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TARGET MAINS 2022

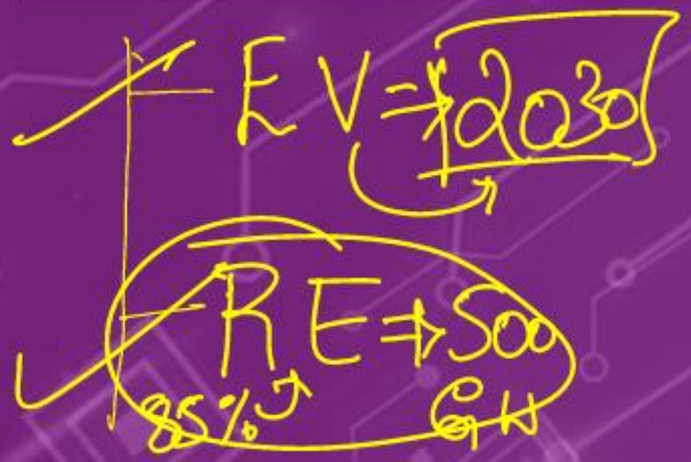
CURRENT AFFAIRS

SCIENCE AND TECHNOLOGY-2

Topics in news

Theme	Topic in news
Coal conversion	1. National Coal Gasification Mission 2. Methanol blending 3. Biomass co-firing
Hydrogen Economy	1. National Green Hydrogen Mission
Electric Vehicles	Issues
Battery technology	1. Li-ion batteries: Opportunities and Challenges 2. Grid-scale batteries 3. Batteries v/s Fuel Cells

Theme	Topic in news
Renewables: Solar energy	Solar farms PM-KUSUM, Solar Rooftop Scheme
Biofuels	1. Compressed Biogas 2. 4th Generation biofuels 3. Ethanol blending: 20% by 2025



Battery Technologies

Types

- Li-ion
- Sodium-Sulphur
- Aluminum-Air batteries
- Flow batteries

Science

Lithium-ion batteries makers win 2019 Nobel Prize for chemistry

Reuters | STOCKHOLM, Oct 9 | Updated On: Oct 09, 2019

Policy Push Required for Driving Li-Ion Revolution in India

Lithium ion batteries are bringing in a whole new reality to the world of energy. With battery technology going through a revolution, the new age lithium ion batteries are opening up new possibilities be it mobile phones and laptops, electronic gadgets or automobiles.

Written by Guest

November 25, 2021 3:09:46 pm

OPINION: Li-ion batteries: The mainstay of the new rechargeable world

There is no doubt that with the right government support, India has a tremendous scope of becoming global EV leader and battery manufacturing hub in the years ahead.

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India working on an 'Energy Storage' policy

India has 100 gigawatt (GW) of installed solar and wind capacity, with another 63GW under construction. (Photo: Reuters)

2 min read . Updated: 12 Oct 2021, 08:05 AM IST

Govt eyes 14GWh battery storage system in Kutch

1GWh battery capacity can power 1 million homes for 1 hour

3 min read . Updated: 20 Sep 2021, 05:58 AM IST

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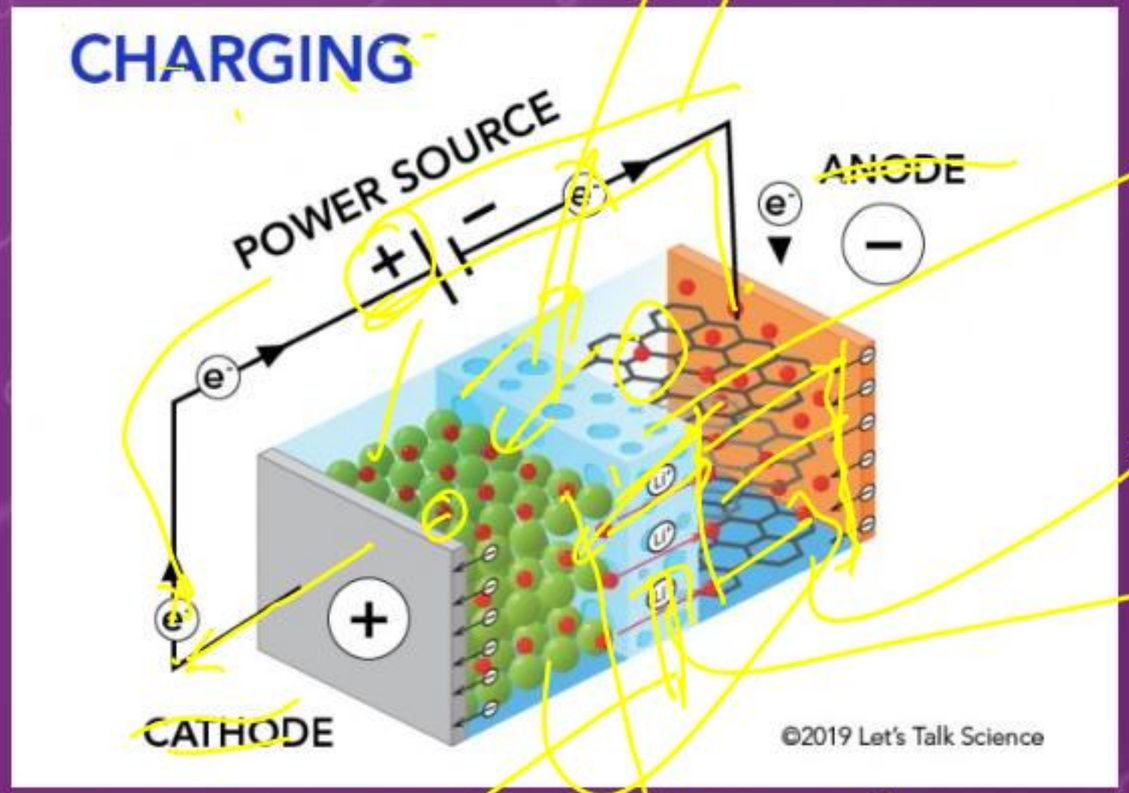
Basic Principle



