

ComEd Utility of the Future Vision



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ENVISIONING THE UTILITY OF THE FUTURE

- System Overview
- Energy Infrastructure Modernization
- Enhanced Resiliency
 - Microgrids
 - Superconductor
- Smart Cities
- Grid of the Future

COMED, AN EXELON COMPANY

- 3.85 million electric customers in northern Illinois, including the City of Chicago
- ~6,000 Employees
- Service Territory: 11,428 square miles
- Peak Load: 23,753 MW (7/20/2011)
- 526,000 distribution transformers
- 65,000 circuit miles of primary distribution
- 53% overhead, 47% underground
- 5,800 circuit miles of transmission
- Including 2nd largest underground network in the U.S.
- 1,083 substations
 - 277 transmission-connected, 806 distribution-connected



ENERGY INFRASTRUCTURE MODERNIZATION ACT (EIMA)

- On October 27, 2011, the Illinois General Assembly enacted the Energy Infrastructure Modernization Act (EIMA), setting in motion a \$2.6 billion investment by ComEd to strengthen and modernize the state's electric grid.
- The Investment Plan has two primary components:
- Reliability-Related Investments— 5 year program, \$1.3B
 - Underground cable – mainline, URD, manholes
 - Ridgeland 69kV cable replacement
 - Training centers
 - Wood pole inspection, reinforcement/replacement
 - Storm hardening – undergrounding, spacer cable
- Smart Grid-Related Investments – 10 year program, \$1.3B
 - Distribution Automation
 - Smart Substations
 - Smart Meters



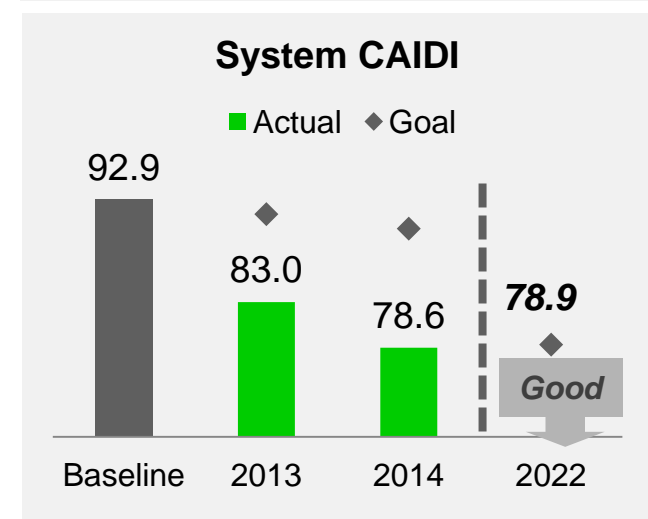
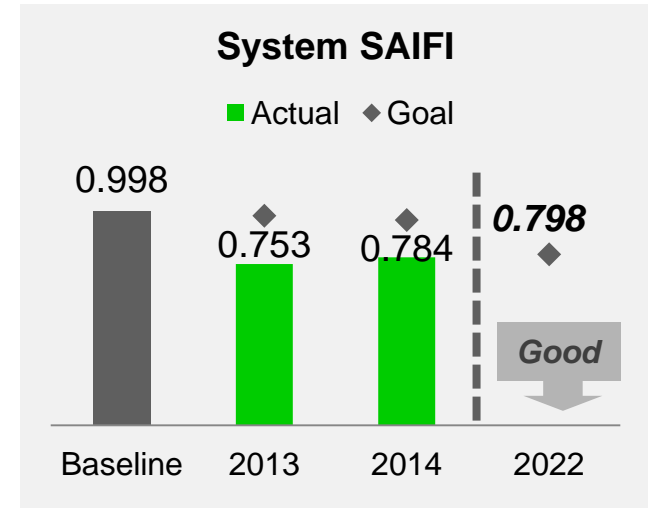
EIMA – PERFORMANCE METRICS

