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Examples of Smart Communities in Action

Electric Companies Play a Leading Role

Projects included as of January 2018

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Smart Communities In Focus

Spotlight: Albuquerque, NM



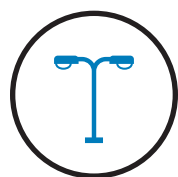
Albuquerque's smart community effort is aided through its partnerships with Public Service Company of New Mexico (PNM), Albuquerque Rapid Transit, Build Your Dreams (BYD), Citelum, Ecoulit/East Penn Manufacturing, Nissan, Northern New Mexico College, Sandia Laboratories, Ugo, University of New Mexico, and the U.S. Department of Energy.

Albuquerque's Goals

- Create new jobs
- Improve citizen well-being
- Introduce more efficient technology
- Develop new ways to cut costs

Smart communities are built on smarter energy infrastructure and leverage the power of data and technology to improve sustainability, spur economic development, help drive efficiencies, and enhance the overall quality of life for their citizens. This summary focuses on specific opportunities where communities and electric companies can collaborate to make communities smarter, including projects that advance: Smart Street Lighting, Smart Transportation, Smart Buildings, Distributed Energy Resources, and Data Analytics and Intelligent Services.

What Makes Albuquerque Smart?



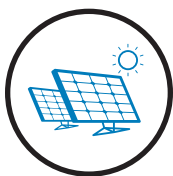
Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- Albuquerque partnered with PNM and Citelum to install 19,000 auto-dimming LED street lights that the city owns. A portion of these lights will include smart controls that allow for auto-dimming and remote notification of maintenance issues. PNM also is partnering with the city to convert 11,600 PNM-owned streetlights to solar-powered LED.
- As part of the LED streetlight upgrade, Albuquerque plans to install Internet of Things sensors on street lights for safety, city attractiveness, financial improvement, and sustainability.



Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- PNM partnered with Nissan to install five DC fast chargers in 2015. PNM continued that partnership with Nissan and a third-party networking provider Ugo in 2017 to install two more DC fast chargers. All chargers are networked to collect data and to be controlled remotely.
- Albuquerque purchased 18 electric buses from BYD for its new Albuquerque Rapid Transit system, providing new service along a critical artery to enhance underserved neighborhoods. These buses will be charged using rapid chargers that can also be controlled remotely.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- PNM's 500-kilowatt Prosperity Energy Storage Project is the nation's first solar and storage facility to be fully integrated into an electric company's energy grid and uses smart grid technology to advance renewable energy integration and reliability.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Albuquerque has installed 550 solar powered downtown smart parking meters, free Wi-Fi, and a city portal with numerous applications to ease access to city services.

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Smart Communities In Focus

Spotlight: Atlanta, GA



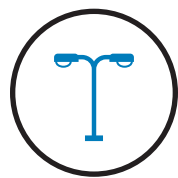
Atlanta's smart community effort, known as SmartATL, is aided through its partnerships with Georgia Power, AT&T, Atlanta Beltline, Atlanta Streetcar, Build Your Dreams (BYD), Current, powered by GE, Georgia Tech, Hartsfield-Jackson International Airport, Metropolitan Atlanta Rapid Transit Authority (MARTA), and Proterra.

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Atlanta's Goals

- Expand mobility options and enable economic opportunities
- Make public and private travel faster, easier, and safer
- Improve commerce and attract employers
- Reduce environmental impacts of transportation
- Improve response time and reduce crime
- Improve citizen/business engagement

What Makes Atlanta Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- Atlanta is in a bidding phase to upgrade 9,000 of 14,000 city-owned street lights.
- Georgia Power also is upgrading 36,000 street lights leased to the city with LED fixtures.
- The City of Atlanta, Georgia Power, Georgia Tech, AT&T, and Current, powered by GE, are partnering to pilot Current's new Internet of Things sensor platform for cities and are installing 1,000 wirelessly controlled LED lights in five Atlanta neighborhoods. Sensors will be networked and will provide information on traffic congestion, crime, and emissions. The first neighborhood pilot is the North Avenue Corridor project, operational in September 2017.



Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- Georgia Power installed 37 electric vehicle (EV) charging stations as part of a statewide initiative to build range confidence and spur EV adoption. A large percentage is located in metro Atlanta.
- Atlanta has 65 electric fleet vehicles in operation with a goal of 600 by 2020.
- More than 100 EV charging stations are at the Hartsfield-Jackson International Airport, and the city plans to install 200 more in future years.
- MARTA is expanding electrified transit services through the Atlanta Streetcar and the Atlanta Beltline, two projects focused on increasing neighborhood interconnectivity, reducing congestion, and promoting clean transportation.
- MARTA is partnering with Georgia Power in the installation of EV charging infrastructure.
- Georgia Power is working with MARTA to evaluate financial and environmental savings of fleet electrification.
- MARTA is exploring bus electrification and has completed demonstrations with Proterra and BYD.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- The scope of the North Avenue Corridor pilot project includes developing a scalable smart city data platform for traffic congestion and a range of other uses.
- Georgia Power fully deployed smart meters as of 2012.

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Smart Communities In Focus

Spotlight: Baltimore, MD



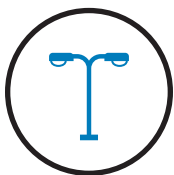
Baltimore's smart community effort, known as B'Smart Baltimore, is aided through its partnerships with Baltimore Gas & Electric (BG&E), Bloomberg Philanthropies, Electric Vehicle Institute, Maryland's Electric Vehicle Infrastructure Council (EVIC), the Maryland Department of Transportation, and the Maryland Energy Administration.

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Baltimore's Goals

- Advance quality education
- Foster a safe environment for the public
- Strengthen economic development and job creation
- Enhance quality of life
- Promote accountability and transparency

What Makes Baltimore Smart?



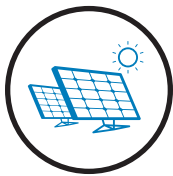
Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- BG&E is partnering with Baltimore to convert all streetlights to energy saving LEDs as well as to support efforts to install 6,000 new pedestrian lights throughout the city to brighten communities and improve public safety.



Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- Baltimore has installed more than 50 electric vehicle charging stations through partnerships with EV charging providers, BG&E, Electric Vehicle Institute, Maryland Department of Transportation, Maryland Energy Administration, and Maryland's EVIC.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- Baltimore has contracted for more than 7.5 megawatts of solar supply to provide renewable energy to many of its accounts with aggregate net metering.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Baltimore is developing a citywide digital transformation strategic plan to be released in 2018, of which a large portion will be dedicated to building upon and improving smart city infrastructure to improve services and quality of life for city residents.
- Baltimore recently installed a new smart metering and billing system to improve customer service and provide more accurate and real-time access to water use data.
- BG&E completed its smart meter deployment in 2015, which improved outage restoration, and enabled city residents to take advantage of energy savings programs and load management incentives.

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January 2018

Smart Communities In Focus

Spotlight: Chicago, IL



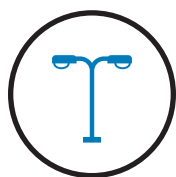
Chicago's smart community effort, known as Sustainable Chicago, is aided through its partnerships with ComEd, Ameresco, Argonne National Laboratory, Chicago Innovation Fund, Chicago Transit Authority, CIVIQ Smartscares, Illinois Institute of Technology, National Science Foundation, Silver Spring Networks, and the University of Chicago.

