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2026 tech talks
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Matter Smart Energy

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MATTER

Agenda

01 Energy Landscape

02 Bridging the Grid-Edge Gap

03 Matter Energy

04 Q&A

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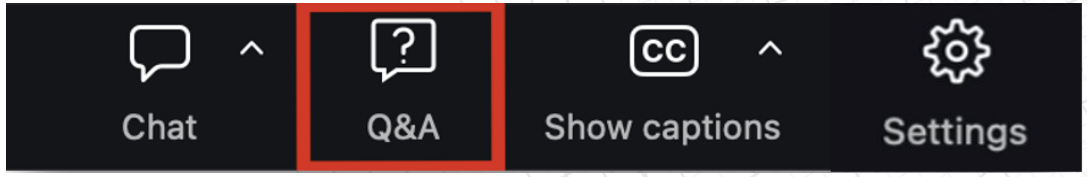
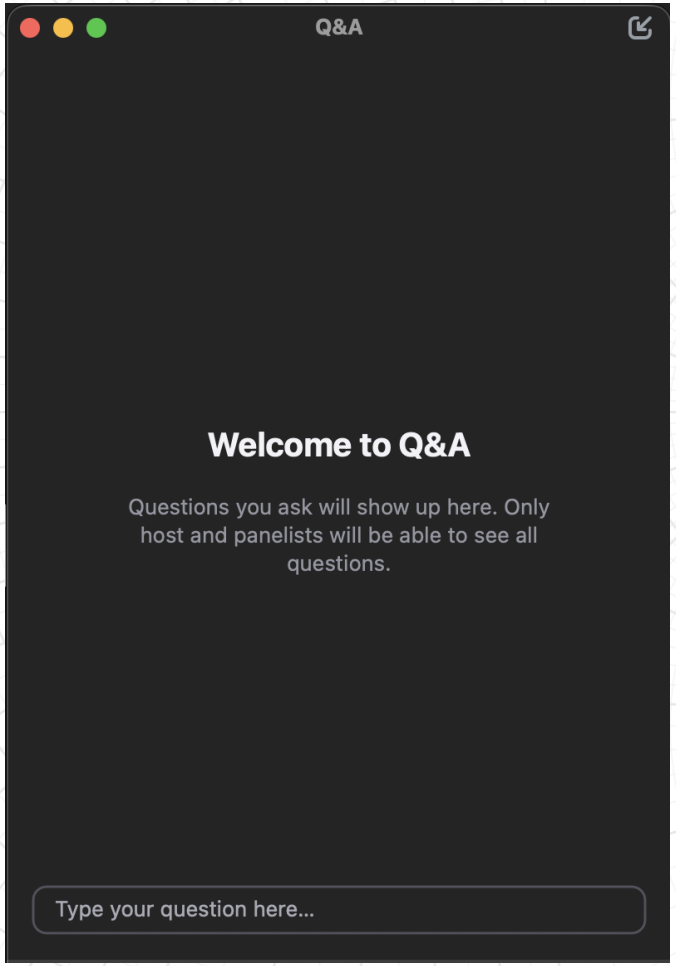
Q&A

- **Select the Q&A button in the bottom control bar to open the Q&A window and submit your questions.**





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Industry snapshot: Entering the Age of Electricity

