Utility of the Future
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Changes in the electric utility industry will require us to reevaluate our strategy for regulatory recovery, our business and operating models, and the way we interface with our customers.
Customer-centric Approach to Utility of the Future

ComEd’s Customer Driven UoF Strategy

1. Target by customer type.
2. Focus offerings to customer wants and needs.
3. Align to and exceed expectations through supreme experience.

Residential Customers
- Budget Constrained Multi-Unit Renters
- Affluent Single Family Home Owners
- Energy Tech Enthusiasts
- Disengaged Customers

C&I Customers
- 24 Hour Power Users
- Retail Big Box
- Small and Medium Businesses
- Critical Users
- Office Buildings and Complexes
- Energy Super Users
- Supersized Infrastructure

Municipal Customers
- City of Chicago
- Forward Looking
- Cost Conscious

Focus offerings to customer wants and needs.
- Comfort and ease through integrated IT, lighting, HVAC, and smart appliance systems
- On-demand access to products and services
- Economically and environmentally friendly transportation options
- Increased disposable income

Align to and exceed expectations through supreme experience.
- Energy marketplace
- Peak time savings and DR programs
- Smart thermostats
- Small-scale storage for CEMI customers
- Public EV charging

- Efficient and flexible operations
- Innovative tools and processes
- High product/service quality
- Digital capabilities to enhance business management and the user experience

- Street lights, water, garbage disposal
- Police, fire and health emergency services
- Disaster mitigation and relief
- Fiscal responsibility
- Quality of life assurance to citizens

- C&I portal
- Microgrids
- Premium power
- Next generation energy efficiency programs

- Municipal portal
- Open data platform
- Smart streetlights
- Non-AMI metering

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ComEd’s role is evolving to meet the growing interest among customers in having more choice and personalized services.

**Grid Operations**

**Guiding Principles**

1. ComEd must adapt from the historical utility model by increasing investments to address aging grid infrastructure in a digital economy requires greater dependency on electricity by both businesses and individuals.

2. ComEd will continue to build, maintain, and operate the grid to provide reliability, security and resiliency at reasonable cost, while investing in foundational automation technologies to move from a smart grid to a “smart cities” concept – where efficiencies derived from the grid can accommodate new, cleaner technologies ranging from smart streetlights to distributed generation.

3. ComEd will leverage its core competencies and expertise to play a role in owning, operating, and managing an integrated grid in a new world where choices for central generation and local distributed generation expand to better serve the customer.

**Customer Lens**

- Service-Based World

- Load-Serving World
The Three Networks of the Utility of the Future

Increasing integration of the three networks to achieve holistic offerings that do the job for our customers

ComEd’s electricity delivery network of 105,000 miles of T&D power lines and over 1,300 substations.
- *Today*, ComEd’s physical network is the legacy of traditional T&D infrastructure that is designed, constructed, and serviced to meet the present and future needs of our 3.8 million customers.
- *Tomorrow*, ComEd’s physical network will be enhanced by innovative grid edge technologies (microgrids, battery storage, smart infrastructure) to optimize our existing assets while unlocking grid flexibility (e.g. multi-directional power flow) and new value streams for our customers.

**Physical Network**

ComEd’s communication network layered between the social and physical networks enables the transmission of data and information.
- *Today*, ComEd’s communication network is comprised of systems to support core utility functions (customer billing and grid operations).
- *Tomorrow*, ComEd’s communication network will evolve to include the collection and transmission of data to optimize grid planning and operations. This enables non-traditional service offerings that enhance security, resiliency and liveability of our communities and facilitate drawing insights from business intelligence and data analytics and new service offerings to our customers.

**Digital Network**

ComEd’s direct relationship with every resident, business, and municipality in northern Illinois, as well as residents interacting with each other.
- *Today*, ComEd’s social interactions are comprised of everyday transactions such as reading meters, providing customer service and billing.
- *Tomorrow*, ComEd’s social interactions will be guided by personalized information and insights, as well as customers providing services or information that can be used by the broader community.