Chicago's Goals

- Support economic development and job creation
- Advance energy efficiency and clean energy
- Develop clean transportation options
- Address climate change

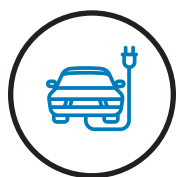
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What Makes Chicago Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- Chicago is partnering with Ameresco to replace 270,000 street lights with LED fixtures with dimming capability. New fixtures will be networked and controlled remotely by a lighting control system. Replacement begins in 2017 and will be completed in 2020.
- ComEd is piloting the implementation of off-grid streetlights, powered by wind turbines, solar panels, and batteries in the Bronzeville neighborhood.



Smart Transportation—Improves safety and mobility, reduces carbon footprint, and provides greater access to services.

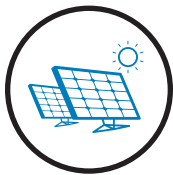
- ComEd developed a screening tool that identifies the best areas in Chicago to install electric vehicle (EV) chargers based on attracting EV usage and energy grid conditions.
- After a successful pilot, the Chicago Transit Authority will add 30–40 electric buses to its 1,800 bus fleet within the next few years.
- ComEd is preparing to pilot a community mobility pilot using shared-use EVs in the Bronzeville neighborhood.



Smart Buildings—*Save energy and improve sustainability.*

- Retrofit Chicago has worked for years to encourage energy efficiency retrofits in residential, commercial, and municipal buildings. Through its Energy Challenge, more than 60 buildings spanning 44 million square feet are committed to reducing energy usage by at least 20 percent.

For more information, see: www.retrofit.cityofchicago.org.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- ComEd proposed a microgrid in the Bronzeville neighborhood of Chicago, clustered with an existing microgrid at the Illinois Institute of Technology. The project will include 750 kilowatts of solar and 500 kilowatts/2,000 kilowatt-hours of battery storage. ComEd also has won a grant from the U.S. Department of Energy to develop and implement a microgrid controller.
- ComEd is developing hosting capacity maps that would support the siting of community solar.
- Under a U.S. Department of Energy grant, ComEd is researching the usage of smart inverters to support increased penetration of renewable energy like wind and solar.
- ComEd is piloting a community energy storage unit integrated with EVs for charging station demand management.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- ComEd is using data from smart streetlights to identify systemic failures and to decrease future outages.
- Chicago partnered with Argonne National Laboratory, the University of Chicago, and others on a project called the Array of Things. Between 2016 and 2018, this project will install 500 sensor nodes around the city and capture environmental, air quality, light, and infrared information. Data gathered through the project will be open, free, and available to the public. It is anticipated that Chicago will develop applications to utilize traffic pattern data for increased efficiency.
- Chicago is piloting the implementation of CIVIQ Smartscape's interactive, networked public kiosks that provide free Wi-Fi and access to relevant transit information and other services.

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August 2017

Smart Communities In Focus

Spotlight: Columbus, OH



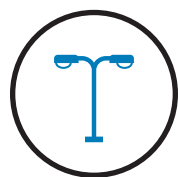
Columbus' smart city initiative, known as SmartColumbus, is aided through its partnerships with AEP Ohio, Autodesk, Amazon Web Services, AT&T, Continental, Central Ohio Transit Authority, Columbus Partnership, DC Solar, Mobileye, NXP Semiconductors, Ohio Department of Transportation, Sidewalk Labs, U.S. Department of Energy, U.S. Department of Transportation, and Vulcan Inc.

Columbus' Goals

- Drive economic growth
- Improve quality of life
- Foster sustainability
- Improve safety

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What Makes Columbus Smart?



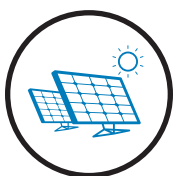
Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- AEP Ohio will upgrade approximately 1,000 street lights to networked LED fixtures, with plans to network another 201,000 street lights pending regulatory approval.
- Columbus Public Utilities plans to replace 53,000 street lights with LED bulbs and to add more street lighting following a piloting phase.
- AEP Ohio and the City of Columbus are discussing the scope of smart street lighting equipment and features, including congestion and parking space monitoring and shot spotting technology. AEP Ohio plans to provide, at minimum, networking capability that will allow sensor/monitoring equipment upgrades in future phases.



Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- AEP Ohio plans to invest \$7 million to install 1,275 electric vehicle (EV) charging stations, including 275 public charging stations—25 of them DC fast chargers—and 1,000 Level 2 residential chargers, pending regulatory approval.
- AEP Ohio is increasing its EV fleet and has made a commitment to purchase 48 additional EVs.
- Columbus is demonstrating connected, autonomous, shared electric shuttles at Easton Town Center.
- Columbus will connect 3,000 vehicles on the road, including installing pedestrian detection and collision avoidance technology on Central Ohio Transit Authority buses.
- More than 60 leading businesses and institutions in the Columbus region set a goal to reduce single occupancy vehicle traffic by 10 percent.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- AEP Ohio has proposed investing \$52 million to build 8–10 electric company solar-powered microgrids at critical locations throughout the city. Each microgrid could be supported by a roughly 3-megawatt-hour storage system and 500 kilowatts of solar generation. The proposal is awaiting regulatory approval.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- The City of Columbus and Ohio Department of Transportation plan to aggregate travel time and route data to provide information via smart phone apps for freight routing, delivery, and event routing.
- Information collected from AEP Ohio's smart lighting system will populate a data exchange being established by the City of Columbus.
- The City of Columbus plans to enhance web-based applications related to EV charging facilities location, public transit fares, and traffic congestion.
- AEP already has deployed 132,000 smart meters in the central Ohio area, and is in the process of replacing another 542,000 meters in the smart city footprint.

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August 2017

Smart Communities In Focus

Spotlight: Denver, CO



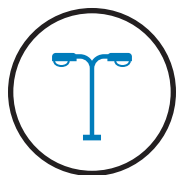
Denver's smart community effort is aided through its partnerships with Xcel Energy, Colorado Regional Transportation District, Denver International Airport, Northern Reliability Inc., Panasonic, Silver Spring Networks, Sunverge Energy, U.S. Department of Transportation, and Waze.

Denver's Goals

- Advance renewable energy and energy grid resiliency
- Improve air quality and mobility
- Demonstrate new technologies

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What Makes Denver Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- Xcel is upgrading 15,000 streetlights to LEDs across Colorado with more than one-third of them located in the Denver metro area.
- The Peña Station Next mixed-use development community being developed near the Denver International Airport will include motion-activated self-dimming LED streetlights powered by solar cells, and HD security cameras to enhance safety.



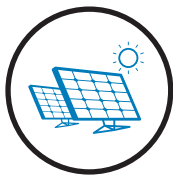
Smart Transportation—Improves safety and mobility, reduces carbon footprint, and provides greater access to services.

- Denver installed two DC fast charger and 10 Level 2 chargers throughout the city. The Denver International Airport installed 10 electric vehicle chargers.
- Colorado's Regional Transportation District expanded its electrified light rail transit in 2016 to include a line from downtown Denver to the Denver airport—with stops including the Peña Station Next development.



