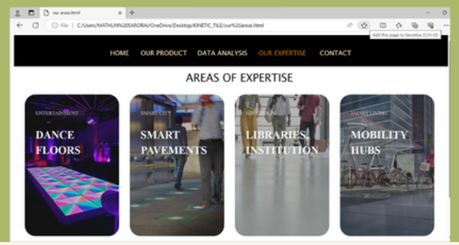


Website









MVP WORKING