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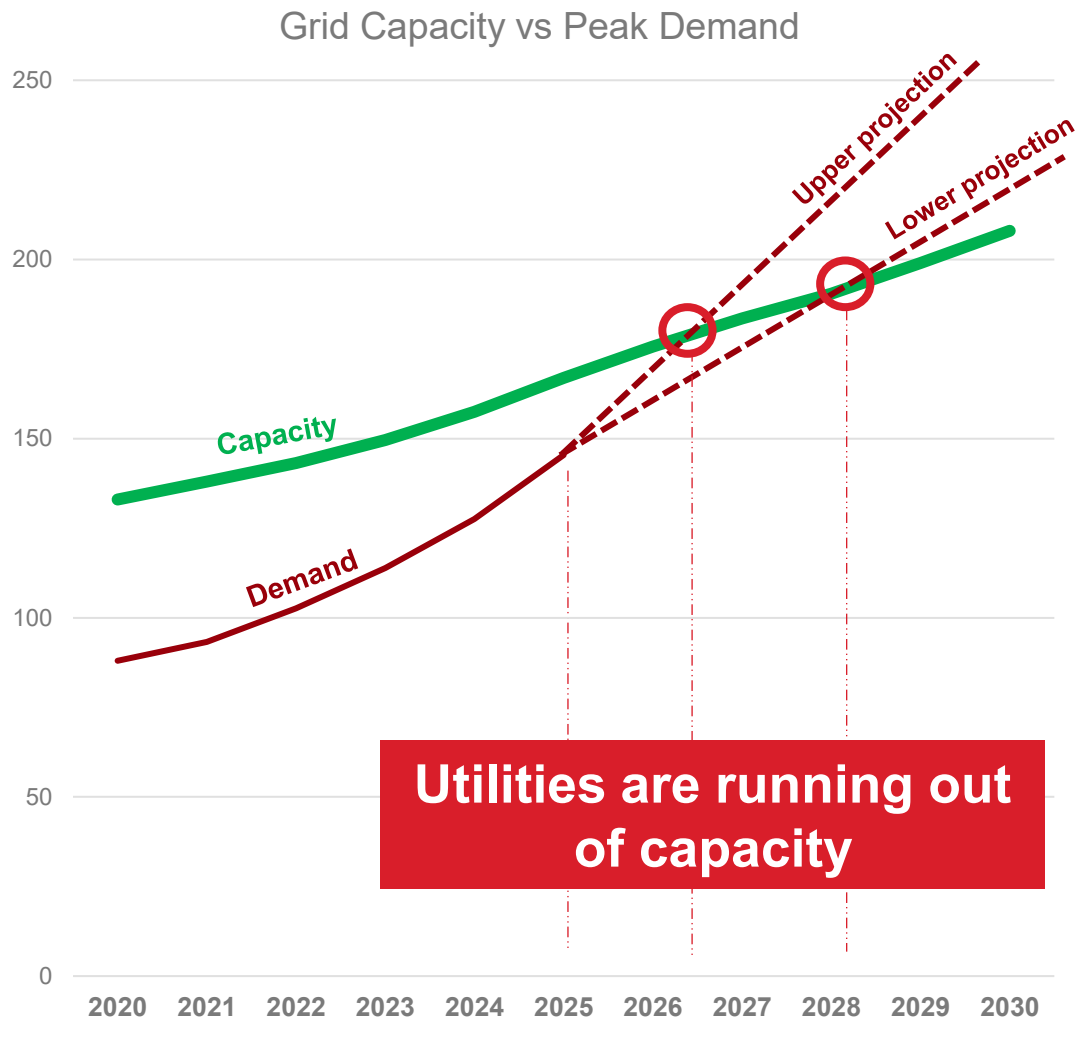
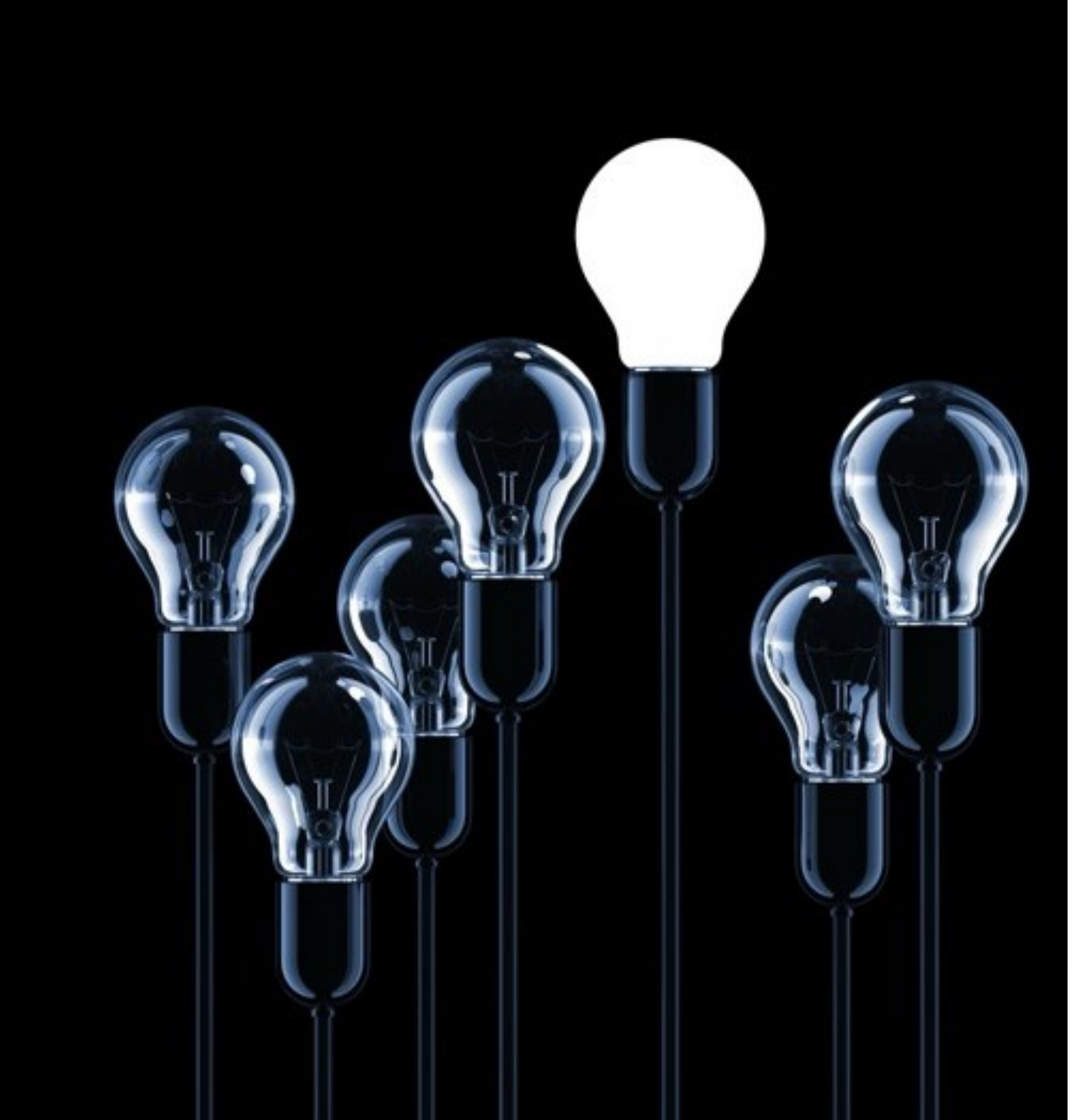
Utility Challenge – Capacity vs. Peak Demand

- **Grid demand growth accelerates**
  - AI data centers
  - EVs
  - Electrification
  - Economy and population growth
  - Climate change
- **Grid supply/capacity growing slowly**
  - Carbon sources going offline/regulated down
  - Slow ramp up of new energy sources
  - New sources are more distributed e.g., solar
- **Aging infrastructure**
  - Limiting power transmission