Smart Buildings—*Save energy and improve sustainability.*

- Denver was the first municipality in Colorado to enter into a Joint Energy Efficiency Program with Xcel Energy. The program establishes target goals for city energy reduction efforts.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- Xcel Energy leads two battery storage demonstrations as part of the Innovative Clean Technology program. One is a partnership among the City of Denver, Xcel Energy, and Panasonic designed to prove the efficacy of high-capacity batteries to provide energy grid services and deliver multiple value streams. The project includes a 1-megawatt (MW)/2-megawatt-hour energy storage system and a 1.3-MW-AC canopy photovoltaic installation. The battery storage system will provide reliability to a Panasonic facility by forming a microgrid in the event of a grid outage.
- Xcel Energy's second battery storage pilot program is in the Stapleton neighborhood, which has some of the highest penetration of private solar in the Denver area. This pilot is testing six 15.5-kilowatt-hour in-home, behind-the-meter battery units, and six large-scale units along the feeder to prevent reverse power flows and to enable solar "time shifting" by storing and discharging solar energy during the residential feeder's peak demand. The behind-the-meter battery systems are operational and the large-scale batteries will begin operations in the fall/winter 2017.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Denver received a \$6 million U.S. Department of Transportation grant to deploy technology that will address traffic congestion and safety.
- Denver is installing dedicated short-range communications in 1,500 city fleet vehicles and is partnering with Waze to create a connected traffic messaging channel and operational environment that supports connected vehicle applications.
- Denver also is developing a dedicated short-range communications-enabled freight signal priority program to improve travel time reliability and to reduce freight congestion during peak travel periods.

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August 2017

Smart Communities In Focus

Spotlight: Kansas City, MO



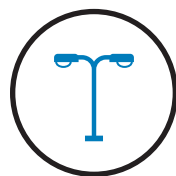
Kansas City's smart community effort is aided through its partnerships with Kansas City Power & Light Company (KCP&L), Bridj, Cisco, Exergonix, Ford, Kansas City Area Transportation Authority, Kansas City Streetcar Authority, Sensity, Sprint, and Xaqt.

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Kansas City's Goals

- Improve delivery of city services
- Improve transportation and connectivity of East Side
- Support connected and autonomous vehicles
- Increase info sharing, mobility, and accessibility

What Makes Kansas City Smart?



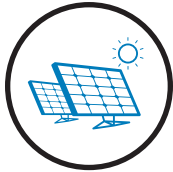
Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- Kansas City is piloting 125 dimmable LED streetlights by Sensity.
- Kansas City has installed 122 video sensors along the streetcar route to track congestion. Shotspotter technology to detect, record, and triangulate the location of a gunshot is being considered as a future upgrade.



Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- KCP&L installed approximately 900 electric vehicle charging stations, including fast DC chargers, and plans to partner with the city of Kansas City to incorporate automatic billing and optimal time/rate charging control.
- The Kansas City Streetcar Authority installed a 2-mile electric “smart” streetcar downtown, and uses the system as a laboratory for future innovation.
- The Kansas City Area Transportation Authority and Ford partnered on a pilot project to test on-demand ride sharing commuter shuttle service.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- KCP&L matched \$23M of federal funding to demonstrate a microgrid in a 2-square-mile area with 14,000 commercial and residential customers. The is part of the Green Impact Zone SmartGrid Demonstration.
- The demonstration includes smart meters, smart substation technologies, and a 1-megawatt, 1-megawatt-hour battery, inverter, and ground mount solar array. The Exergonix lithium polymer battery is connected to the energy grid, and lets KCP&L test how energy storage systems can shave peak load on a circuit, enable volt/VAR control, and support circuit islanding.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Kansas City developed an open-access portal with live maps provided by Xaqt, now online and available to the public, which shows streetcar locations, available parking, and traffic conditions.
- Kansas City and Sprint partnered to develop free public WiFi across 50 downtown blocks, and will extend it to 180,000 more residents.
- Kansas City and Cisco partnered to develop 25 interactive kiosks showing entertainment, dining options, and city services.

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Smart Communities In Focus

Spotlight: Louisville, KY



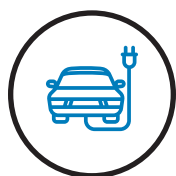
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Louisville's Goals

- Improve public transportation
- Enhance public safety
- Develop an efficient and sustainable city
- Encourage adoption of electric vehicles
- Pioneer energy storage technology

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What Makes Louisville Smart?



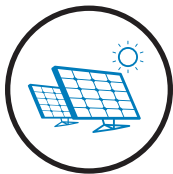
Smart Transportation—Improves safety and mobility, reduces carbon footprint, and provides greater access to services.

- LG&E received approval from the Kentucky Public Service Commission to install 10 public EV charging stations across its service territory. To date, three public stations have been installed in the Louisville Metro area, and two additional stations are hosted by commercial customers. LG&E partnered with ChargePoint to offer this service.
- PARC installed seven charging stations in city-owned garages and is in the process of surveying EV customers to determine locations for future charging stations.
- Louisville Metro, TARC, and the Federal Transit Administration partnered to develop 'ZeroBus', an all-electric bus service in downtown Louisville. TARC currently has a fleet of 15 all-electric buses operating in the city. Each ZeroBus is expected to save \$11,000 per year in diesel fuel and \$20,000 per year in maintenance costs.



Smart Buildings—*Save energy and improve sustainability.*

- Louisville Metro partnered with Johnson Controls to perform \$27 million of energy efficiency upgrades across nearly 200 municipal buildings, including water conservation efforts, lighting upgrades, HVAC upgrades, solar panels, and building management system controls. The project is expected to save \$56 million over 25 years.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- LG&E and KU Energy received approval from the Kentucky Public Service Commission to develop a community solar facility, which can accommodate up to four megawatts, through the subscription-based Solar Share program. The facility will be built for customers in Louisville and around Kentucky who are interested in supporting local solar energy. The electric companies also offer a Business Solar program and will build, own, and operate individual, private solar arrays for business and industrial customers.
- Just 80 miles from Louisville, LG&E and KU Energy commissioned Kentucky's first large-scale energy storage project that can host up to three individual megawatt-scale energy storage systems. The cutting-edge site allows researchers to evaluate the potential benefits of large-scale battery technologies and serves as a collaborative platform for research.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Louisville Metro partnered with Amazon Web Services to analyze data from companies such as Waze and from 311 reports to monitor real-time traffic flow and is working towards the development of an interconnected traffic management system that can sense dramatic changes in traffic flow and dynamically adjust city infrastructure to mitigate impacts.
- Louisville Metro partnered with AT&T to launch free public Wi-Fi hotspots throughout West Louisville, including the PNC Gigabit Experience Center, and multiple hotspot locations in public areas that provide connectivity to hundreds of residents each month.
- As part of their customer engagement and education strategy around advanced meters, LG&E and KU Energy commissioned the Advanced Meter Early Adoption Program, providing detailed energy usage information to 5,000 LG&E and 5,000 KU residential and small commercial customers. About 7,400 meters have been installed to date.