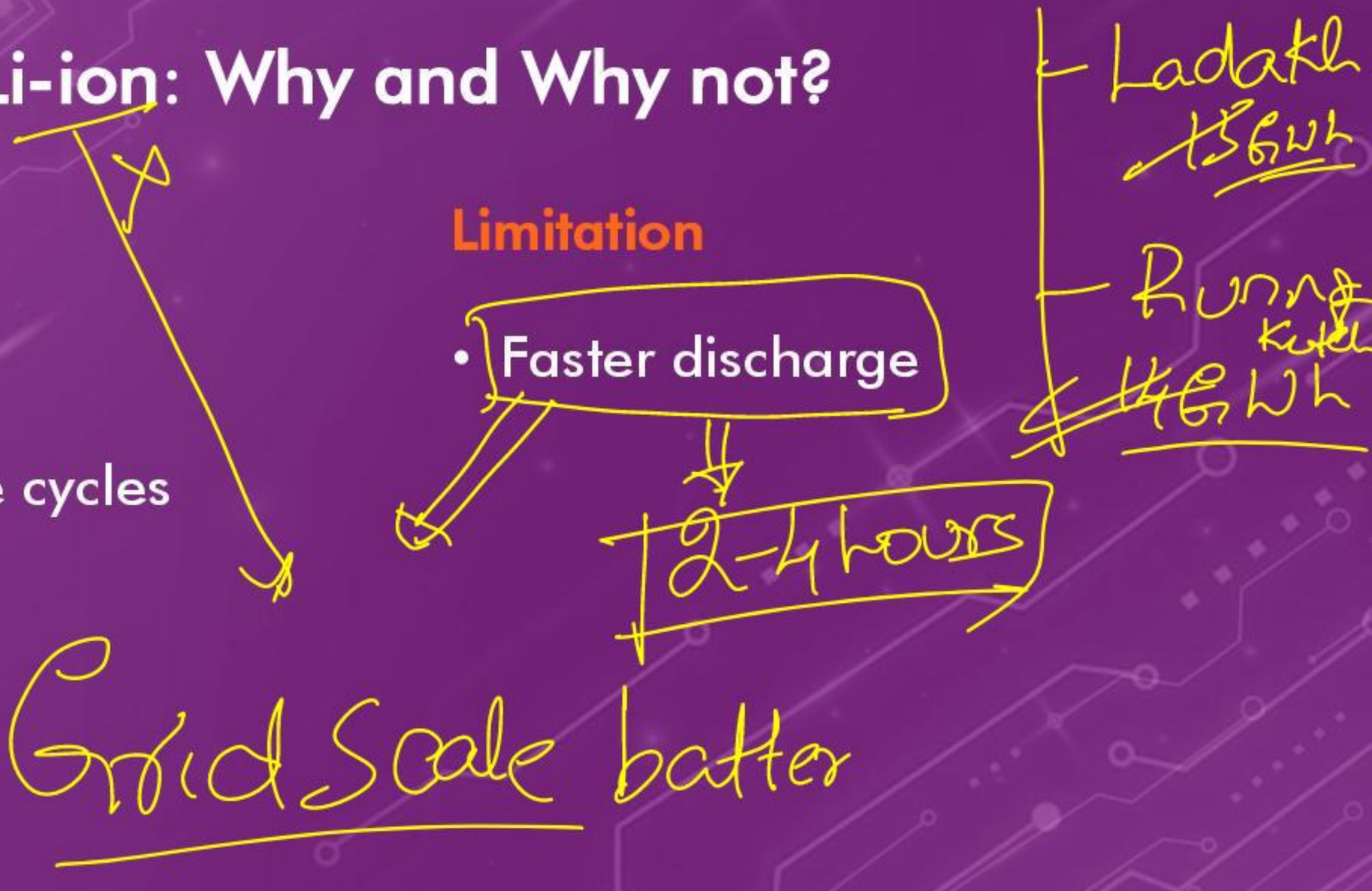
Li-ion: Why and Why not?

