

Digital Energy Grids - Enablers of Regional Power Trade and Market Integration

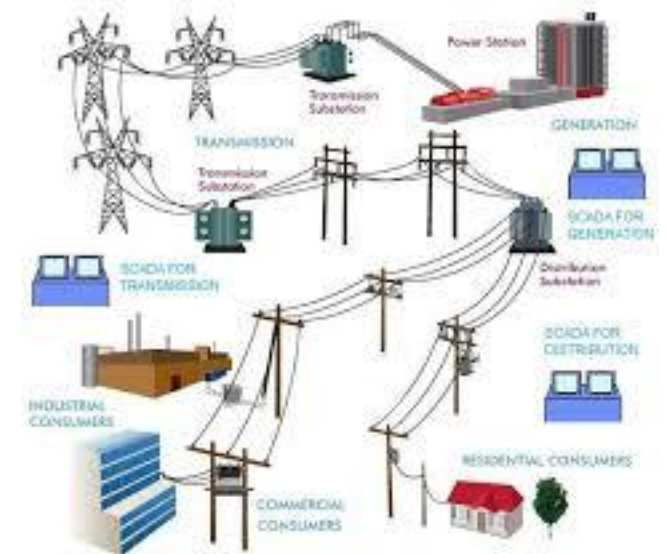
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ACEF 2025 - Session 2.3

Enhancing Regulatory and Policy Frameworks for Power Trade

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The Transition Towards Integrated Power Markets



Increasing Interconnectedness

Power systems are being interconnected at national and regional levels – larger power systems are more efficient to manage in the evolving era of rapidly growing intermittent RE resources



Beyond Transmission

Transmission of regional grids requires harmonization of standards, policies and grid codes



Digital Grids are the Future

Digital grids of the future would allow people to buy electricity from anyone selling from anywhere

and the digital platforms would allow to settle the payments online!

Energy Exchanges in India and Innovative Market Design

Three Energy Exchanges in India Offer a Variety of Products and Market Segments:

- **Integrated Day Ahead Market (I-DAM)** is a physical electricity trading market which allows **market participants to buy and sell electricity for the next day**
- **Real-Time Market (RTM)** a market segment with physical **delivery of electricity 1 hour after deal closure**; 3 power exchanges in India run 48 sessions of RTM every day
- **Term-Ahead Market (TAM)**, provides a range of products allowing participants to **buy/sell electricity on a term basis for a duration of up to 90 days**.
- **Green Term-Ahead Market (GTAM)** is a market segment for trading in **renewable energy under bilateral transactions through Exchange**
- **Green Day-Ahead Market (GDAM)**: is part of Integrated Day Ahead Market allows **market participants to buy and sell renewable electricity for the next day**

New Regulations:

- **Peer-to-Peer (P2P) Trading of Rooftop Solar Energy:** 3 states in India have issued Regulations/Guidelines promoting P2P trading; one state issued Draft Regulations
- **Vehicle-to-Grid (V2G) Regulations:** One state issued Draft Regulations

What are Digital Energy Grids (DEG)?

Real-Time

Continuous network visibility

Monitoring

Control for optimal performance

Two-Way

System and devices

Communication

Communicate bidirectionally for agility

Advanced

AI-driven analytics supporting

Forecasting and resource scheduling

Planning

Blockchain

Forms

Blockchain connected with Digital Platforms to enable

Trust

Buyers and Sellers to discover and negotiate prices;