- Reliability Performance Metrics:
 - Reduction in Frequency of Customer Interruptions for the System, Southern Region and Northeastern Region by 20% over 10 years (SAIFI)
 - Reduction in Duration of Customer Interruptions by 15% over 10 years (CAIDI)
 - Reduction in the number of customers that do not meet the service reliability targets by 75% over 10 years
- Customer Benefits:
 - Reduction in the number of Estimated Bills by 90% over 10 years
 - Measuring AMI Benefits (average of):
 - Reduction in Consumption on Inactive Meters by 90% over 10 years
 - Reduction in Unaccounted For Energy by 50% over 10 years
 - Reduction in Uncollectible Expense by \$30M per year over 10 years
 - Increasing capital expenditures for Minority-Owned and Female-Owned Business Enterprises by 15% over 10 years
- Financial Penalties (5 bps is the equivalent of ~\$2M):
 - Takes the form of a basis points (“bps”) reduction for the relevant 12 month period
 - Reliability Metrics (each goal): 5 bps years 1-3, 6 bps years 4-6, 7 bps years 7-10
 - Estimated Bill and AMI Metrics: 5 bps every year



EIMA RESULTS TO DATE

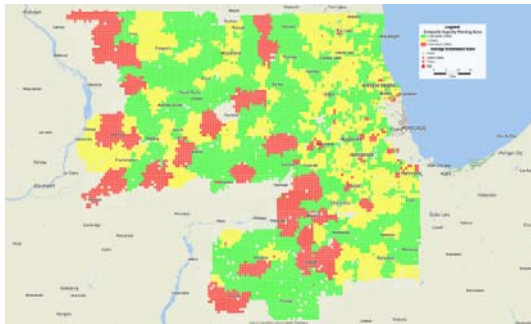
- System improvements commenced in 2012
- 54% of the work plan has been completed; target completion is 2017 for most work, 2018 for AMI
- In 2014, ComEd achieved 9 of the 10 annual performance goals
 - System SAIFI and CAIDI in 2014 beat the 2022 goals; second year for SAIFI
 - The customer metrics aggregate average beat the goal by 65%
 - ComEd's annual capital expenditures for Illinois minority-owned and women-owned businesses of \$178 million exceeded the goal by \$111 million; 2013 and 2014 combined expenditures is \$287 million or \$154 million more than goal



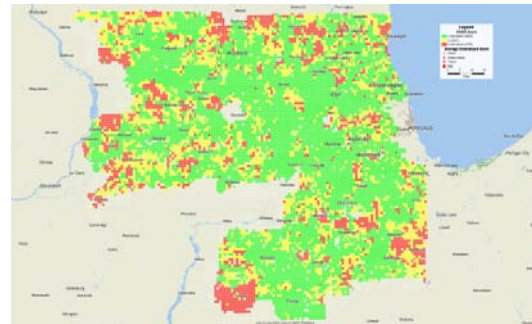
WHAT'S NOW...MICROGRID 5 YEAR PROGRAM

Holistic data driven approach site selection with governmental agencies partnership

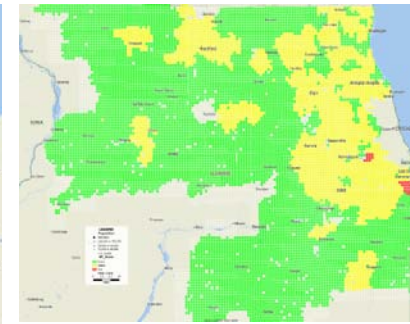
- Each section (1 mile x 1 mile) outside of Chicago and quarter section (0.5 miles x 0.5 miles) within the City was first rated with respect to each of the four primary factors. - Scale of 1-3 (Green, Yellow, Red).
- These four factors are then combined into a composite metric. This was calculated as a weighted average of:
 - Critical customer (50%), Reliability rating – SAIDI (25%), Capacity rating (12.5%), Substation bus tie reliability ranking (12.5%)
 - Capacity planning combined metric includes weighted avg. of feeder loading (10%), terminal load(10%), and load at risk (80%)
 - An additional half point was added to the composite score if the location was on the most recent green board report, or had had a yellow greenboard rating on average over the past 2 years.



