✅ Summary: DeEnergy – A Decentralized Solar Energy Trading Platform

DeEnergy is a blockchain-based platform that allows solar energy producers like **Ravi** to tokenize their surplus power and sell it directly to nearby consumers like **Anu**, bypassing traditional utility providers.

🔆 Real-Life Use Case

👨‍🌾 **Ravi**, a farmer in Kerala, produces 50 kWh/day from his rooftop solar panels.

🏡 **Anu**, his neighbor, wants to buy affordable green energy.

- Ravi connects his **smart meter** to the DeEnergy platform.
- Anu connects her **crypto wallet**, views Ravi's price (₹5/kWh), and buys **10 ENGY tokens**.
- After Ravi’s meter confirms 10 kWh delivered, funds are released via **smart contract**.

⚙️ Behind-the-Scenes Workflow

1. Energy Tokenization

- Smart meter (Raspberry Pi + MQTT) sends live energy data.
- Backend API publishes data to blockchain via **Chainlink Oracle**.
- Smart contract **mints ENGY tokens** (1 token = 1 kWh) into Ravi’s wallet.

2. Energy Listing & Purchase

- Energy listing stored **on-chain**.
- Anu connects her wallet and views offers via a **Next.js** frontend using **The Graph**.
- She initiates a purchase; payment held in **escrow smart contract**.

3. Energy Delivery & Fund Release

- Smart meter confirms **10 kWh delivered**.
- Oracle updates blockchain with delivery proof.
- Smart contract **releases funds** to Ravi and unlocks ENGY tokens for Anu.

🧰 Core Technologies Used

Layer	Tools
Blockchain	Polygon, Solidity, ERC-20, Chainlink
IoT Gateway	Raspberry Pi, MQTT, Node.js
Frontend	Next.js, RainbowKit, TailwindCSS
Indexing	The Graph, IPFS, TimescaleDB

💡 Key Benefits

- 💵 **Fair pricing** for both producer and consumer
- 🔒 **Transparent**, trustless payments via smart contracts
- 🌱 **Eco-friendly** energy adoption
- 🧑‍⚖️ **Community governance** via DAO