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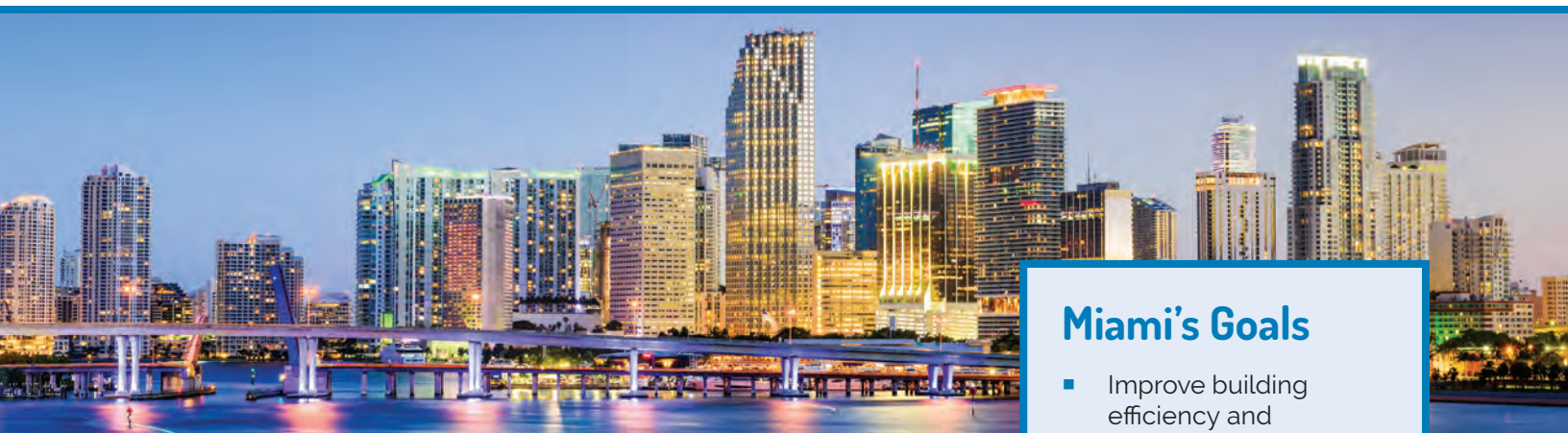


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January 2018

Smart Communities In Focus

Spotlight: Miami, FL



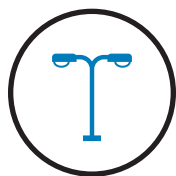
Miami's smart community effort is aided through its partnerships with Florida Power & Light Company (FPL), CIVIQ Smartscapes, the Department of Transportation and Public Works (DTPW), Electrify America, EvGo, the Florida Department of Environmental Protection, Silver Spring Networks, the South Florida Regional Planning Council, Tesla, and the U.S. Department of Energy.

Miami's Goals

- Improve building efficiency and sustainability
- Make public and private travel faster, easier, and safer
- Expand electric vehicle access
- Encourage renewable energy adoption
- Provide highly reliable and low-cost energy

Smart communities are built on smarter energy infrastructure and leverage the power of data and technology to improve sustainability, spur economic development, help drive efficiencies, and enhance the overall quality of life for their citizens. This summary focuses on specific opportunities where communities and electric companies can collaborate to make communities smarter, including projects that advance: Smart Street Lighting, Smart Transportation, Smart Buildings, Distributed Energy Resources, and Data Analytics and Intelligent Services.

What Makes Miami Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- FPL partnered with Silver Spring Networks to install wireless mesh networking technology and management control software to 107,000 street lights in the Miami-Dade County region, as part of the electric company's efforts to deploy 480,000 smart street lights across the state of Florida.



Smart Transportation—Improves safety and mobility, reduces carbon footprint, and provides greater access to services.

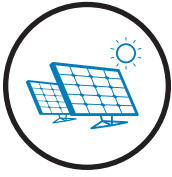
- Through partnerships with FPL, Electrify America, EvGo, the South Florida Regional Planning Council, and Tesla, Miami-Dade County has deployed more than 700 EV charging stations throughout the area.
- Miami-Dade County requested funding to develop 52 new EV charging stations at county-owned facilities from Volkswagen's state mitigation funding.

- The County also requested funding to purchase 75 all-electric buses from Volkswagen's state mitigation funding as part of their initiative to replace 44% of their current bus fleet by 2019.



Smart Buildings—*Save energy and improve sustainability.*

- As part of its Sustainable Buildings Program, Miami-Dade County has 30 green building projects in planning, design, or under construction that will comply with the U.S. Green Building Council's LEED Green Building Rating System.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- FPL partnered with more than 50 commercial and governmental customers to install distributed solar projects, including deploying its new Solar Trees at Miami's Frost Museum of Science and Tropical Park.
- FPL partnered with Florida International University's College of Engineering in Miami on a clean energy research program, and installed a 1.4-megawatt commercial-scale distributed solar energy system.
- FPL launched an energy storage pilot project, repurposing batteries from 200 BMW electric vehicles for grid management during periods of high demand in a residential area of southwestern Miami.
- FPL built a mobile energy storage system to complement the FPL smart grid to avoid power interruptions or power quality issues at national televised events. The system functioned as designed during the 2017 Miami Open at Key Biscayne.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Miami-Dade partnered with CIVIQ Smartscales to install up to 300 "WayPoint" digital interactive kiosks throughout the county, more than 1,000 Wi-Fi devices in public transit vehicles, and 51 additional Wi-Fi devices in public transit stations.
- Smart traffic signal technology installed along NW 36th Street, between 71st and 84th Avenues, as part of a \$160 million effort to improve traffic flow, signal synchronization, and reduce congestion, will give priority to buses and improve reliability for public transportation.
- FPL has invested more than \$3 billion since 2006 to build a stronger, smart, and more storm-resilient energy grid, and has installed more than 4.9 million smart meters and more than 90,000 intelligent devices across its service area. These investments have paid off, as FPL's service reliability exceeds 99.98%.

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Smart Communities In Focus

Spotlight: New York City, NY



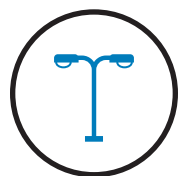
New York City's smart community effort is aided through its partnerships with Consolidated Edison Company of New York (Con Edison), Current powered by GE, General Electric, the Metropolitan Transportation Authority Board, New Flyer, New York City Department of Transportation (NYCDOT), the New York State Energy Research and Development Authority, and Proterra.

Smart communities are built on smarter energy infrastructure and leverage the power of data and technology to improve sustainability, spur economic development, help drive efficiencies, and enhance the overall quality of life for their citizens. This summary focuses on specific opportunities where communities and electric companies can collaborate to make communities smarter, including projects that advance: Smart Street Lighting, Smart Transportation, Smart Buildings, Distributed Energy Resources, and Data Analytics and Intelligent Services.

New York City's Goals

- Modernize and better integrate NYC's electric infrastructure
- Make NYC's energy grid more environmentally friendly
- Increase access to 'smart' infrastructure for lower-income citizens
- Improve public safety and convenience with new technologies

What Makes New York City Smart?



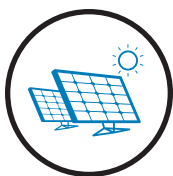
Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- New York City's Department of Transportation is in the process of retrofitting all 250,000 street lights with LED bulbs, and expects to save approximately \$6 million in energy and \$8 million in maintenance costs annually.
- New York City is partnering with General Electric, and its energy startup Current, to pilot GE's Intelligent Lamp Posts. The GE street lights are equipped with sensors and cameras to measure traffic and crowd movement, as well as provide relevant information to the public.



Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- In September 2017, New York City announced plans to invest \$10 million to develop fast charging hubs in every borough by the end of 2018 and 50 fast charging hubs citywide by 2020. Each hub will be equipped with 20 chargers.
- New York City is piloting the performance of all-electric buses. The city leased five electric buses from Proterra and is expected to lease another five from bus manufacturer New Flyer.
- Con Edison partnered with FleetCarma on a peak load reduction program called SmartCharge New York. Under the program, EV owners receive a free FleetCarma "C2" connected car device that tracks their driving and charging data. Owners who install and use their C2 device and charge their vehicles during off-peak periods earn SmartCharge rewards.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- Con Edison's Brooklyn Queens Demand Management Program allows the electric company to contract 52 megawatts (MW) of demand reductions and 17 MW of distributed energy resources, deferring a \$1.2 billion substation upgrade.
- As part of its Brooklyn Queens Demand Management Program, Con Edison provided incentives for battery, solar, and fuel cells at a moderate income, 625-unit building in Brownsville, Brooklyn, reducing energy costs at the building and adding resiliency to the community.
- The New York State Energy Research and Development Authority launched its NY Prize competition, which allocates \$40 million to spur microgrid development throughout the state. Three microgrid projects in New York City, located in East Bronx, Clarkson Ave, and Sunnyside Yard, have been awarded feasibility studies.
- New York City launched its Solarize NYC campaign in December, 2014, to increase access to community solar throughout the city. To date, more than 850 projects have been installed or are in development, saving residents and businesses more than \$2.9 million in costs.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Con Edison is spending \$1.3 billion to install nearly 5 million smart meters by 2022, starting in Staten Island in 2017.

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Smart Communities In Focus

Spotlight: Phoenix, AZ



Phoenix's smart community effort is aided through its partnerships with Arizona Public Service Company (APS), Traffic Research & Analysis Inc. (TRA), and Valley Metro.

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Phoenix's Goals

- Improve city efficiencies
- Research and deploy battery storage
- Enhance integration of renewable energy
- Promote adoption of electric vehicles

What Makes Phoenix Smart?



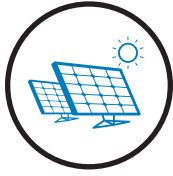
Smart Transportation—Improves safety and mobility, reduces carbon footprint, and provides greater access to services.

- APS plans to partner with schools in Phoenix to pilot all-electric buses and charging infrastructure and test how these buses can be used to absorb influxes of solar energy during the day and manage the schools' demand during peak hours.
- APS recently proposed to build, own, and operate an electric vehicle (EV) charging network for commercial fleets, workplace charging, and multi-family sites in Phoenix. The pilot program will focus on managed charging in alignment with advanced rates and system benefits.
- APS's Time of Use (TOU) rate structures encourage customers with EVs in Phoenix to save on electricity by charging their cars during off-peak hours. Residential TOU rates allow customers to charge at a gasoline equivalent of 30–90 cents per gallon during off-peak periods.



Smart Buildings—*Save energy and improve sustainability.*

- New homes constructed in APS's service territory are eligible for an incentive to pre-wire the home for owners to install fast EV chargers.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- APS owns and operates a 12-megawatt (MW) microgrid to serve customers and local resiliency needs in the Phoenix Valley. The microgrid serves as a peaking, voltage management, and frequency-response resource, as well as backup generation for a mission critical customer.
- APS owns and operates more than 280 residential rooftop solar systems and more than 1.1 MW of solar at Phoenix schools. APS will be developing \$30–45 million of additional customer sited solar resources targeted at serving limited income populations from 2018 through 2020.
- APS is performing industry-leading research with Phoenix residents using a variety of distributed energy resources to intelligently manage energy usage on advanced rates through APS's Solar Innovation Studies. The program compares different technology types and advances interoperability of technology for customer value.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Phoenix has a 20-year partnership with TRA to provide traffic data collection services to the city.
- APS has fully implemented smart meters with wireless capabilities in Phoenix.

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January 2018

Smart Communities In Focus

Spotlight: Pittsburgh, PA



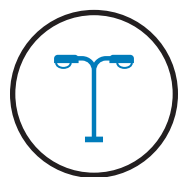
Pittsburgh's smart community effort is aided through its partnerships with Duquesne Light Company (DLC), Carnegie Mellon University, National Institute of Standards and Technology (NIST), Pennsylvania Department of Environmental Protection, Port Authority of Allegheny County, University of Pittsburgh, and the U.S. Department of Transportation.

Pittsburgh's Goals

- Improve air quality
- Expand energy independence
- Increase mobility
- Promote safety and economic opportunity

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What Makes Pittsburgh Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- Pittsburgh, with state funding, installed 4,500 LED streetlights in 2012. The city recently closed an LED upgrade request for information for 40,000 streetlights, which encouraged proposals for sensing equipment, networking, and data sharing platforms.



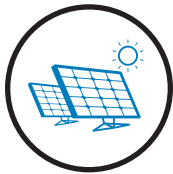
Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- In October 2016, the U.S. Department of Transportation awarded an \$11 million grant to Pittsburgh for its "Smart Spines" project, a network of sensors that support smart signaling and congestion control in critical corridors throughout the city, helping buses and freight vehicles move through intersections more efficiently.
- Pittsburgh received \$250,000 in state funds to upgrade city fleet vehicles to electric vehicles (EVs) and to install EV charging centers.
- The Sports & Exhibition Authority and the Pittsburgh Parking Authority installed several publicly available EV charging stations in parking garages/lots.
- The Port Authority of Allegheny County announced plans for a Bus Rapid Transit system that would operate electric buses in addition to plans to electrify portions of its existing fleet.



Smart Buildings—*Save energy and improve sustainability.*

- Pittsburgh is working with NIST and a consortium of local businesses that specialize in Internet of Things energy management and controls to monitor, track, and inform municipal building energy usage.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- Leveraging existing energy infrastructure, Pittsburgh included a concept of a "grid of microgrids" in its resiliency plan and is further developing the concept in partnership with DLC.
- DLC is planning a microgrid for its Woods Run operations center campus (six buildings).

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August 2017

Smart Communities In Focus

Spotlight: Portland, OR



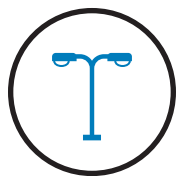
The city of Portland smart community effort is aided through its partnerships with Pacific Power, Portland General Electric (PGE), Portland State University, CIVIQ Smartscapes, Forth Mobility, Hacienda CDC, Multnomah County, National Institute of Standards and Technology (NIST), Portland Bureau of Transportation, Schneider Electric, and Tri-County Metropolitan Transportation District of Oregon (TriMet).

Portland's Goals

- Transition to a carbon-free economy
- Collaborate to become a zero-emissions vehicle city
- Integrate smart grid technologies with renewable energy generation
- Leverage private-sector partnerships and autonomous, connected vehicle technologies to reduce congestion

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What Makes Portland Smart?



Smart Street Lighting—*Saves energy, improves safety, and reduces traffic congestion.*

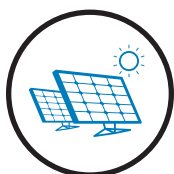
- Portland issued an \$18.5-million bond for an LED streetlight upgrade project, which is 85 percent complete. 48,500 street lights have been upgraded, and the city has saved \$300,000 per month in energy costs to date.



Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- Portland ranks fourth among U.S. cities in electric vehicle (EV) charging stations per million.
- PGE owns 10 DC fast chargers and 27 Level 2 chargers within city limits and the majority are publicly accessible.