Layer

execute smart contracts; and settle payments

Integrated

with

Utility

Utility

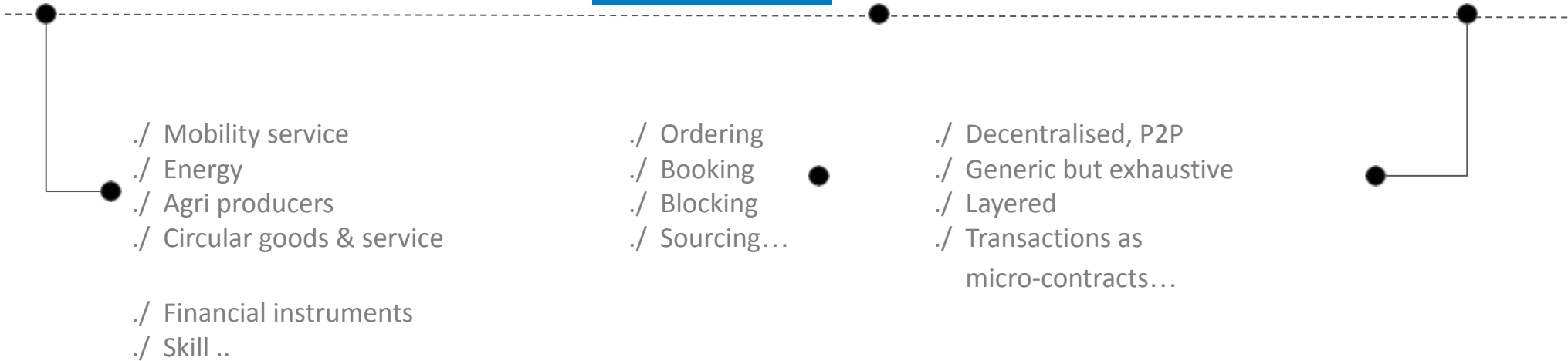


Peer-to-Peer (P2P) Pilot Projects in India Leading to DEG

- **Peer-to-Peer (P2P) Trading:** Prosumers with Solar RTPV can sell their green electricity to others who wish to buy GREEN ELECTRICITY – this can be done efficiently on blockchain platforms – development of Green Energy Communities!
 - ISGF implemented three successful pilot projects (Lucknow, Delhi and Kolkata) on P2P trading of solar RTPV energy on blockchain
 - **P2P Regulations issued in UP, Delhi and Karnataka; and Draft Regulations in Kerala**
 - Another 5 states in India are considering P2P regulations
 - ISGF is working on the demonstration of P2P on **Unified Energy Interface (UEI) Platform** in Lucknow which should Go-Live very soon - **Birth of Energy Internet!**
 - **Evolving Era of Green Energy Communities – any one can buy green energy from anywhere in India; and across the boarder in the next phase**
 - In the near future, Smart Appliances will be able to buy the cheapest and cleanest electricity on UEI platforms and run its needs
-

An economic resource discovery & transaction protocol

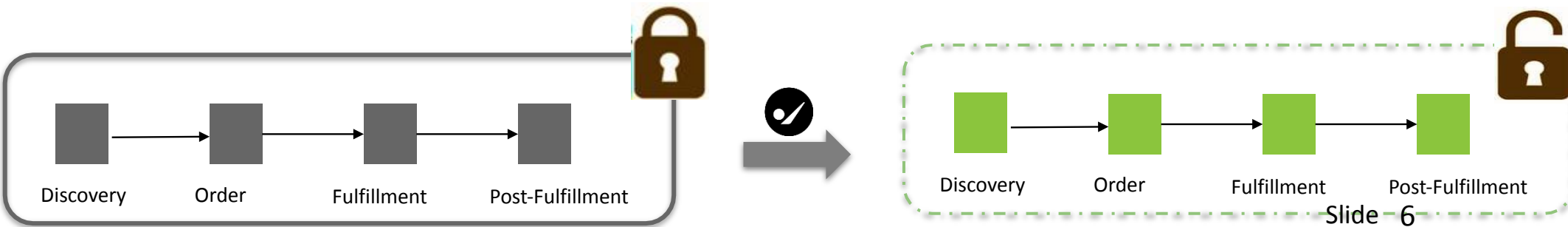
www.fide.org



Open Source Specifications

Tech & AI Neutral

Open Community



Open Network Ecosystems on Beckn Protocol

Open **Mobility** Network



Nov'22

In 18 months, Namma Yatri has impacted...