Advantages

- Energy density
- Charge-discharge cycles

Limitation

- Faster discharge



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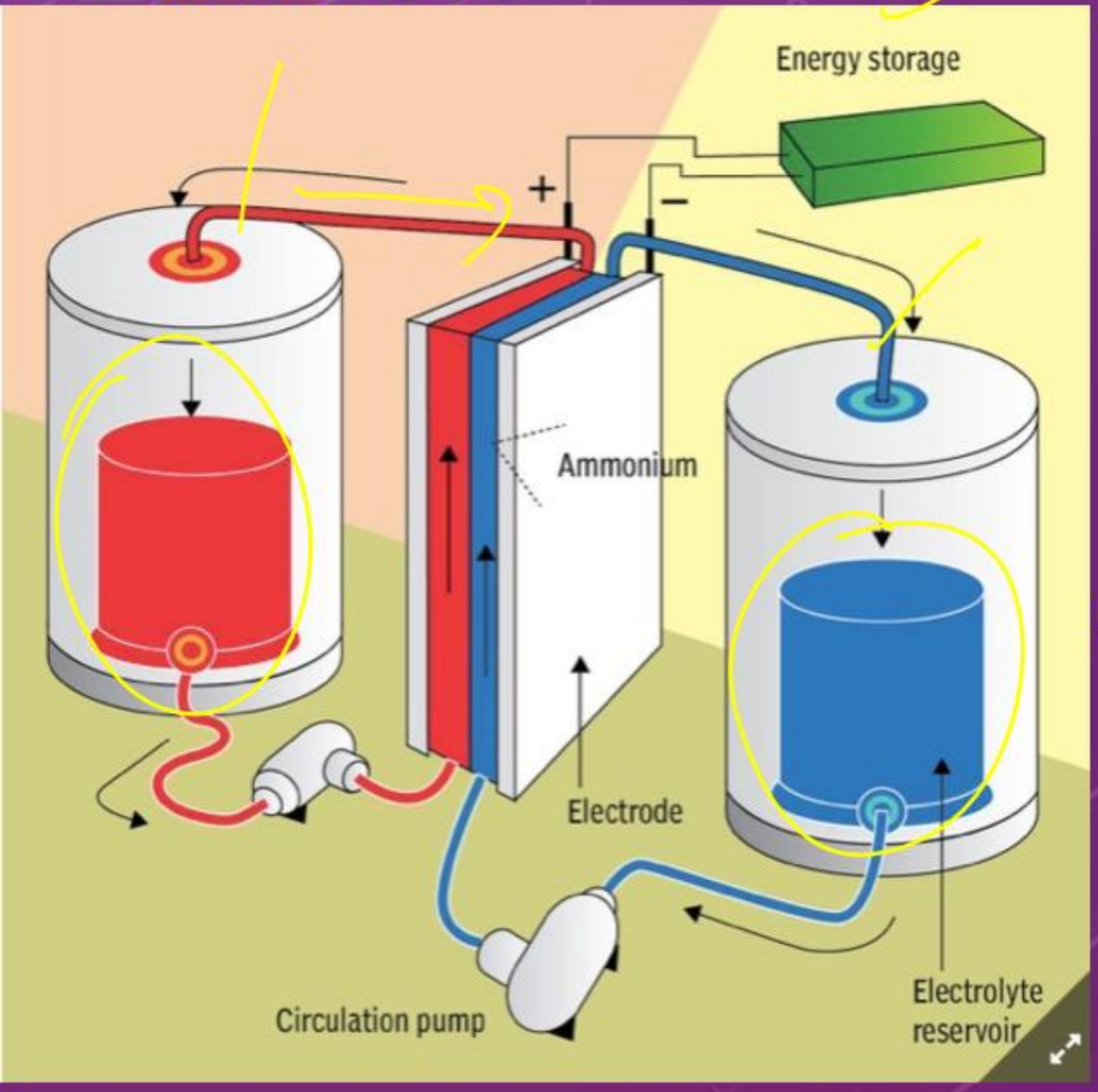
Flow batteries