**Social Network**

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The Next Generation Energy Plan (NGEP) is a comprehensive energy solution that will drive Illinois’ clean energy future while saving and creating jobs and strengthening the state’s economy and infrastructure. The plan doubles energy efficiency, jumpstarts solar energy in Illinois, provides $1B in low-income assistance, and secures the future of the state’s nuclear plants.
No Regret Investments to Build Utility of the Future

**Smart Cities**

- Intelligente substations
- Underground cable replacement
- Pole replacement
- Advanced Metering Infrastructure
- Manhole refurbishments
- Storm hardening
- Wood pole remediation
- Distribution Automation

**Advanced Grid Infrastructure**

- Microgrids: Analyze and pilot initiatives to further the development of microgrid technologies and integration with the larger distribution system.
- Superconductor: Deployment plan of high temperature superconductor technology to build a superconducting cable system that will strengthen Chicago’s electric grid, providing a new level of reliability and add unparalleled redundancy to the heart of the financial and business district of Chicago.
- Power Quality & Premium Power: Development of an offering targeted to C&I customers to reduce risk of outages, ensure consistency of power delivery, and diversify the suite of products, services and information available to optimize energy consumption of C&I end-users.

**BI/DA Infrastructure**

- Asset Intelligence & Data Monitoring: Deployment of modern monitoring, protection and switching devices and voltage regulation/control assets.
- Deployment of OT/IT Infrastructure: Cost-effective identification and replacement of deteriorated or outdated OT/IT infrastructure, including control center infrastructure, full DMS/OMS functionality, communications systems, IT and enterprise systems.
- Grid Analytics: Procurement, customization, development, implementation, review, and update of several grid analytics applications and tools to be used in T&D infrastructure planning, operations, and engineering analysis, including applications pertaining to DER management, Distribution State Estimation, Phase Balancing and bidirectional power flow analysis.

**Foundational Initiatives**

- GRIP Program Expansion: Further investment in the three categories of the existing GRIP program: RTEP/Supplemental Transmission, Transmission Improvements and Distribution Improvements.
- Post EIMA Initiatives: Continue infrastructure, training and smart grid improvements of the EIMA program while preparing ComEd’s grid for emergent challenges such as higher reliability and resiliency expectations.
- People: Develop and acquire big data analytical skills, market function and design skills, Maintenance and planning programs, EP/OCC Ops.
- Processes: Enhance ComEd’s existing processes by integrating existing and new IT systems, and leveraging data from OT/IT infrastructures to address data integrity issues.
### Customer Ops Initiatives to Build Utility of the Future

#### Analytics & Insights
Creating high performance and modular IT architecture and solutions that will bear extensive multi-directional data traffic and computing capability, while maximizing easy integration into both existing and more swiftly evolving new platforms.

- Analytics Platform
- Residential Meter Usage Data (RMUD) Access
- Channel Analytics Use Case

#### People Strategy
Identifying required skill sets and needs of the “employees of the future” to develop, train, and tap full value of existing talent, and to strategically attract and acquire the full range of diverse talents necessary to bring value to customers of future.

- Customer Operations People Strategy
  - Recruiting and Selection
  - On-boarding
- Employee Engagement
  - Performance Management and Development
  - Succession Planning

#### IT Systems
Creating high performance and modular IT architecture and solutions that will bear extensive multi-directional data traffic and computing capability, while maximizing easy integration into both existing and more swiftly evolving new platforms.

- CIS North Star Project
- Interval Data Services / External Data Exchanges
- MDM Phasing Project
- AMI EDE Roadmap
- CIS Pluggable Architecture
- Data Abstraction Layer

#### Choice and Control
Fundamentally pivoting from a “one-size-fits-all” service strategy to a suite of offerings that offer customers analytics/insight-driven choices, and selections that, in turn, genuinely empower the customer to easily take actions that are meaningful to him/her in the channel of choice.