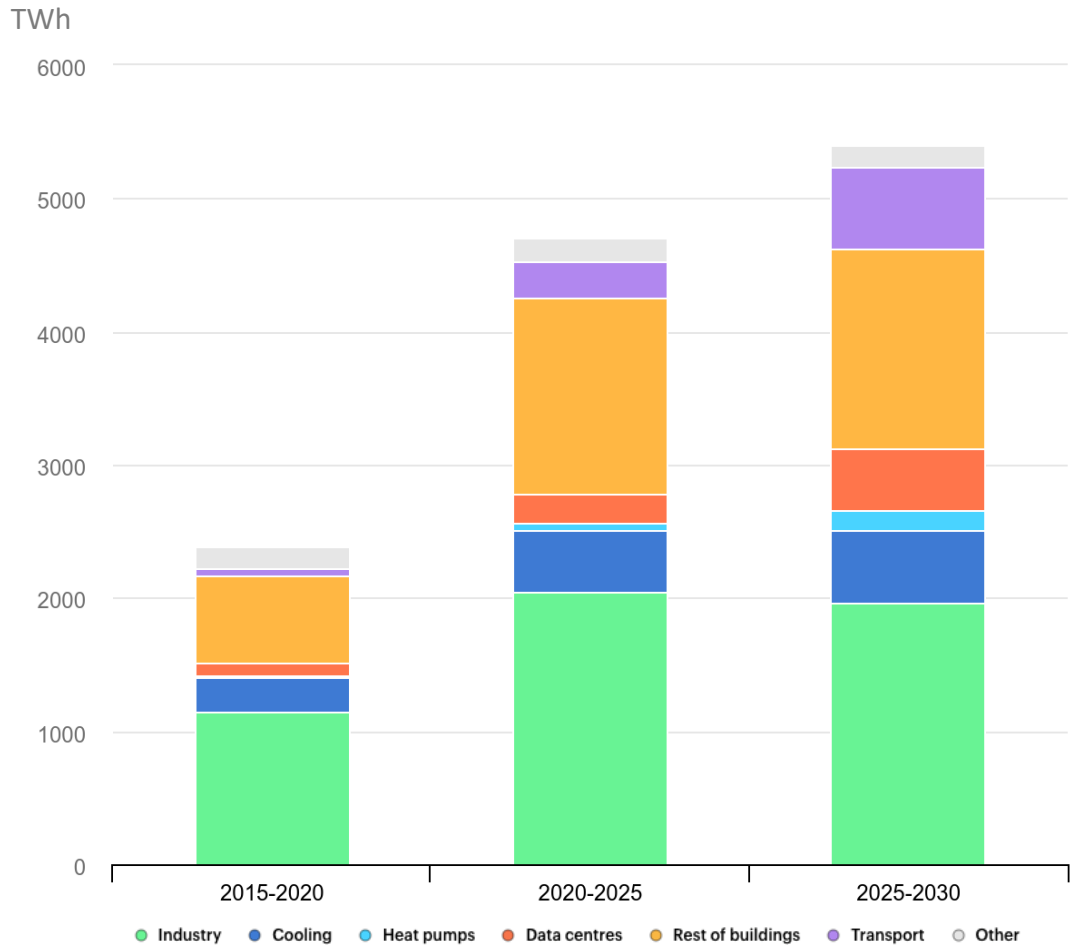
Changes in Power Consumption

Global electrical energy consumption is on the rise

- Industrial production increasing
  - Emerging economies driving growth
  - China and India are main drivers
- Electrification of transport
  - EVs projected to comprise 40% of all vehicle sales by 2030
- Expansion of data centers and AI compute
  - Increasing usage of LLMs requires large amounts of power, data storage and cooling
- Increase of cooling and heating needs
  - Uptake in HVAC installations
  - Extreme weather events requiring cooling or heating

Demand Growth – IEA Report

- **Electricity demand keeps rising fast to 2030: ~3.6% per year (2026–2030).**
- **Growth is stepping up: next 5 years are ~50% higher than the previous decade.**
- **Segments driving growth 2025-2026.**
  - Industry: ~36%
  - Transport (mostly EV charging): ~14%
  - Air conditioning / space cooling: ~10%
  - Data centers: ~8%
- **Emerging economies drive most of the increase:**
  - ~80% of added demand; China ~50% of the global growth.
  - China adds demand equal to the EU's total consumption today over the next 5 years.
- **Advanced economies re-accelerate (~20% of growth):**
  - US demand grows ~2%/yr, with ~half of the increase from data centres;
  - EU demand rises ~2%/yr and doesn't return to 2021 levels before 2028.



IEA (2026), Global electricity total demand growth by sector and end-use, 2015-2030, IEA, Paris https://www.iea.org/data-and-statistics/charts/global-electricity-total-demand-growth-by-sector-and-end-use-2015-2030, License: CC BY 4.0

Challenge with Power Generation

Renewable Power Sources Add to Grid Complexity…

- **Hydro**
  - Water and regulatory constraints limit dispatch
  - Seasonal and multi-year resource variability
  - Competing infrastructure priorities
- **Solar**
  - Diurnal and cloud-driven intermittency
  - Low inertia and voltage stability impacts
  - Bidirectional distribution power flows
- **Wind**
  - Rapid output variability and ramp events
  - Forecast uncertainty and capacity gaps
  - Transmission congestion and curtailment
- **Nuclear**
  - Limited ramping flexibility
  - Long, discrete outage cycles
  - Market inflexibility in dynamic supply environments

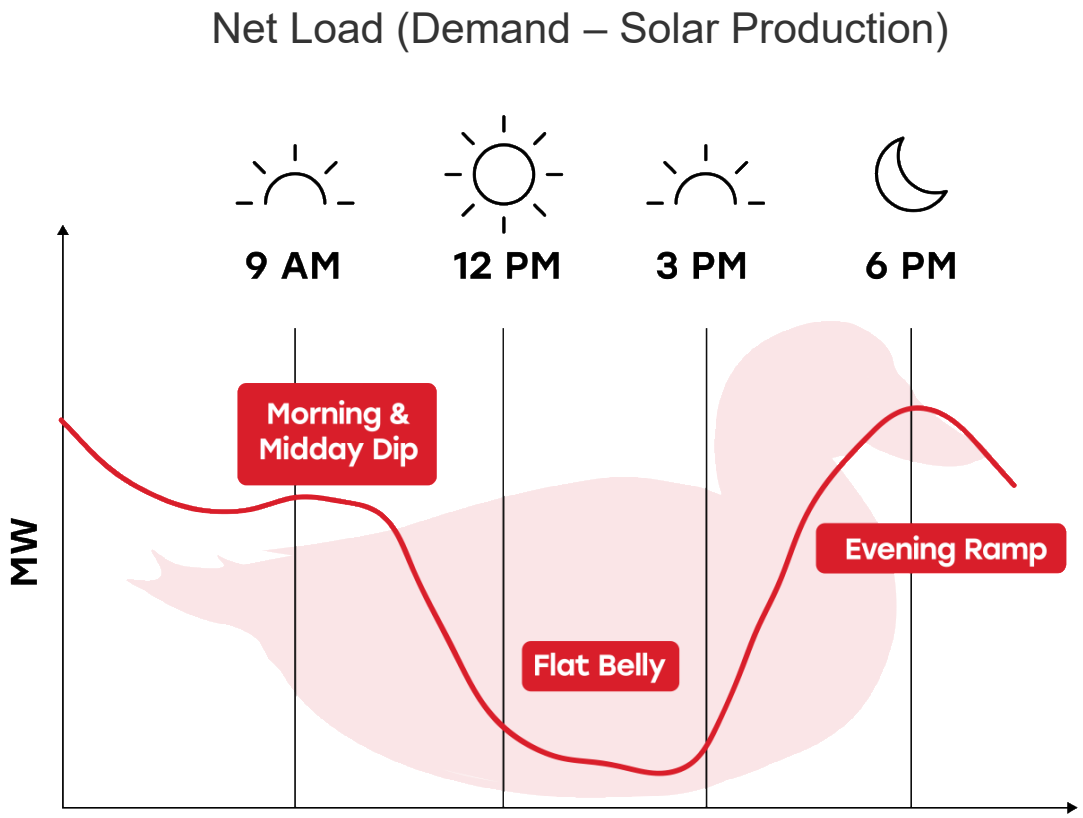
… And Drives Edge Intelligence Requirements