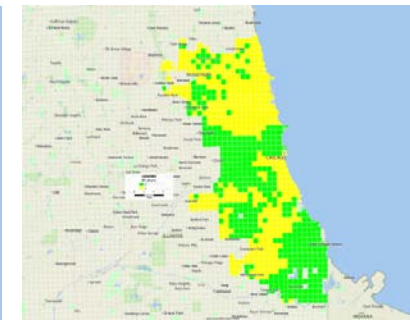
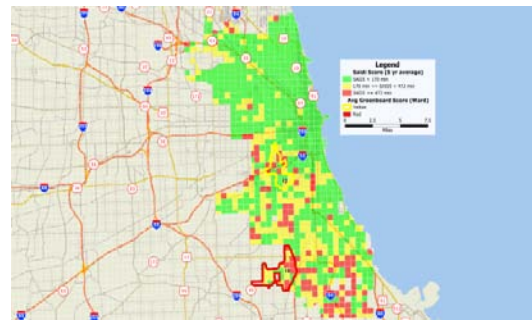
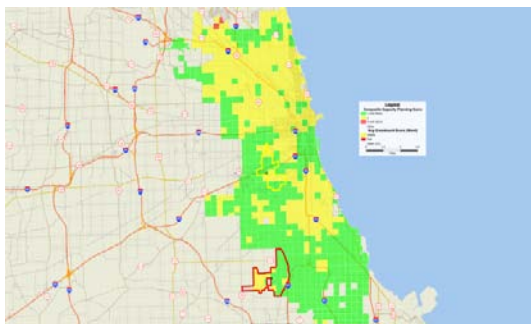
Capacity Planning Combined Metric



Reliability (SAIDI)



Substation Bus Tie Risk Score



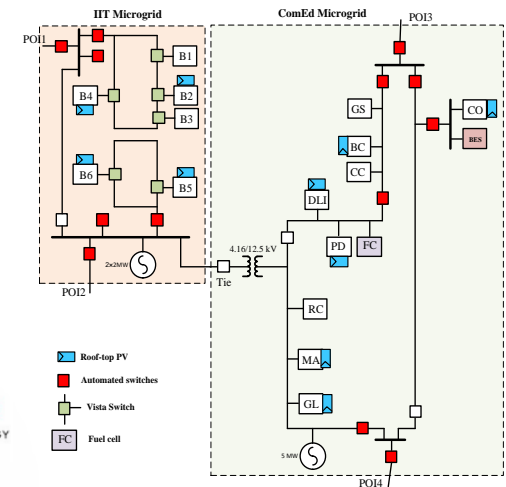
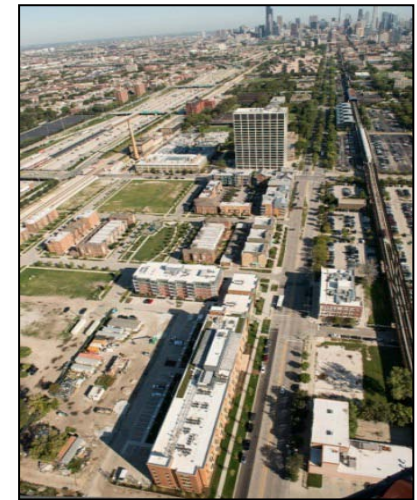
Candidates include:

1. The Bronzeville Community of Chicago
2. The Illinois Medical District
3. City of Rockford Airport
4. Du Page County government complex
5. Aurora FAA facility
6. Chicago Heights water pumping & treatment facility

The resiliency metric was heavily influenced by critical customer information

WHAT'S NOW.....MICROGRID CONTROLLER DEVELOPMENT

- The DOE awarded approximately \$1.2 million to ComEd and its partners to develop and test a commercial-grade microgrid controller capable of managing two or more clustered microgrids.
- Chicago's Bronzeville neighborhood was identified as one of the ideal locations for siting a microgrid.
- Bronzeville includes a diverse mix of facilities and critical loads, including police and fire department headquarters, educational facilities, major transportation infrastructure, healthcare facilities for seniors, and private residences.
- ComEd playing a key role in supporting IEEE 2030.7 microgrid controller standard development, IEEE/PES microgrid taskforce and Quadrennial Energy Review.