Grid scale

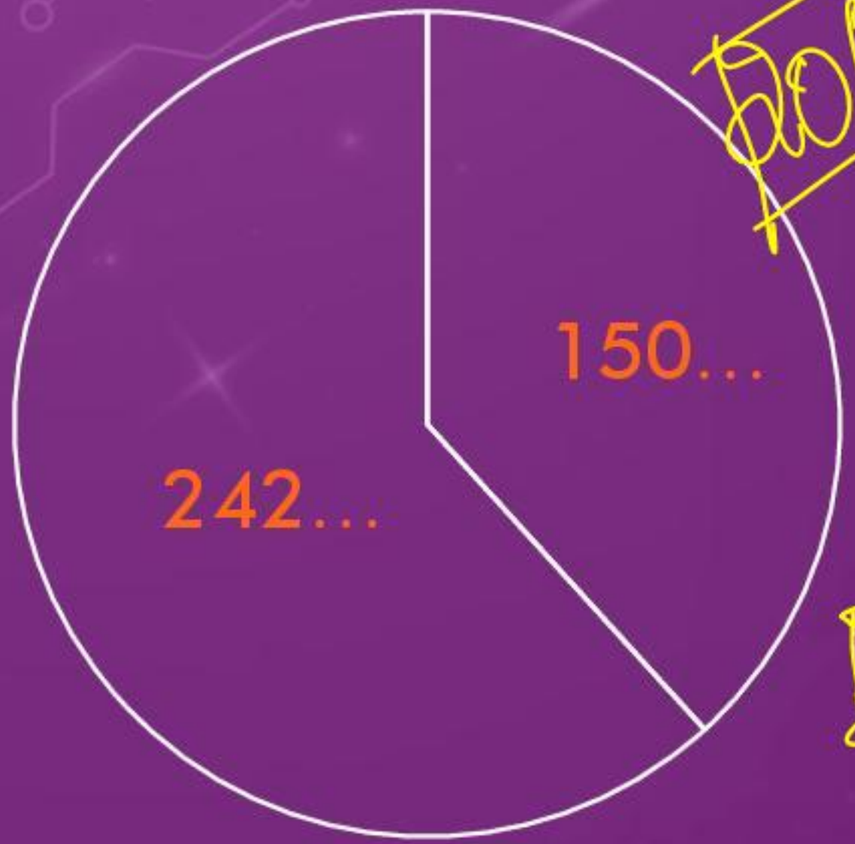
Store

8-10 hours

Mission 500 GW and 50%

- Pathway: Solar-Wind hybrid

Total Energy Capacity = 392 GW



2018

Intermittency Problem

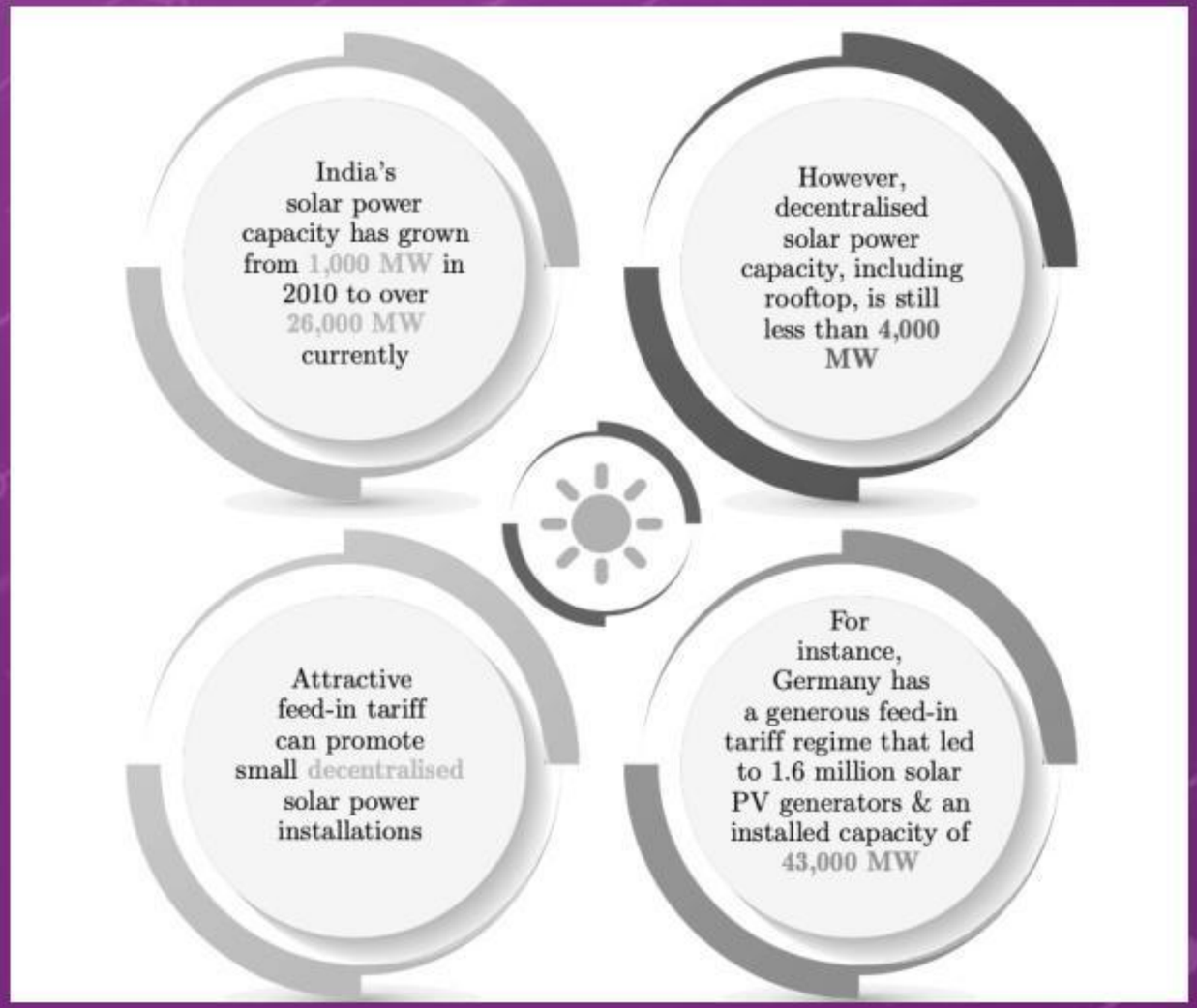
Batteries

Energy Storage

Demand ≠ 4 PM

Supply ≠ X

Solar Energy: The Approach