- **What the Grid Now Needs**
  - Real-time awareness
  - Adaptive control
  - Predictive orchestration
  - Resilient communications
- **Where Grid-Edge Intelligence Enables Value**
  - DER coordination and Virtual Power Plant participation
  - Distribution automation and voltage optimization
  - Demand response and flexible capacity
  - Asset health and predictive maintenance
  - Secure, interoperable device networks

Generation and Demand Mismatch - The Duck Curve

- **Production of solar (both residential and utility) causes the net load during the day to drop**
- **When solar production drop and load peaks (during 16-20:00) it causes a steep ramp to manage**
- **Low net load during the "Belly" can cause instability to the grid**

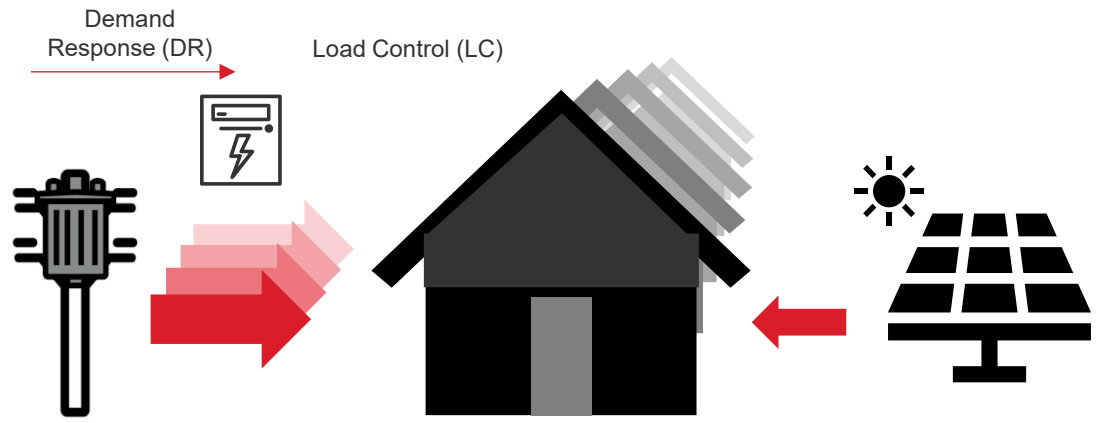
- **Predictions, delaying consumption and storages as a solution**
  - Utilities, TSOs and DSOs have been solving the problem for years with production and consumption predictions, but the with deeper the "belly" other mechanism needed to counter the ramp
  - Energy Storages can be charged during the excess production and discharged during the ramp
  - Delaying the consumptions with grid intelligence can smoothen the ramp without causing inconveniences at the consumers



Distribution Network Scaling Challenge

- **Current USA grid infrastructure and residence**
  - Transformer: 20-50 kW supports 3-5 houses
    - Heavy load devices per residence
      - Level 2 EV Charger: 7-20kW
      - Dryer: 2-5kW
      - HVAC System: ~3kW
      - Pool Pump ~2kW
- **Grids need to handle changing demand profile**
  - EVs driving up demand creating unstable grid conditions
  - Renewable adoption needs to be factored into demand
- **Edge intelligence to handle demand and utilization**
  - Edge needs to be more aware of itself and surroundings
- **Transformer lead times and investment costs are preventing fast adaptation to changing load profiles**

Growing household energy consumption exceeding transformer capacities



Transformer Capacity 20-50 kW

Peak Load up to 30kW
- EV Charger: 7-20kW
- Dryer: 2-5kW
- HVAC System: ~3kW
- Pool Pump ~2kW

Varying Production

Local renewable production needs to be factored into demand

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The Solve: Bridging the Grid-Edge Gap