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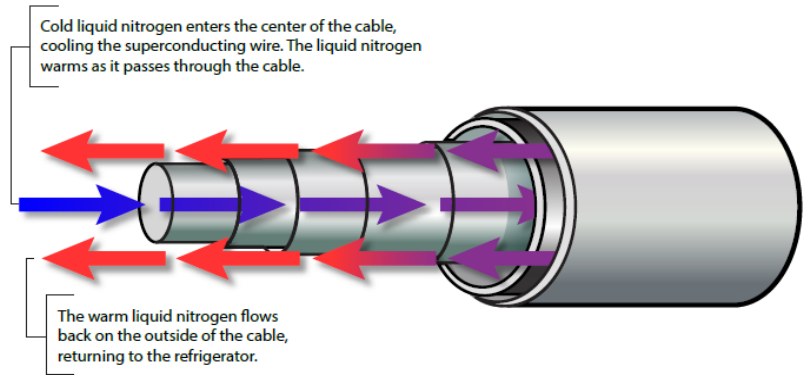
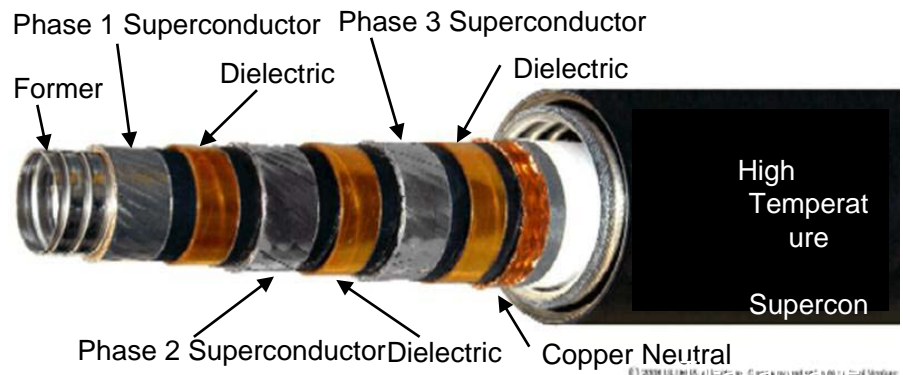
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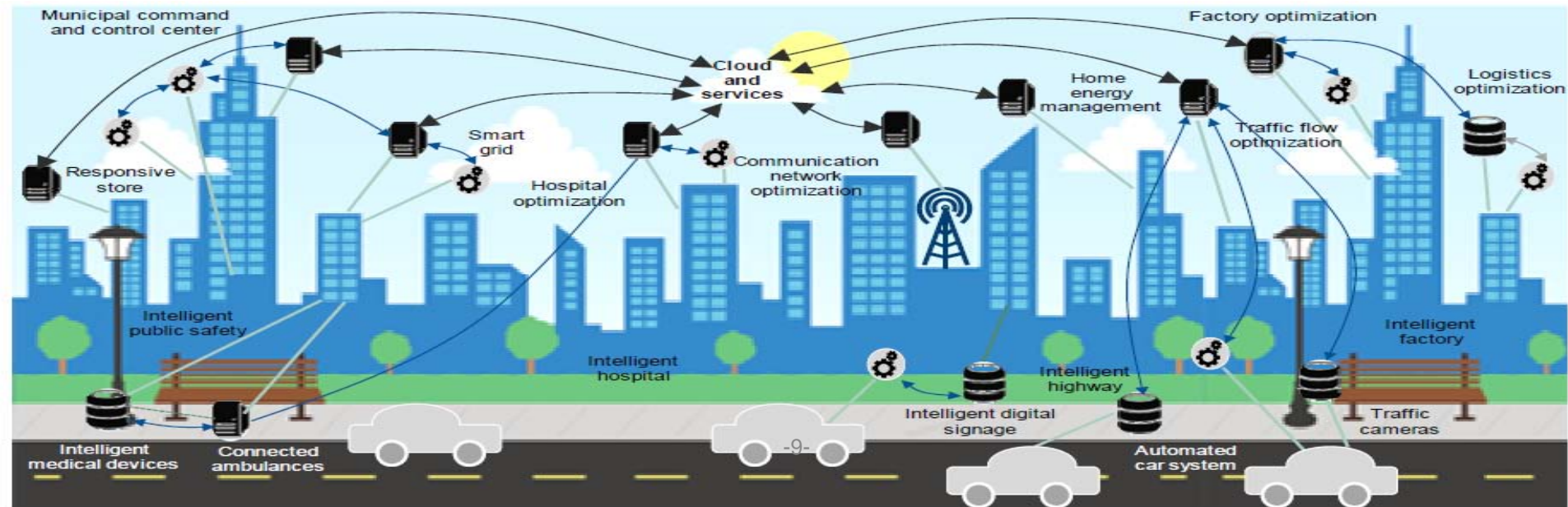
WHAT'S NOW.....SUPERCONDUCTOR: CHICAGO LOOP GRID RESILIENCY