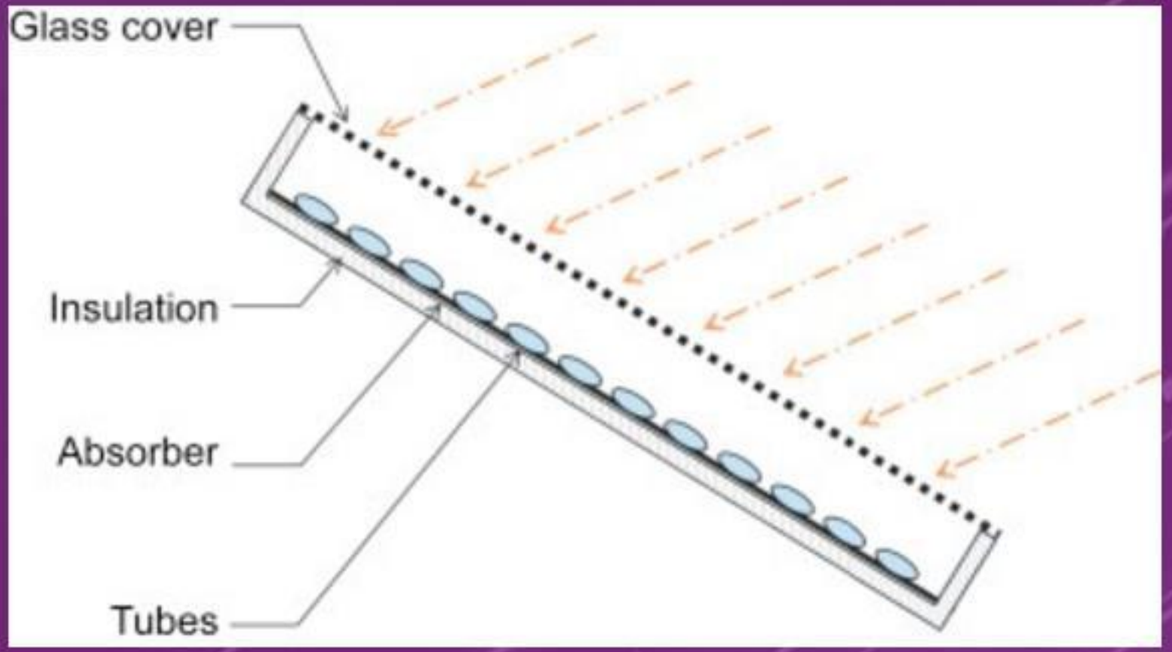


Solar Energy: Pathways

- Solar Thermal
- Solar PV
- Solar towers

Solar Thermal

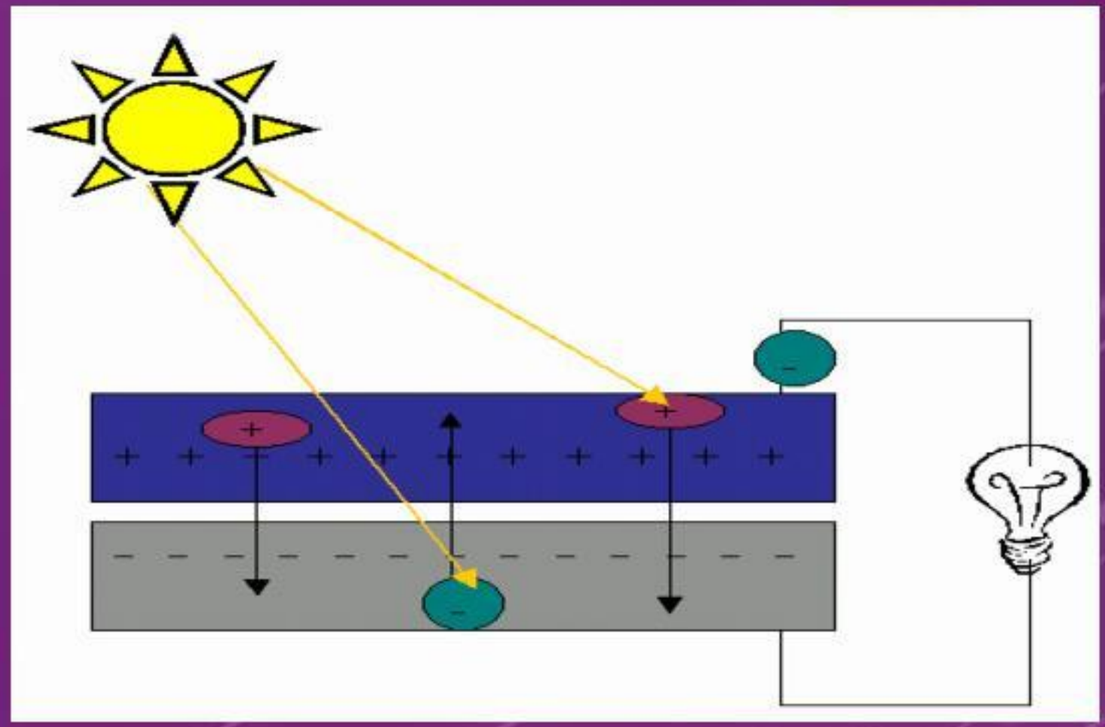
- Principle: Greenhouse effect



Advantages	Disadvantages
70% Efficient	Scalability

Solar PV

Type of PV	Material	Efficiency	Limitation
1st Gen	Silicon crystal	16%	Thick
2nd Gen	CdTe, CIGS, Amorphous Si	15%	
3rd Gen	Perovskites		



Solar Towers

Theme	Topic in News
IT and Digital	• DEPA • IndiaStack • Regulation of blockchain • Metaverse • 5G testbed
Biotechnology	• CAR-T cell therapy • Tissue engineering • Xenotransplantation • Regulation of Gene editing