Bridging the Grid-Edge Gap

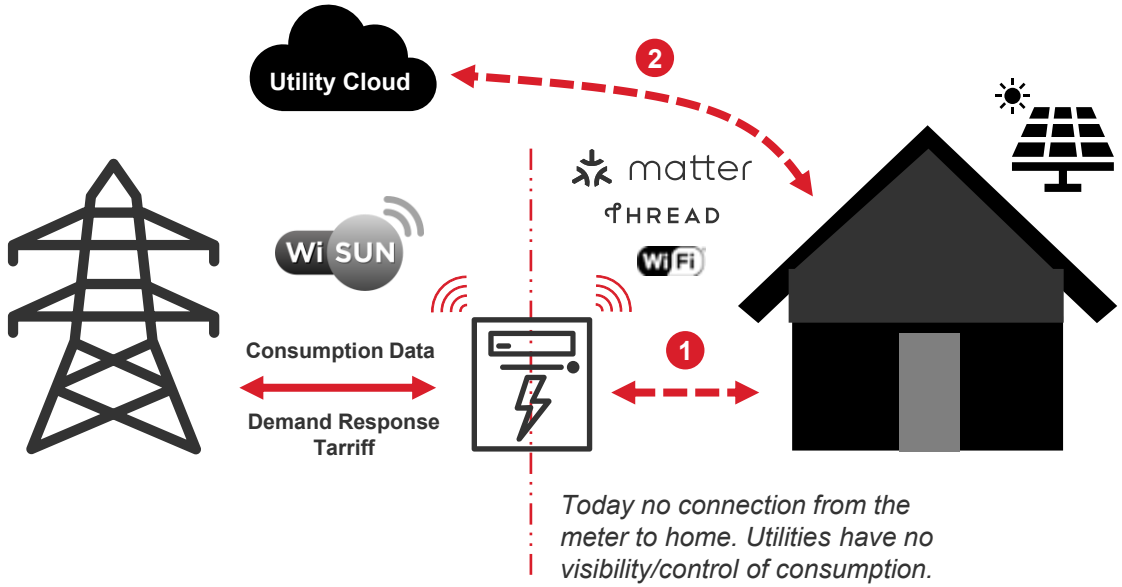
- **Grid edge is the point where the utility grid and the customer's energy ecosystem intersect.**
  - Behind-the-meter renewables are accelerating (e.g., rooftop solar).
  - EV charging demand is rising quickly.
  - Aging utility infrastructure is increasingly stressed—and often difficult to upgrade or replace.

- **What's the challenge?**
  - Utilities need better visibility and control of fast-changing, customer-driven loads.
  - The grid does know:
    - Network capacity constraints and the real-time cost of energy.
  - The grid often doesn't know:
    - Customer consumption in detail, on-site generation, storage availability, and when load can be flexed or reduced.

- **Why bridging the grid edge matters**
  - Align grid capacity with customer usage in near real time.
  - Target utility investments more effectively.
  - Maintain reliability as electrification and DERs scale.

Two ways to bridge the Grid-Edge gap:

1. Smart Meter enabled with Matter over Thread / Wi-Fi, Wi-SUN to utility
2. Appliances connected to Cloud via Matter over Thread / Wi-Fi, utility Cloud



Grid-Edge Gap

Grid Edge – Use Case Examples

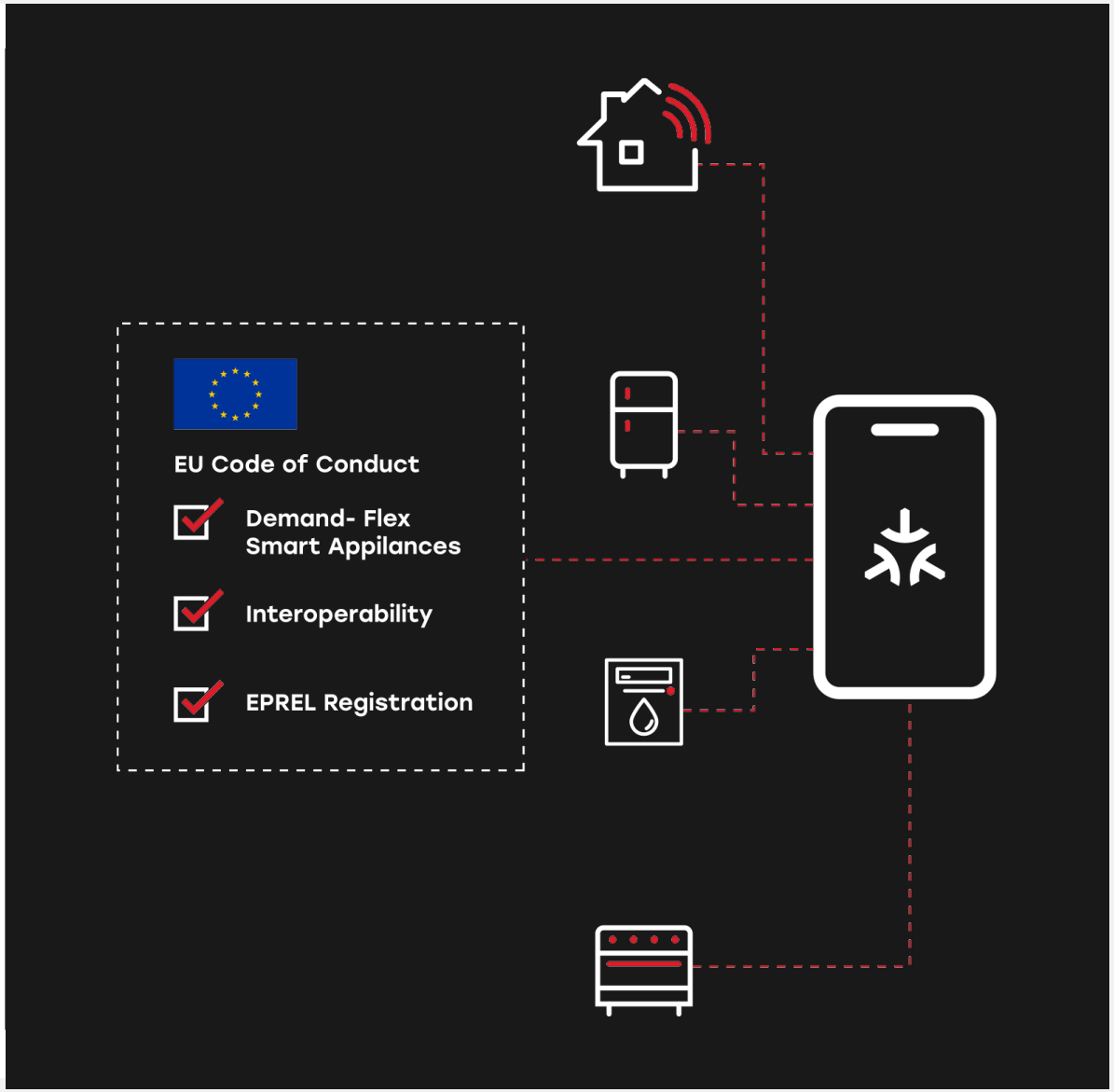
- **Demand Response**
  - Grid operator-initiated alerts to stabilize the grid
- **Time-of-Use and Dynamic Pricing**
  - With pricing and tariffs steering consumption to shave consumption peaks and shift usage to more optimal times
- **Distributed Energy Resources coordination**
  - Forecast-aware orchestration of behind the meter solar and battery to manage peaks/ramps and local consumption
- **Outage response and restoration**
  - Coordination between grid capabilities, production and batteries, and loads to balance the grid
- **Inertia management**
  - Using Inertia generating mechanisms in coordination with load management to stabilize the grid inertia