May'24



340K +
registered drivers



6.5Mn +
registered users



~ 130k
rides per day

Unlocking



70+ Mn USD

in **direct** driver earnings in a year

Open **Commerce** Network



202

Crossed **7.5 million** transactions
month

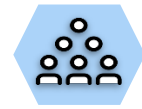
ONDC as of May 2024



~50+ Mn Orders



590+ Cities



510 K+ Sellers



10 Sectors

Open **Energy** Network



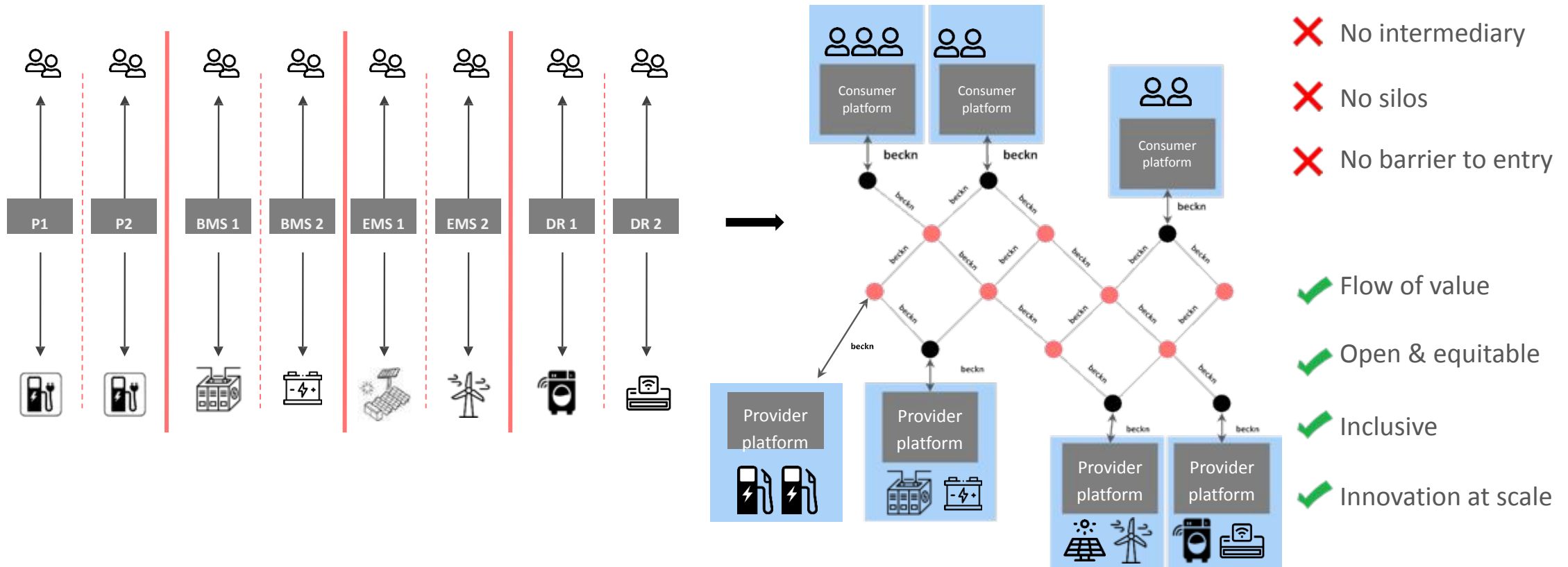
8th Feb' 24

20th May' 24

280 k+ Total Number of Transactions on UEI.
~ 3200 / day

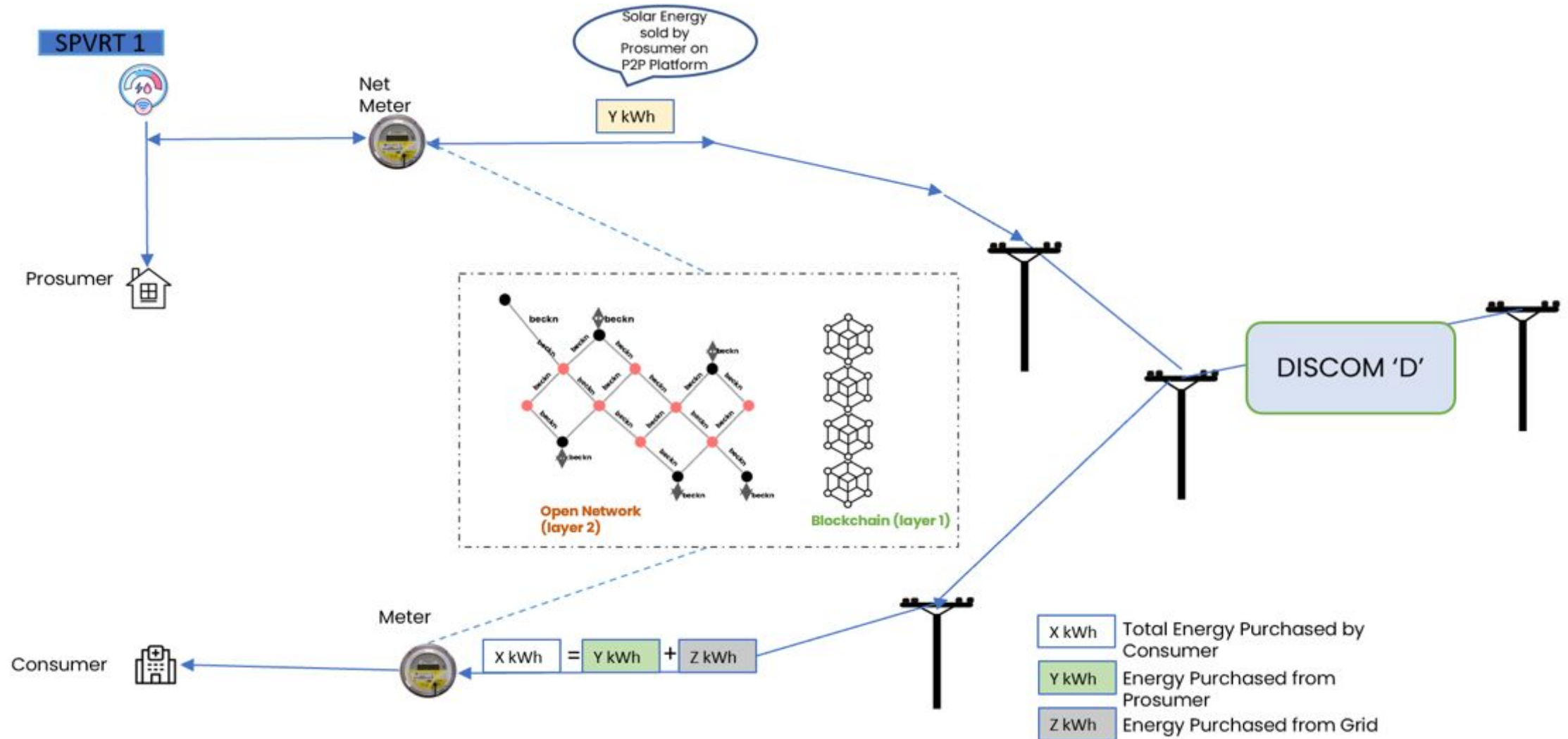
2100 MWh+ Total Energy Dispensed
~ 20500 kWh/ Day