- Developing plans to deploy high temperature superconductor cable in Chicago's central business district (CBD). The project will connect multiple substations in Chicago's CBD, greatly enhancing grid resiliency.
- The DHS program is designed to provide protection against the catastrophic effects resulting from the loss of critical substation facilities by allowing the sharing of capacity of nearby substations that cannot typically be accomplished through conventional means.
 - Support a project of sufficient length to allow high temperature superconducting cables and related components to achieve notable cost reduction
 - DHS is providing \$60 million in funding
 - Project duration of 3-4 years



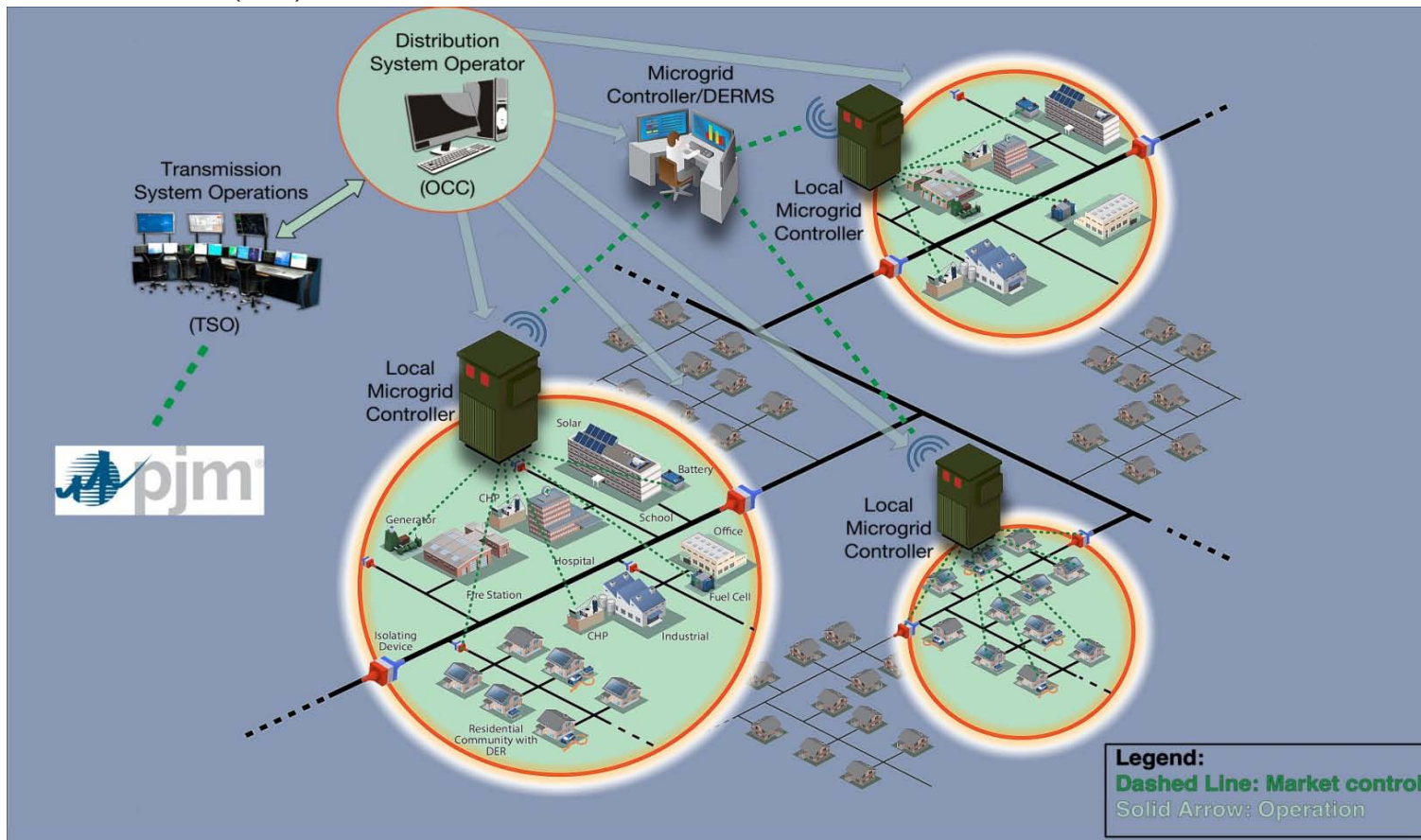
WHAT'S NOW.....ENABLING SMART CITIES

- Leverage ComEd physical assets, communications network infrastructure and capabilities to develop Smart City offerings for communities within ComEd's service territory.
- Some initiatives ComEd is actively pursuing in this space include:
 - Smart LED Streetlights. A pilot deployment of 800 fixtures is currently underway in two municipalities.
 - AMI Network for Water Metering. Leveraging ComEd's AMI network to provide meter reading services to municipal water departments.
 - Hybrid AC-DC Nanogrids. ComEd in conjunction with the Illinois Institute of Technology, DOE, Argonne National Laboratory, Emerge Alliance, and Starline DC solutions is deploying a building level microgrid that has both AC and DC circuits that provide higher overall energy efficiency.