- **Octopus Energy — “Intelligent Octopus Go”**
  - Charging is automatically scheduled based on the tariff—classic “price signal → device control” loop for EVSE/EV charging.
- **ecobee (smart thermostats)**
  - ecobee positions its thermostats/eco+ platform explicitly for DR and grid events; utilities use connected thermostats for dispatchable load reduction
- **Google Nest — “Rush Hour Rewards”**
  - Utilities trigger “rush hour” events; Nest thermostats automatically adjust setpoints a few degrees to reduce peak load

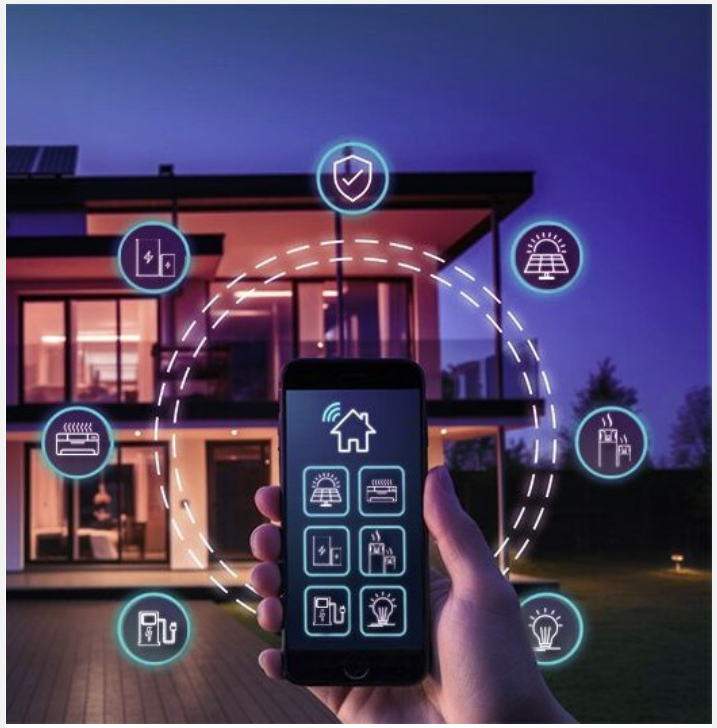
Use cases with clear benefits exist - still closed ecosystems and one-offs integrations

EU – Energy Smart Appliances Code of Conduct

- **Motivation:** Making your home appliances are smarter and help you cut down on electricity costs while supporting green energy.
- Voluntary EU Code of Conduct to drive interoperable demand-flex features
  - flexible start / power limit / incentive-table based management
- Device makers to implement common “demand flexibility” functions and declare capabilities in EPREL (European Product Registry for Energy Labelling)
- Devices in scope:
  - Washing machines
  - Tumble dryers
  - Dishwashers
  - Heat pumps / water heating (HVAC).
- Launched 23 Apr 2024;
  - EPREL will list compliant appliances from 16 Mar 2026.



Strategy for Sustainable Energy Business



MANAGE ENERGY

Optimize Demand
Supplement Supply, Renewables
Utilize Distributed Resources

Optimize Demand & Consumption

ADD VALUE

Develop New Energy Services
Expand Product Portfolio
New Business Models

Increase Revenue & Retention

GROW CAPACITY

Increase Capacity
Distribute Production
Increase Transmission

Invest Sustainably

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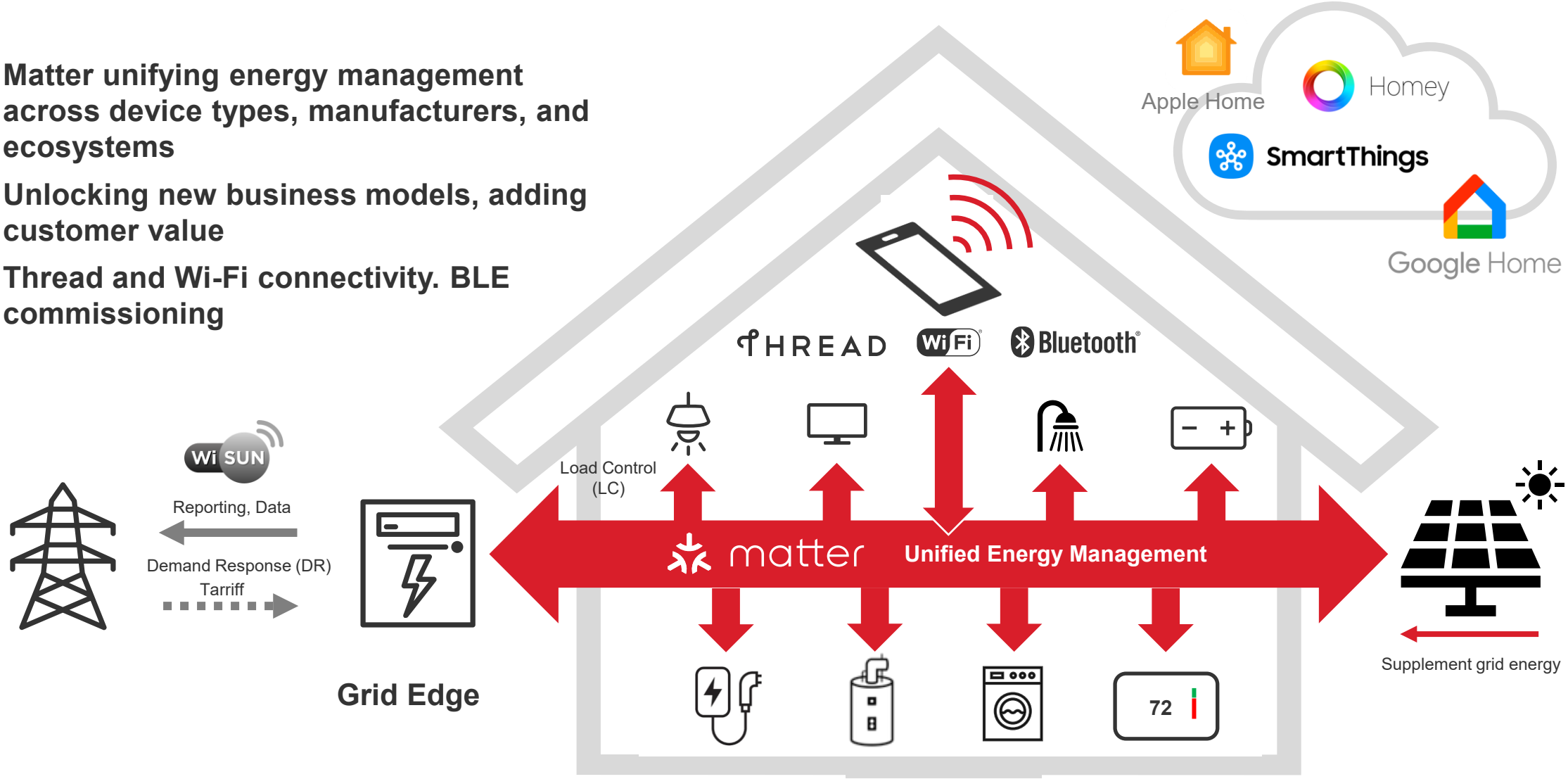
Matter for Energy

