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ESIG Session 4B:

Distribution System Resilience and the Role of DERs

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New York Clean Energy Goals and Changing Grid Needs

- CLCPA **sets out ambitious goals to reach 70% clean electricity generation by 2030 and 100% by 2040**
- As a result, Con Edison and New York State will have to navigate the following challenges:
  - Increased **penetration of renewables to meet CLCPA goals**, resulting in more distributed and intermittent power generation
  - High **load growth** primarily driven by transportation and building electrification, resulting in **increased reliability needs**
  - Building electrification is **increasing winter peak loads** in addition to summer peaks
- Recognizing these challenges, Con Edison is interested in the **role of grid flexibility to maintain a high level of reliability (or even increase reliability)** through the clean energy transition, and enable a transition that is **efficient, orderly, and cost effective**

What is Grid Flexibility?

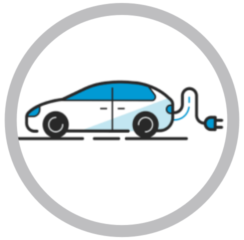
Utilities around the world say:

- The ability to change generation and consumption patterns to support the electricity system
- Technologies that can be deployed…to allow the power system to quickly respond to changes
- The change of…load…in response to market signals
- Utilizing variable power sources…to balance supply and demand

New York State says: The grid's ability to shift either demand or supply to meet bulk power system and/or local distribution system needs

Con Edison Programs and Initiatives Enabling Flexibility Today

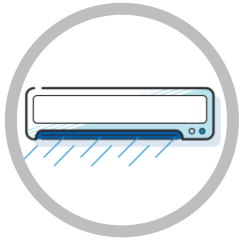
Targeted demand management (demand response, non-wires solutions)



EV managed charging

Energy storage (utility-integrated storage, utility dispatch rights)

DERMS



Energy efficiency incentives (building controls, heat pumps)

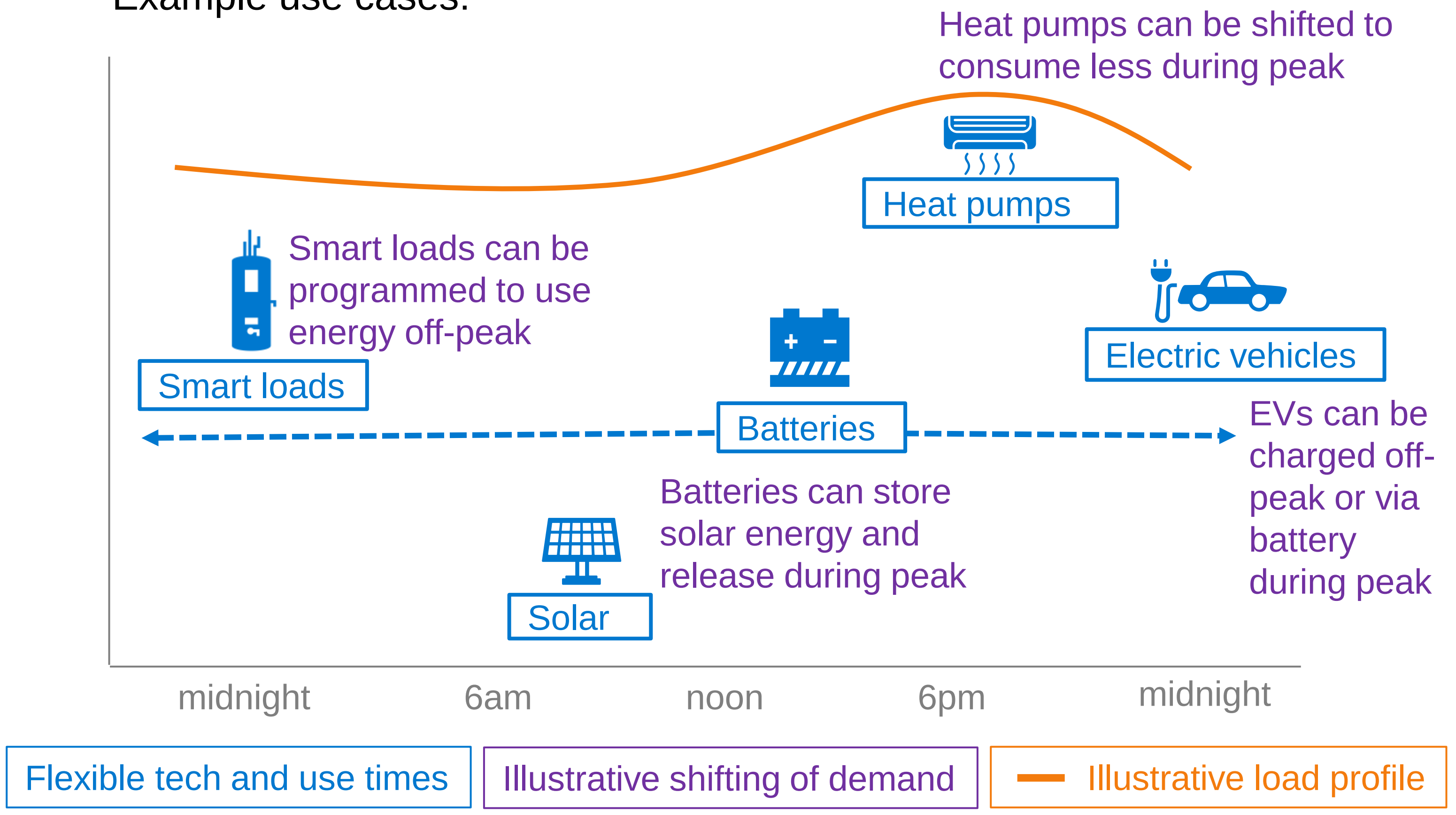
The Role of Flexibility in the Grid of the Future