Open Networks - a Shift from Platforms to Protocols

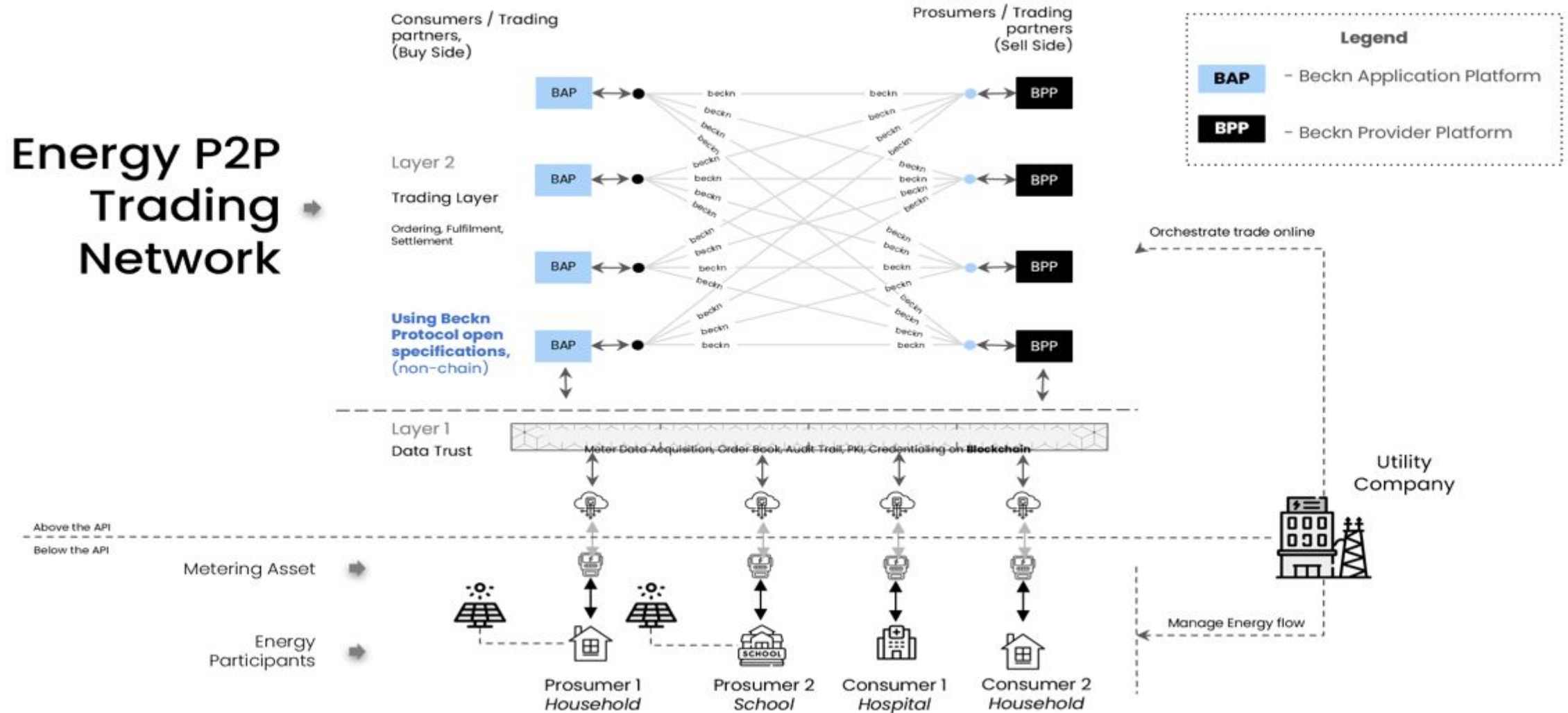


Slide

P2P Energy Trading Platform Architecture based on UEI



Energy P2P Trading Network – Beckn Protocol



Faster Grid Synchronization
Accelerates multi-country grid coordination

Lower Transaction Costs
Reduces disputes through transparent digital records

Renewable Pooling
Enables utilization across diverse geographic regions

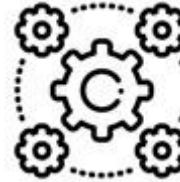
Scalable Market Access
Expands participation in regional power exchanges

Data Governance



Frameworks for secure cross-border data sharing

Interoperability Standards



Uniform protocols for devices and platforms

Regulatory Sandboxes



Testbeds for innovative market models

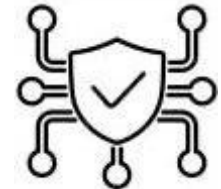


Dynamic Pricing Support

Facilitate congestion management and real-time tariffs

Cybersecurity Mandates

Ensure resilience against digital threats.





Digital Readiness Index - Benchmark utilities' technology maturity

Data & Interoperability Task Force - Coordinate standards and cross-border integration

Multi-Country Pilot Projects - Test digital power trade innovations

Focus on Digital Resilience - Embed robust cyber and operational security

Thank You !!!

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