Matter – Unified Energy Management

- **Matter unifying energy management across device types, manufacturers, and ecosystems**
- **Unlocking new business models, adding customer value**
- **Thread and Wi-Fi connectivity. BLE commissioning**



Benefits of Matter for Energy Management

- End user savings and incentives, without sacrificing comfort

  Doesn’t require a cloud connection or partnerships with utilities, can advertise local energy data directly

- Better grid stability

  System operators can offer incentives, allowing usage of more sustainable energy sources

- Time of use optimization

  Shift start times, pause operations and adjust instantaneous power in response to grid events

- Regulatory compliance

  Countries/Regions are publishing regulations mandating energy-aware energy management systems

Matter Energy Use Case Examples

	EVSE	WATER HEATER	APPLIANCES
Overview	EVSE is a high-impact, flexible load well suited for utility coordination and grid optimization. Matter Energy enables interoperable, local control across ecosystems without cloud dependency	Water heaters act as thermal batteries, offering long-duration flexibility with minimal user impact. Matter Energy standardizes control across brands for utility and home energy management systems.	Large appliances provide deferrable loads that can be scheduled following ESA (Energy Smart Appliance) standard, without degrading user experience. Matter Energy enables consistent behavior across ecosystems and vendors.
Use-cases	• **Peak Shaving / Load Shifting** • **Charging with Renewables** • **Demand Response Participation**	• **Peak Shaving / Load Shifting** • **Pre-Heating with Renewables** • **Demand Response Participation**	• **Smart Scheduling** • **Utility Signals** • **Home Energy Optimization**
Functionalities	• Start/stop charging and set charging power limits • Time-of-use and utility-driven scheduling • Real-time energy consumption reporting	• Temperature setpoint and operating mode control • On/off and duty-cycle modulation • Energy usage & availability status reporting	• Cycle scheduling and start/pause control • Power state and operational status reporting • Estimated energy consumption per cycle

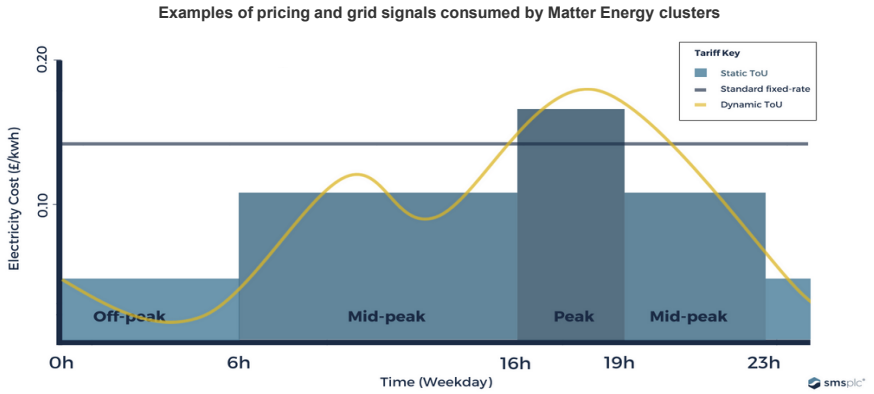
What’s New in Matter 1.5: Energy Device Types

- **Electrical Utility Meter -** Utility-grade billing endpoint
- **Electrical Meter -** Sub-meter for circuits and appliances
- **Meter Reference Point -** Anchor for site energy topology
- **Electrical Energy Tariff -** Tariff entity paired with price data

What’s New in Matter 1.5: Energy Clusters

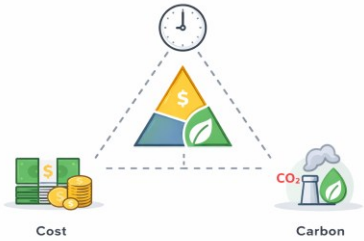
Pricing & Signals

- **Commodity Tariff -** Tariff structure (TOU, tiers, riders)
- **Commodity Price -** Time-varying prices and forecasts
- **Electrical Grid Conditions -** Carbon intensity and grid signals