Data Empowerment and Protection Framework

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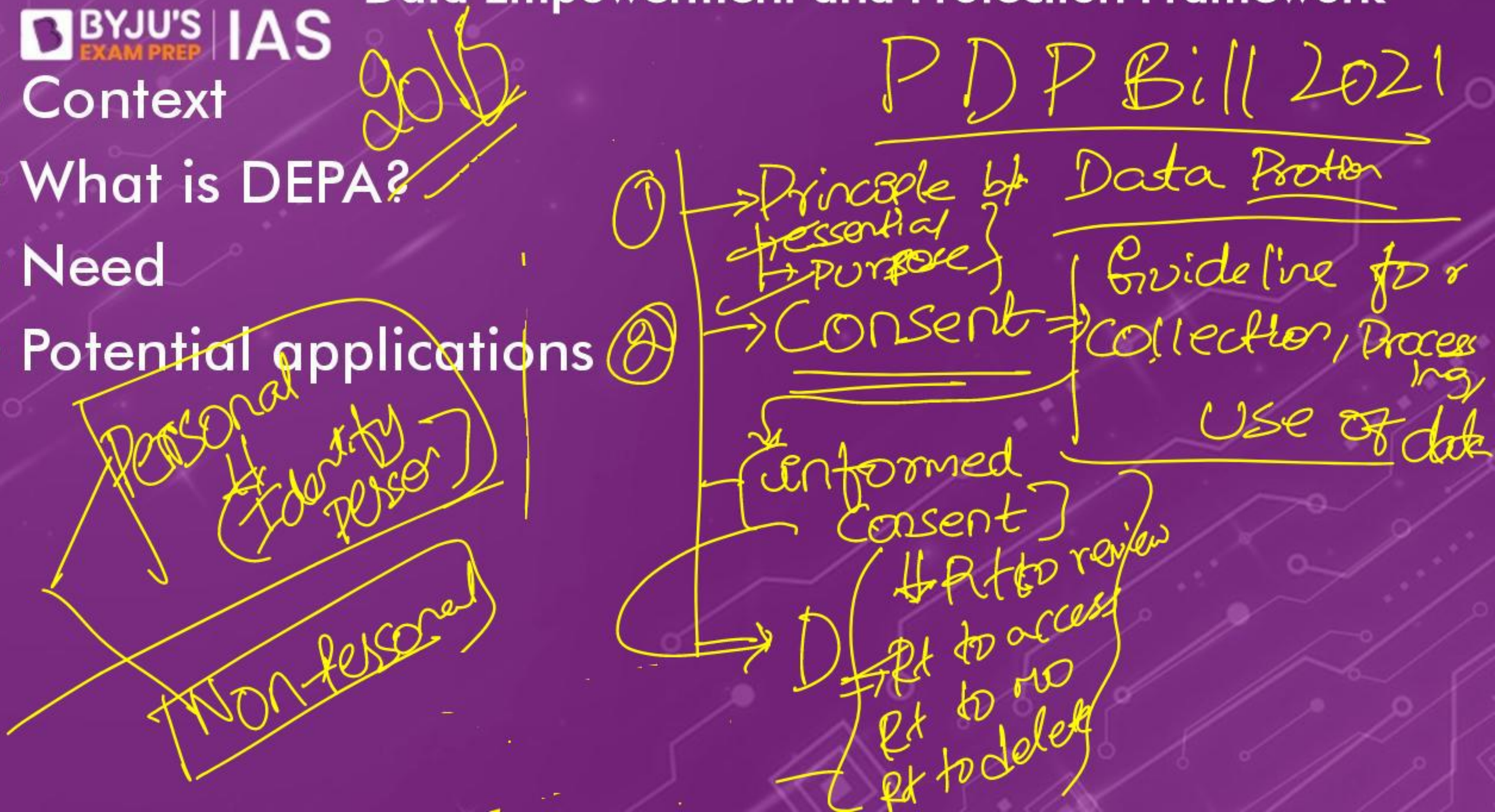
- Context
- What is DEPA?
- Need
- Potential applications



Relevance

- Important pillar India Digital Ecosystem Architecture (InDEA 2.0)
- Socio-economic value
- Innovation
- OECD: Correlation between data sharing and GDP
- Technology-solution for Personal Data Protection Bill

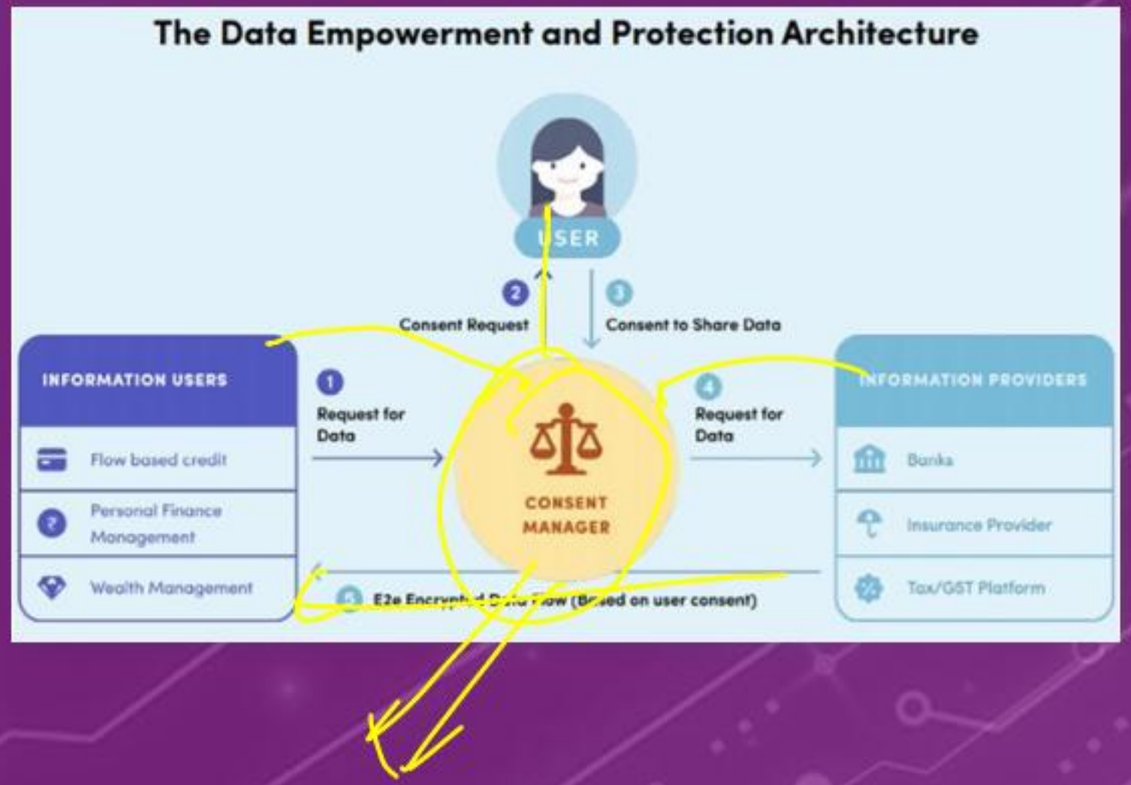
What is DEPA?