- Through 2017, PGE's 100-percent renewable energy electric charge stations in downtown Portland powered more than 1 million miles of EV travel since their 2015 installation.
- TriMet is using a \$3.4M federal grant to purchase four battery-electric buses and to develop depot-based and on-route charging infrastructure. PGE has proposed to take on the cost of bus charging and transformer upgrades associated with this project, in the hopes of allowing TriMet to purchase an additional bus. The buses are expected to be operational in 2018.
- Pacific Power contributed to the installation of EV charging equipment to support a pilot EV car sharing program for low-income, underserved areas in Northeast Portland.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- Portland has engaged with Pacific Power, PGE, and Multnomah County and other local stakeholders in an effort to identify potential public sites for solar and storage projects that provide resiliency and emergency preparedness benefits.
- Pacific Power's voluntary green power program, Blue Sky, provided funding for the 63-kilowatt solar installation at the North Portland Police Precinct in 2016. Blue Sky funds also supported the installation of 2.2 megawatts of solar capacity at Portland Metro, Portland Public Schools, and the Port of Portland.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Portland is partnering with CIVIQ Smartscapes to deploy interactive kiosks around the city with information for wayfinding, multi-modal transit, free Wi-Fi, capability for emergency alerts, and 311 applications. System display will carry advertising to make it financially self-sufficient.
- Portland Bureau of Transportation, Portland State University, and NIST worked together to deploy and test nine air quality sensors at three intersections. Additionally, the city of Portland will install 200 pedestrian and vehicle traffic monitoring sensors.
- Pacific Power developed a software solution with Schneider Electric that allows commercial building owners to easily upload energy benchmarking data, as required by the city, into the Energy Star portfolio manager.

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August 2017

Smart Communities In Focus

Spotlight: Salt Lake City, UT



Salt Lake City's smart community effort is aided through its partnerships with Rocky Mountain Power (RMP), Park City, Breathe Utah, Fourth Mobility, Giv Development, Idaho National Laboratory, Maverik, New Flyer, Salt Lake City International Airport, the U.S. Department of Energy, Uber, Utah Clean Cities Coalition, University of Utah, Utah State University, and the Utah Transit Authority (UTA).

Salt Lake City's Goals

- Promote adoption of electric transportation
- Enhance access to renewable energy
- Reduce city emissions
- Enhance energy efficiency

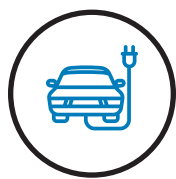
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What Makes Salt Lake City Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- Salt Lake City has successfully retrofitted half of the city's 15,505 street lights with LED lighting.



Smart Transportation—Improves safety and mobility, reduces carbon footprint, and provides greater access to services.

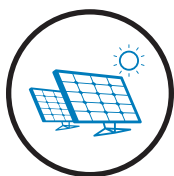
- RMP will use \$4 million awarded by the U.S. Department of Energy and \$10 million from its Sustainable Transportation and Energy Plan to accelerate the adoption of plug-in electric vehicles in the greater Salt Lake City area by developing electric highway corridors, advancing workplace charging, and incentivizing fleet conversions.
- In 2017, RMP partnered with public and private entities to install 110 charging ports across Salt Lake City and will install an additional 600 charge ports in the greater Salt Lake area over the next 3 years.

- Salt Lake City International Airport will deploy all-electric ground support equipment and infrastructure and install more than 100 electric vehicle charging stations at short- and long-term parking lots as part of a \$3 billion expansion.
- Salt Lake City is partnering with RMP, UTA, and the University of Utah to deploy five electric buses operating between the downtown transit hub and the University.
- Salt Lake City and RMP partnered with Forth Mobility to develop a ride hailing program for transportation networking company (TNC) drivers that includes building fast charging stations at key locations throughout the city, providing training to TNC drivers, and establishing a program to explore low-cost financing solutions for TNC drivers.
- RMP is working with the Giv Group to develop an electric vehicle car share program at its newly constructed all-electric multi-family affordable housing development in Salt Lake City. The cars will be available for residents to rent by the hour.



Smart Buildings—*Save energy and improve sustainability.*

- Salt Lake City International Airport's \$3 billion expansion will include a new LEED Gold-certified terminal with building automation for advanced lighting and heating/cooling systems, and energy efficient baggage handling equipment.
- RMP's wattsmart® Communities program supports Salt Lake City's Elevate Buildings and Project Skyline programs by providing technical expertise and cash incentives to help buildings save energy and reduce environmental impacts. In 2016, wattsmart provided \$25 million in energy efficiency incentives for the greater Salt Lake area.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- In 2016, Salt Lake City and RMP signed a joint clean energy cooperative statement setting a goal for the city to achieve 100-percent renewable energy for community-wide electricity supply by 2032.
- RMP launched the Subscriber Solar program in 2016, allowing customers to purchase renewable energy from a 20-megawatt solar resource. The project was fully enrolled by the time the resource was operational in 2017.
- RMP is implementing a 5-megawatt-hour battery storage system connected to a 650-kilowatt solar array to study the integration of solar and battery technologies while displacing the need to make system capital investments.

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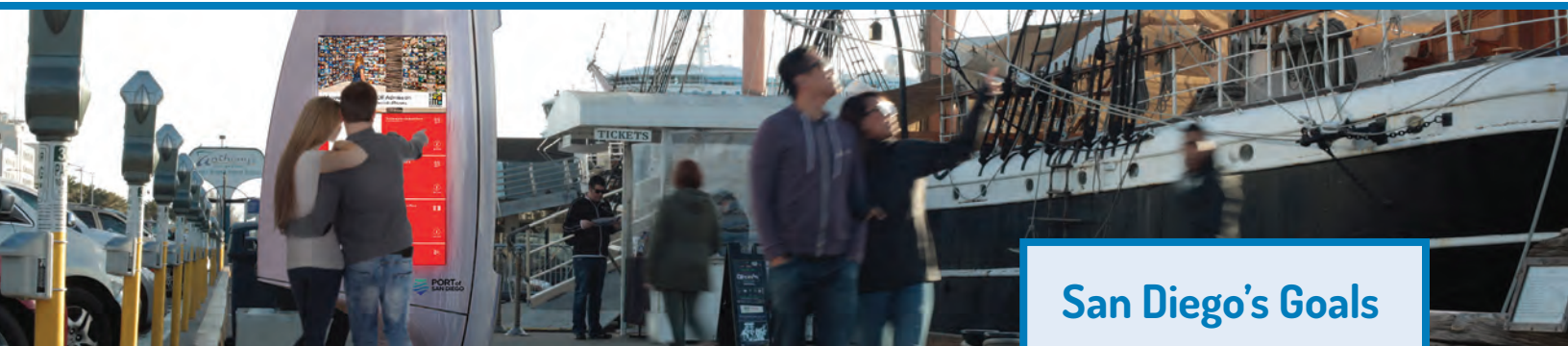


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January 2018

Smart Communities In Focus

Spotlight: San Diego, CA



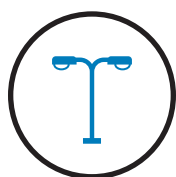
San Diego's smart community effort is aided through its partnerships with San Diego Gas & Electric (SDG&E), Black & Veatch, Center for Sustainable Energy, CivicSD, Cleantech San Diego, Dell, Free Ride, General Electric, IKE Smart City, Intel Corporation, OpConnect, OSIsoft, Port of San Diego, Qualcomm, San Diego Metropolitan Transit Authority, and UC San Diego.