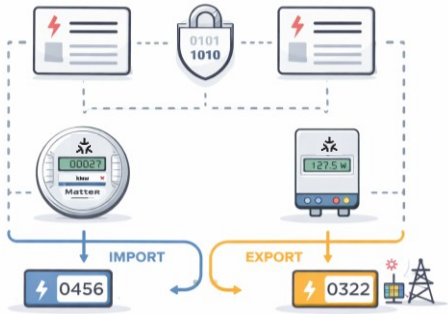
Optimization Intent

- **Energy Preference -** Cost vs comfort vs carbon intent



Measurement & Attribution

- **Meter Identification -** Meter identity and metadata
- **Commodity Metering -** Import/export energy counters

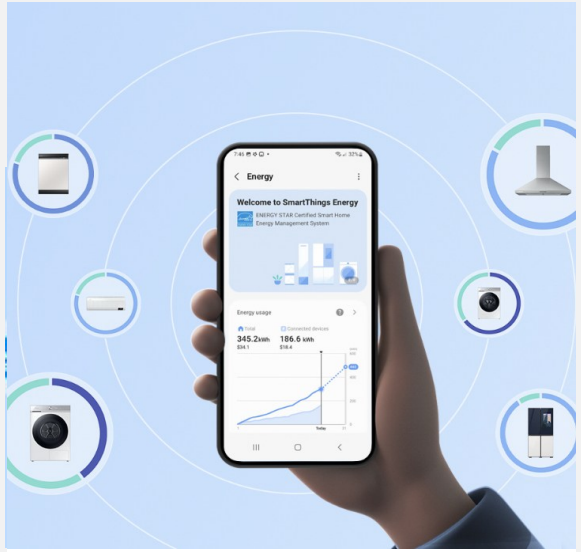


Ecosystems Integrating Matter Energy

APPLE ENERGY KIT

- **Electricity Usage**
- **EV Charging Schedules**
- **Grid forecasts**
- *(other features - Integrated Apple Home)*

https://www.theverge.com/news/685733/apple-home-energykit-energy-management-ios26-wwdc



SMARTTHINGS FLEX CONNECT

- **Demand Response**
- **AI Powered Energy Savings**
- **User Driven Choice**
- *(in SmartThings App)*

https://news.samsung.com/us/samsung-smartthings-expands-energy-management-solutions-with-leap-launching-demand-response-ny-ca/

LG HOMEY

- **Usage monitoring**
- **Automations based on Spot Pricing**
- **Smart Meter Integrations**

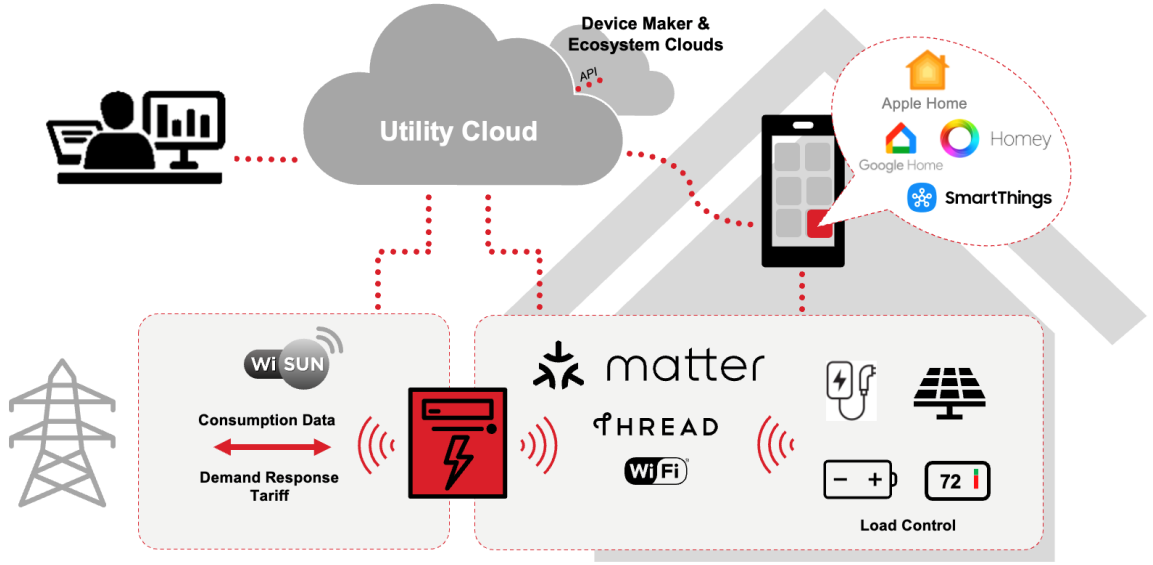
https://www.theverge.com/2024/12/11/24318680/homey-lg-smart-home-energy-management-features

OTHERS

- **Home Assistant**
- **Google**
- **Free@Home (ABB)**
- **InHab (Siemens)**
- *(Ecosystem support increasing)*

Conclusions

- **Matter – Unified energy management across device types, manufacturers, and ecosystems**
- **Unlock new business models, tailored pricing**
- **Wi-SUN - Next-gen smart metering connectivity**
- **Bridge Grid and Home for end-to-end information flow and load control**



Utility Benefits

- **Seamless visibility and control of homes and users**
- **Demand Response – Enhanced, real-time network and load management**
- **Add value – New pricing models and services, Matter 3P product offering**
- **Optimize capacity investments!**

Device Maker Benefits

- **Matter – Increase sales from unified ecosystems**
- **Reduce development costs**
  - In-built standard Matter functionalities such as Load Control
- **Integrate to all ecosystems at once**

User Benefits

- **Tailored services & pricing models, saving energy costs**
- **Enhanced user experience:**
  - Better control of energy usage, single ecosystem App for everything
- **True, real-time home automation**

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谢谢!

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日期 (星期三)	时间 (北京/台北)	演讲主题
5月20日	14:00 - 15:00	Matter能源管理
6月10日	14:00 - 15:00	动手实践边缘AI：开发嵌入式AI/ML应用
7月15日	14:00 - 15:00	扩展LPWAN部署：支持大规模与分段式微型网状网络
8月19日	14:00 - 15:00	蓝牙信道探测：从性能突破到实际应用落地
随选回放		
Amazon Sidewalk平台演进、新应用场景与未来展望（*收看视频回放*）		