Flexibility can enable the following grid and policy goals:

- Effectively managing grid costs
- Enhancing grid reliability and resiliency
- Enabling renewable resource integration
- Accelerating electrification
- Reducing emissions
- Benefiting disadvantaged communities
- Improving the customer experience

An orchestrated portfolio of flexible resources on the grid of the future can help shape load profiles

Example use cases:



Grid of the Future Regulatory Proceeding

Objective

Unlock innovation and investment to **deploy flexible resources** – such as distributed energy resources and virtual power plants – to achieve clean energy goals at a **manageable cost** and at the highest level of **reliability**

Scope

Impacts all levels of the grid, from the **grid edge**, to the **distribution** and **transmission** systems, to **generation,** by exploring:

1. Flexible resource deployment
2. Distributed system platform comprehensiveness
3. Flexible resource valuation and compensation
4. Rate and utility bill price-signals
5. Responsibilities of industry parties
6. Digital technology and information infrastructure
7. Physical and cyber security protocols
8. Temporal and geographic variability
9. Allocation of costs and benefits

DPS Staff Approach

- **November 15, 2024:** Complete Grid Flexibility Study
- **December 31, 2024:** Complete first iteration of the New York Grid of the Future Plan
- **December 31, 2025:** Complete comprehensive Grid of the Future Plan

Con Edison Approach to the Grid of the Future

Goals for 2024:

1. Develop a roadmap for flexibility at Con Edison
2. Create a flexibility strategy for customer programs
3. Identify possible new flexible resource offerings

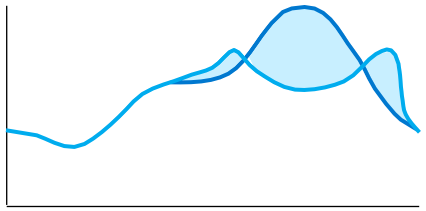
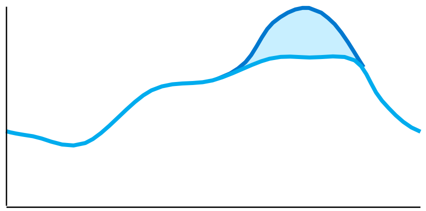
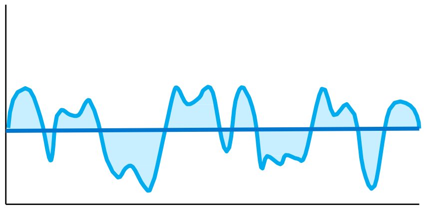
Key Considerations:

- Encourage flexible resource adoption and installation of enabling technologies to increase realizable potential and unlock additional use cases
- Send clear, increasingly dynamic price signals to customers through utility program incentives (as opposed to static rates), indicating where to install flexible resources on the grid
- Enable integration of flexible resources into utility digital platforms while adhering to cybersecurity best practices
- Leverage automation to increase reliability of resource participation in events