San Diego's Goals

- Improve the region's energy independence
- Empower citizens to use electric vehicles
- Reduce greenhouse gas emissions
- Encourage economic growth

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What Makes San Diego Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- San Diego is replacing 14,000 (of 60,000) streetlights with LED lamps. This is part of a \$30 million upgrade effort that includes sensors, monitoring, and adaptive controls that provide the ability to dim the lights on fixtures remotely, based on need or situation, and lumen maintenance capabilities. Estimated savings are \$2.4 million annually.
- The adaptive control system monitors the fixtures, and provides maintenance notifications, and the GPS coordinates for each fixture. Fixtures are expected to be installed by fall 2018.
- San Diego also is installing cameras, microphones, and sensors on 3,000–6,000 street lights in downtown San Diego, covering 160 miles in 2017/2018. The system will use sensing nodes on light poles to locate gunshots, estimate crowd sizes, check vehicle speeds, optimize parking and traffic flow, enhance public safety, and track air quality. Data will be provided to entrepreneurs and students to develop applications.
- San Diego installed 30 adaptive traffic signals, which adjust timing based on real-time traffic conditions, and integrated them with the freeway on-ramp metering system.



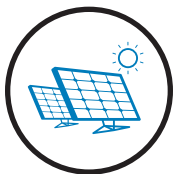
Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- San Diego installed 68 electric vehicle (EV) charging ports at 15 locations—including 9 spots installed in 2014.
- SDG&E is installing 3,500 EV charging stations beginning in 2017.
- Free Ride Everywhere Downtown (FRED), a free, electric-powered, smart-phone ride-hailing service, began operating in downtown San Diego in 2016.
- San Diego Metropolitan Transit Authority is investing \$2 billion in the electric-powered San Diego Trolley system to develop an 11-mile extension from downtown to UC San Diego.



Smart Buildings—*Save energy and improve sustainability.*

- The San Diego Airport is the country's first LEED Platinum-certified commercial airport, with a 12 kV microgrid.
- In December 2014, the Port of San Diego became the first demonstration site in a series of regional public-private smart building initiatives. The smart building project uses sensors to detect energy consumption and translates it into easy-to-manage, real-time data for building operators at the Port of San Diego. Similar sensor and smart building technology was piloted at PetCo Park and the San Diego Airport.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- A 45-megawatt microgrid provides UC San Diego with 85–90 percent of its power needs.
- SDG&E operates a 30-megawatt lithium-ion battery storage facility in Escondido that supports the electricity needs of San Diego.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- San Diego provides free Wi-Fi at all public libraries and at the convention center.
- The Port of San Diego will install 30 networked, interactive public kiosks in 2018. The effort is funded through advertising.

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August 2017

Smart Communities In Focus

Spotlight: San Jose, CA



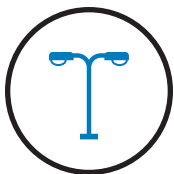
San Jose's Smart City Vision effort is aided through its partnerships with Pacific Gas & Electric (PG&E), Bay Area Rapid Transit (BART), Enphase Energy, General Electric, Philips, Proterra, Santa Clara Valley Transit Authority (VTA), Silver Spring Networks, and Tesla.

Smart communities are built on smarter energy infrastructure and leverage the power of data and technology to improve sustainability, spur economic development, help drive efficiencies, and enhance the overall quality of life for their citizens. This summary focuses on specific opportunities where communities and electric companies can collaborate to make communities smarter, including projects that advance: Smart Street Lighting, Smart Transportation, Smart Buildings, Distributed Energy Resources, and Data Analytics and Intelligent Services.

San Jose's Goals

- Leverage technology to enhance safety
- Broaden access to digital infrastructure to all residents
- Enable deployment of energy management technology
- Expand civic engagement
- Utilize open data and visualization to inform decision-making

What Makes San Jose Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- The City of San Jose retrofitted one-third of its 60,000 street lights with LED lamps and is in the process of bidding the remaining upgrade.
- PG&E, Philips, and San Jose are collaborating on a Smart Poles project that integrates a low-profile, two-way communicating meter on top of the pole, eliminating the need for a standalone meter box on the sidewalk, and allows for energy monitoring and lighting control, accurate billing of pole-mounted telecom equipment, and expanded 4G/LTE broadband applications.



Smart Transportation—Improves safety and mobility, reduces carbon footprint, and provides greater access to services.

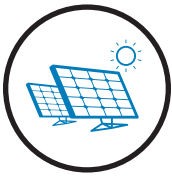
- The City of San Jose installed 53 electric vehicle (EV) chargers in public parking garages.
- The California Public Utilities Commission authorized PG&E to move forward with installing 7,500 EV charging stations throughout its territory.
- BART is extending electrified rail service to San Jose by the end of 2017.

- VTA is piloting electric buses in collaboration with Prospect Silicon Valley, a cleantech innovation hub, and electric bus manufacturer Proterra. Five electric buses will be operational in 2017 and 35 more by 2019. The pilot includes an energy management system that minimizes cost of bus charging and assists integration of variable renewable energy sources.
- The City of San Jose opened a request for information in 2017 for autonomous vehicle pilot demonstrations in five corridors of the city, with the goal of providing mobility options to the underserved, offering alternative modes to incentivize drivers off the road and help reduce greenhouse gas emissions.



Smart Buildings—*Save energy and improve sustainability.*

- Over an 18-month period, PG&E partnered with 448 San Jose businesses to inspire employees to adopt energy-savings actions in the workplace. As of January 2017, these employees achieved 27.6 gigawatt-hours of energy savings, which is equivalent to the electricity needed to power 2,800 homes for one year.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- PG&E is working with General Electric to demonstrate a distributed energy resource management system (DERMS) in San Jose. This demonstration is expected to run from September to December 2017, and will include up to 150 residential customers and up to 20 commercial customers in San Jose. The demonstration will evaluate a DERMS' capability to use smart inverters and battery storage to enhance power quality and power flow management as more third-party distributed energy resources—such as residential and commercial solar—connect to the energy grid.
- A key part of the DERMS demonstration is leveraging the automated dispatch system of the Yerba Buena 4-megawatt sodium sulfur battery energy storage system, located in the foothills of San Jose, for CAISO market participation.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- San Jose has identified and will make available up to 50 transportation data sets related to traffic on the city's Open Data Portal to encourage innovation in transportation and civic technology.
- San Jose is collaborating with Facebook to deploy Terragraph, a free 60-gigahertz wireless network, which uses phased array antennae mounted on city street lights to route and steer wireless connections around urban area interferences like tall buildings that create dead zones or internet congestion due to high user traffic.

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August 2017

Smart Communities In Focus

Spotlight: Spokane, WA



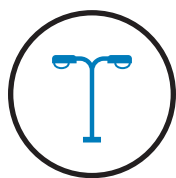
Spokane's smart city living lab, known as Urbanova, is aided through its partnerships with Avista, Itron, McKinstry, University District Development Association, and Washington State University.

Spokane's Goals

- Stronger economy
- Safer neighborhoods
- Smarter infrastructure
- More sustainable environment
- Healthier citizens

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What Makes Spokane Smart?



Smart Street Lighting—Saves energy, improves safety, and reduces traffic congestion.

- Avista is leading an Urbanova pilot project with 29 LED fixtures with dynamic dimming capabilities that use data from traffic sensors to increase energy efficiency and public safety while also assessing the role of air quality in healthy cities. The street lights and sensors are scheduled for installation in the fall of 2017.
- In addition, 10 smart and connected streetlights installed by Avista in early 2017 capture ambient temperature, ambient light, peak noise level, motion detection, and pole orientation.



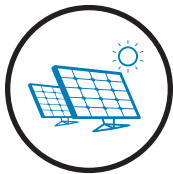
Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- Avista is installing electric vehicle chargers in 120 homes, approximately 50 workplaces, and 30 public locations with multiple plug-in ports across the eastern part of Washington, including 7 DC fast chargers. The project began in July 2016 and is scheduled to be completed at the end of June 2018.
- Spokane Transit Authority will implement a \$72-million, six-mile battery electric bus rapid transit line from 2018–2021. The buses will be zero-emissions and recharge through inductive or conductive technology.