- Consent-based data sharing
- Standardized API for data sharing (UPI-like platform)
- Data dashboard
- Separates consent collection from consent sharing
- Custodian-controlled to individual-controlled

Applications

- Financial sector
- Health sector
- Personnel management
- Telecom sector

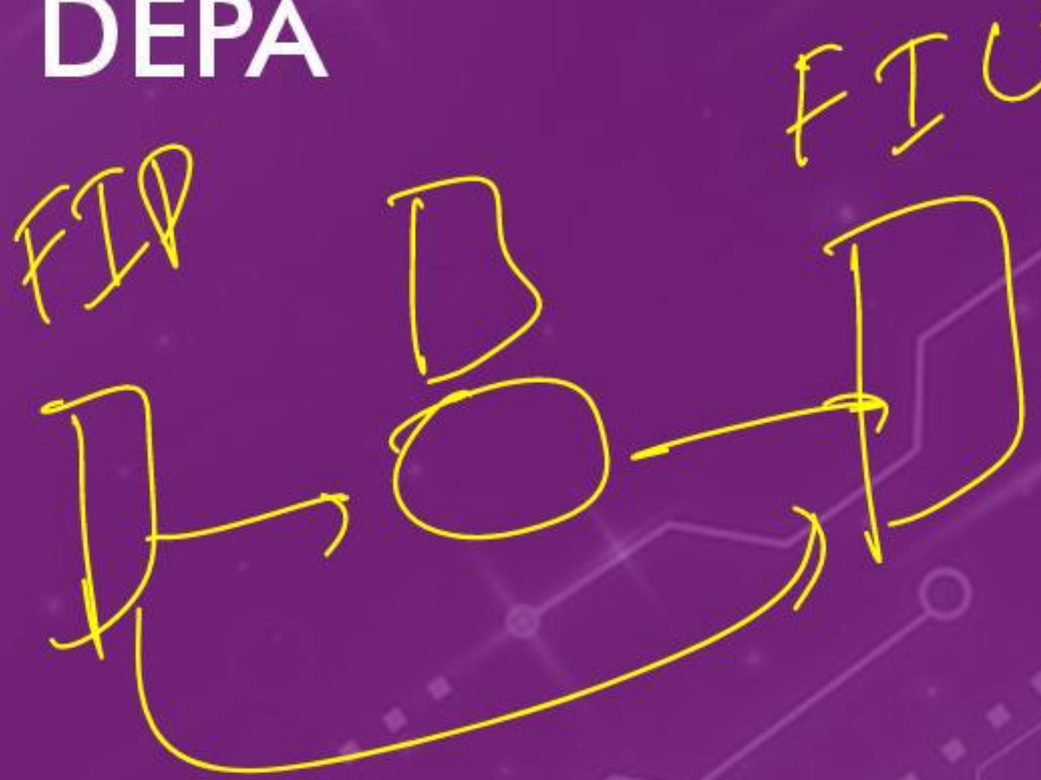
Illustration



DEPA

Impact

- Reduction in transaction cost
- Increased competition
- Technological solution to privacy and data protection
- Data interoperability
- Link between data providers and data users



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"The regulation of blockchain technologies will turn them into threats or opportunities." Discuss.

Given the advantages of blockchain technology namely disintermediation, provenance, immutability and decentralization it should be leveraged for potential use cases as in record management systems, supply-chain management, digital currency, taxation, voting etc. However the anonymization that the technology offers poses significant threats particularly malpractices like illegal trade, fraud, money-laundering etc. This merits a balanced approach which stays away from horizontal regulation to leverage the technology and resultant innovations and a strict vertical regulation particularly in the financial and capital market sectors.