- Bidgely Pilot
- Smart Meter Connected Devices Pilot
- Nest and Xfinity Thermostat Pilots
- Residential Real Time Pricing (RRTP) Program
- Peak Time Savings (PTS) Program
- Energy Management and Efficiency Programs
- Pre-Payment Pilot Study
- Energy Strategy for Businesses Pilot
- Retrocommissioning Opportunity Expansion
- LED Streetlight Incentive Program
- Commercial & Industrial Web Portal (Managed Accounts)

#### Personalization
Customized, personal, and data driven offerings and services that are based on customer preferences and insights, and are directly relevant to the customer.

- My Account Usage Integration Project
  - Preference Center Build-out
  - BTM Marketplace Beta
  - Appointment Scheduling and Order Status Tool
  - Channel Analytics Use Case
  - Mobile App Redesign
  - Energy Concierge Service Program
  - Unique Building Energy Efficiency Pilot
  - Optimize Your Operations for Businesses

#### Transaction Freedom
Acknowledging, enabling, and extending faster, more barrier-free, and easier customer-to-utility, customer-to-customer, customer-to-group, and other newly developing bilateral and multi-party transactions and interactions involving energy.

- Green Button Connect My Data C&I and Residential
- Automate POG-Net Metering Billing
Microgrid Pilot Program

The goal of the pilot program is to protect critical infrastructure required to operate in the event of catastrophic incident that impacts the electric grid.

Resiliency, Security & Safety:
- Improved physical and cyber security
- Increased resiliency through localized system control and operations

Reliability & Power Quality:
- Reduced interruptions
- Shorter outages
- Enhanced power quality

Economic:
- Greater system efficiency
- Deferred or avoided capacity investments
- Create new jobs

Environmental:
- Reduced CO2 and other harmful emissions
- Increases sustainable generation resources
- Reduced system losses

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Bronzeville – Testbed for Community of Future

An ideal candidate to serve as an innovation test bed to align emerging energy products and services to mounting customer expectations, as well as a pioneer ComEd’s initiative to effectively deploy and manage DERs in a way that optimizes rather than constrains the grid and maximizes value to customers and shareholders.

Evolution of Bronzeville to Integrated Community of the Future

Dense urban community with distribution system built with legacy equipment

Resilient and reliable microgrid

Community of the future led by customer insights and optimized with advanced grid technologies/DERs

Microgrid Controller: In 2014, ComEd was awarded with the Department of Energy grant to develop a microgrid master controller with applications to the Bronzeville Community Microgrid. The master controller will be capable of multiple microgrids together as microgrid clusters.

The customers of Bronzeville are...
- 10 MW of load **
- $33,000 median household income
- Diverse Community
- 62,000 utility customers of which >90% are residential
- Home to the Illinois Institute of Technology; Department of Homeland Security; Chicago Police Department Headquarters
- Diverse population of customers and load profiles

Technologies/offers to be tested:
- Smart inverters
- Energy storage
- Wireless charging
- Transactive Energy
- Smart EV charging
- Smart street lighting
- AMI for water metering
- Service package
- Smart thermostat control
- Select low-income energy management devices and education
- EV to thermostat pairing

Developed Data Analytics Tools:
- Resiliency metrics
- Microgrid optimization tool - Secured a patent
- Hosting capacity - On patent process
- Distribution State Estimation

ComEd’s Enables Ecosystem with Open Data, Analytics & Customer Management Platforms

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Microgrid Controller
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.

SHINES/MISST
The DOE awarded $4 M to ComEd to utilize smart inverters for solar PV and battery storage systems. Proposed MISST project will deploy high power solar PV and a high-power Battery Energy Storage System (BESS) in the Bronzeville Community Microgrid (BCM).
Next Steps

• Further develop and refine Utility of the Future Business and Operating model

• Identify and pursue most appropriate Legislative and Regulatory pathway to enable U of F strategy and preserves optionality

• Leverage learnings from existing and future customer and grid operations partnerships, pilots and initiatives

• Continue monitoring U.S. legislative and Regulatory proceedings, emerging technologies and consumer trends