Smart Buildings—*Save energy and improve sustainability.*

- Avista and Washington State University are partnering on a shared energy economy project, integrating building management systems into a microgrid. Building automation systems will be added or upgraded to buildings that have solar and storage co-located.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- Spokane's Urbanova partners are developing a shared energy economy proving ground to demonstrate an improved model for utilization of renewable energy and electric distribution systems. A microgrid will be constructed in Spokane consisting of distributed solar, energy storage, and automated buildings connected to a smart, dual-fed distribution loop. Multiple resource optimization modes will be developed, and the value of each mode will be calculated to show the financial benefits of a coordinated energy system with customer participation.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- Spokane installed a 100-block free Wi-Fi hot zone in 2004. This since has been replaced by private Wi-Fi providers. Additional public Wi-Fi features are to be implemented as part of the Riverfront Park renovations currently underway.
- Spokane has deployed smart parking, connected waste receptacles, license plate readers, automated water meter reading, automated vehicle location, and a 311 platform for citizen engagement.
- Urbanova partners are developing an integrated smart parking strategy across multiple parking jurisdictions in the 770-acre University District.
- Avista is in the process of extending its smart meter capability throughout Spokane.

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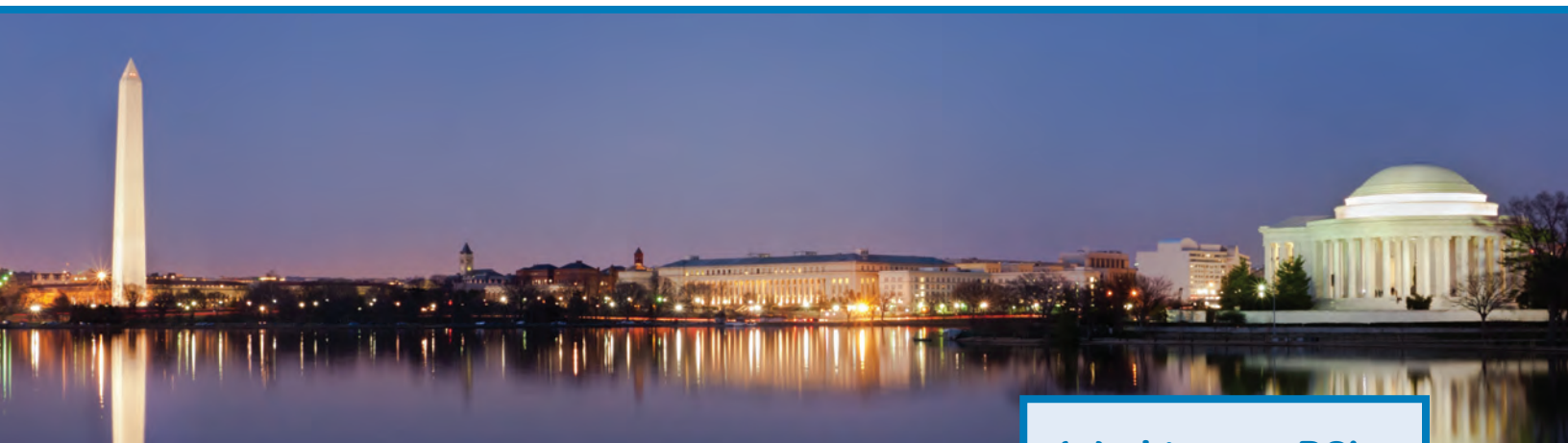


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August 2017

Smart Communities In Focus

Spotlight: Washington, DC



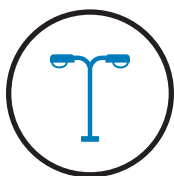
Washington, DC's smart community effort, known as Smarter DC, is aided through its partnerships with Pepco, the Office of For-Hire Vehicles, the District Department of Transportation (DDOT), the District of Columbia's local Redevelopment Authority, the Office of the Chief Technology Officer (OCTO) and others.

Washington, DC's Goals

- Improved quality of life
- Comprehensive infrastructure solutions
- Citizen inclusion through digitally enhanced services
- Enhanced energy reliability and resiliency

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What Makes Washington, DC Smart?



Smart Street Lighting—*Saves energy, improves safety, and reduces traffic congestion.*

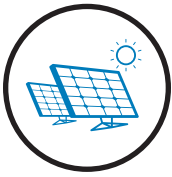
- Washington, DC is evaluating the potential to upgrade 76,000 streetlights to LEDs with integrated remote monitoring and control systems enabled through gigabit-speed Wi-Fi that also provide internet access for District citizens.



Smart Transportation—*Improves safety and mobility, reduces carbon footprint, and provides greater access to services.*

- Pepco is seeking regulatory approval for a project designed to manage electric vehicle (EV) charging demand on its grid and reduce charging costs for EV owners. Up to 100 residential customers with EVs and installed EV supply equipment will have the option to receive discounted electricity when charging their vehicles during off-peak hours. In addition, the project proposes to install chargers for multi-dwelling units as well as 4 DC fast chargers.

- In 2016, DC Streetcar began operating along a 2.1-mile route from Union Station through Northeast Washington, DC. More than 1 million residents, workers and visitors rode the DC Streetcar in its first year of operation, and Washington, DC plans to add eight additional electric streetcar lines.
- Washington, DC's Office of For-Hire Vehicles established an Electric Vehicle Taxicab service with 150 taxis in use.
- Washington, DC plans to use \$6 Million from the VW Electrify America program to develop EV charging infrastructure.



Distributed Energy Resources—*Improve sustainability, efficiency, and reliability.*

- A Master Development Team lead by Urban Ingenuity and including Hines, Urban Atlantic, and Triden, is building an advanced microgrid for the Walter Reed Army Medical Center, integrating a series of combined cooling, heating, and power energy centers with solar photovoltaic, district heating and cooling, and energy efficiency assets. The microgrid provides sustainable energy services to 3 million square feet of new and redeveloped real estate on the 66-acre campus.
- Pepco is committed to ensuring safe and reliable interconnection of renewable energy resources into the electric grid by providing a range of tools and technology including state-of-the-art hosting capacity maps and soon-to-be-released heat maps that support renewable energy and partner with customers.



Data Analytics and Intelligent Services—*Increase efficiency, improve city services, and enhance quality of life.*

- The Office of the Chief Technology Officer is planning to use data from smart sensors in key economic development corridors to enable digitally enhanced services, drive more efficient city operations, and enhance economic planning efforts.
- Washington, DC's Department of Transportation launched the Demand-Based Pricing Pilot Project in the Chinatown/Penn Quarter area as part of the "ParkDC" initiative. The purpose of the pilot is to evaluate managing Washington, DC's curbside and parking assets through demand-based pricing to influence parking space availability, which would have a positive effect on traffic congestion.
- Washington, DC is partnering with Pepco on a "Smart & Connected Corridor" pilot project by installing high-capacity Wi-Fi on Pepco-owned street light poles along a one-mile corridor in the city. The pilot will provide public Wi-Fi services for citizens and allow the city to evaluate the positive effects of Wi-Fi and other smart city innovations in an underserved mixed business/residential area.
- Pepco has deployed 279,000 smart meters in Washington, DC.

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