WHAT'S NEXT.....OPERATIONAL VISION OF THE GRID OF THE FUTURE

- Currently in the process of developing transformational grid control algorithms and architectures that optimize the usage of flexible load and DERs.
- The expected system level benefits of reliably managing dynamic changes in the grid by leveraging the additional grid resources, while having minimal impact on customer quality of service.
- Additional savings are expected to be achieved by supporting higher penetration of Distributed Generation (DG)



WHAT'S NEXT...COMED'S PROPOSAL FOR ILLINOIS' ENERGY FUTURE

- HB 3328 / SB 1879 is comprehensive legislation that advances a superior vision for a cleaner, greener, more secure Illinois, simultaneously empowering energy consumers and the Illinois economy.
 - Leverages Smart Grid to increasingly integrate clean energy options, such as community solar and green technology including electric vehicles
 - Further enables ComEd to make clean energy options more widely accessible to Illinois residents of all income levels, across all geographic areas of our service territory.
 - Presents a sustainable clean energy policy for Illinois consumers and businesses, powering Illinois' economic growth foundation through technology advancement, smart innovation, and responsible, equitable investment.
 - Is superior to other proposals:
 - A far reaching plan for a clean energy policy in Illinois
 - Provides more choices for consumers
 - Ensures customers only pay their fair share of electricity cost
 - Offers assistance to those in need
 - Incorporates energy security and resilience features
 - Jump starts the electrification of the transportation sector

WHAT'S NEXT.....A PATH TO ILLINOIS' ENERGY FUTURE

Legislative Change	Description	Customer Benefits
1 Expand Energy Efficiency	Allows utilities to invest in voltage optimization to meet energy efficiency goals; spreads costs to customers over 5 years minimizing initial customer impact; shifts all energy efficiency program management to the utilities	<ul style="list-style-type: none"> • More energy efficiency • More customer cost savings for most customers regardless of program participation
2 Solar Power for the Community	Changes existing net metering law to enable community solar and other meter aggregation programs; provides access to Renewable Energy Resources Fund (RERF) to support development of community and rooftop solar	<ul style="list-style-type: none"> • More customer access to sustainable generation for customers at all income levels and dwelling types (rentals, condos, homes with rooftop limitations, etc.)
3 Equitable Cost Allocation Through Rate Design Modifications	Implements kilowatt-based rates for all retail customers; breaks-out capacity and transmission charges as separate bill line items; eliminates the requirement that a residential customer who elects real-time pricing remain on that rate for a minimum of a year	<ul style="list-style-type: none"> • Allocates costs of grid more fairly and aligns residential rate design with long-standing C&I rate design • Unbundling charges facilitates comparisons of energy offerings • Adjustment to real-time pricing provides more pricing choices to customers
4 Additional Financial Assistance for those in need – 2021	Extends access to ComEd shareholder-funded customer assistance dollars for low-income customers, including senior citizens, veterans, small businesses, and community organizations	<ul style="list-style-type: none"> • Provides \$50M in customer assistance benefits
5 Microgrids for Security and Resiliency	Pilot program to demonstrate how microgrid technology can provide security and resiliency to critical infrastructure	<ul style="list-style-type: none"> • Increased security, resiliency, and reliability for critical infrastructure
6 Electric Vehicle Charging Stations	Initiates a program to increase the number and accessibility of electric vehicle charging	<ul style="list-style-type: none"> • Supports electrification of transportation sector
7 Demand Response Facilitation Service	Enables utility to aggregate demand response procurement for retail energy providers in service territory; easing the administrative burden on retail energy providers	<ul style="list-style-type: none"> • Ensures viability of demand response participation in Illinois
8 Renewable Portfolio Standards Enhancements	Improves access to RERF money which is limited under the current legislation and streamlines administration	<ul style="list-style-type: none"> • Allows for more competitive service for large C&I customers • Increases RECs purchase

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