Flexible Resources and Enabling Technologies

Sector		Flexible resource	Enabling Technology
Buildings		**HVAC** For example: heat pumps, electric boilers, chillers	**Building Energy Management System (BEMS)** **Smart Thermostat**
		Water heating	**Home Energy Management System (HEMS)** **BEMS** **Smart Water Heater**
		Other building load For example: lighting, appliances	**BEMS** **HEMS** **Smart panels**
Transportation	Multi-DER	**Electric vehicles** For example: light duty, medium/heavy duty	**EV telemetry or smart chargers** **Bi-directional chargers and EV software**
Energy	Multi-DER	**Energy storage**	**Smart inverter**
	Multi-DER	**Solar**	
Tools that enable technologies to be connected, disconnected or monitored on the grid			**AMI** **Meter Collar**

Actions That Can Be Taken By Flexible Resources to Support the Grid

Types of actions	Description	Illustration	Expected frequency of dispatch
Shift load permanently	Permanently change timing of consumption and demand		Daily
Reduce load on short notice	Eliminate or defer consumption Dispatch energy on short notice to alleviate temporal peaks		10-15 times per year
Dynamically adjust load (ancillary services)	Fast ramp up or down of demand and generation		Numerous times per day

Source: DOE Pathways to Commercial Liftoff: Virtual Power Plant

Grid Needs that Flexibility Can Address

Grid needs	Description
Bulk system capacity	Alleviate bulk-system capacity constraints to handle increased loads
Network Capacity	Alleviate physical constraints and increase hosting capacity to support increased loads and additional DERs
Resource and energy adequacy	Ensuring that there is enough capacity and energy to meet expected load demand
Contingency support	Transferring load during unexpected outages (e.g., equipment failure)
Supply/demand balancing	Balance the distribution of electrical loads to avoid overloading system components (e.g., to balance renewables)
Voltage support	Respond to fluctuations in voltage levels in real time
Frequency stability	Manage frequency instability to maintain interconnection frequency at 60 Hz

Vision for the Evolution of Interconnection Process

Flexibility Recognizing Heterogeneity

Project Diversity

- Project variation, e.g., size, engineering complexity and export impacts interconnection cost/timeline

Grid Diversity

- Local grid based on topology and proximal resources can offer opportunity or constrain

Location Diversity

- DER locations can impact policy considerations such as resiliency in disadvantaged communities

Business Model Diversity

- Customers have varying business models dictating their financial and operational constraints

Excellence over Compliance Framework

Outcome Focused

- Interconnection is today process focused when customers are focused on outcomes

Excellence Based

- Framework that encourages excellence over lowest common denominator offers more benefits

Innovation Grounded

- Framework needs to be grounded in innovation and improvement for nimble evolution

Education and Outreach during Incipiency

Incipient Market Phase

- New developers and new technologies require sustained education and outreach

Flexible resources can enable a more orderly and cost-effective energy transition

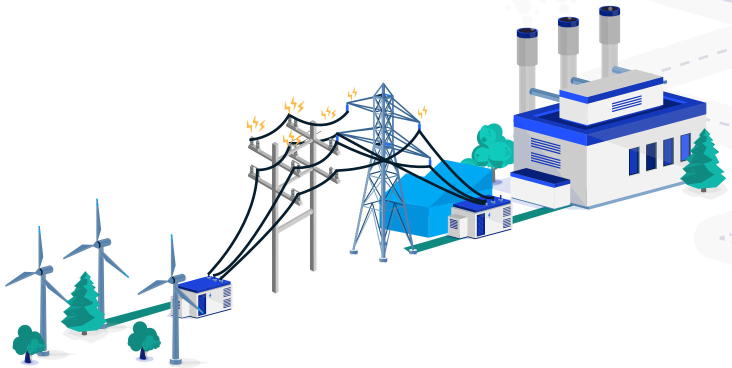
Conceptual view of the grid of the future

C. Increase resiliency

Provide ancillary services to stabilize the grid

A. Ensure an orderly energy transition

More intermittent generation

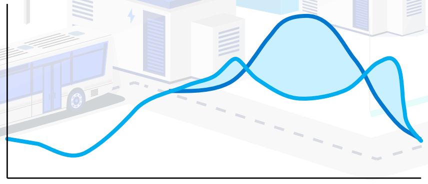


Flexible capacity could help defer- but not avoid – T&D grid investments

Load growth

Increase reliability by alleviating network and system peaks

B. Ensure a cost-effective transition



Create opportunities for energy arbitrage by moving consumption from on- to off-peak conEdison

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