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F R O S T  S U L L I V A N

Excellence in Energy
Resourcefulness
Award:

Grid Intelligence

North America

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BACKGROUND AND COMPANY PERFORMANCE

Industry Challenges

Despite a tough year, utility capital expenditure (CAPEX) in the United States grew 10% in 2020, according to the US Energy Information Administration (EIA).¹ The total CAPEX for electricity distribution was about \$35 billion, with advanced technologies accounting for roughly 12%. Across the nation, at least 8 states and more than 180 cities have set goals to achieve 100% clean energy as early as 2045 and as late as 2050. Investments are therefore needed to manage the expectation for and integration of a flexible load model.

Flexible load refers to base load shifting from fossil fuels to distributed energy resources and utility-scale renewables. This complex maneuver starts with investing in real-time visualization tools that can capture and analyze diverse sets of data coming from sources such as line sensors, distribution feeders, smart meters, substations, and from the point of load consumption.

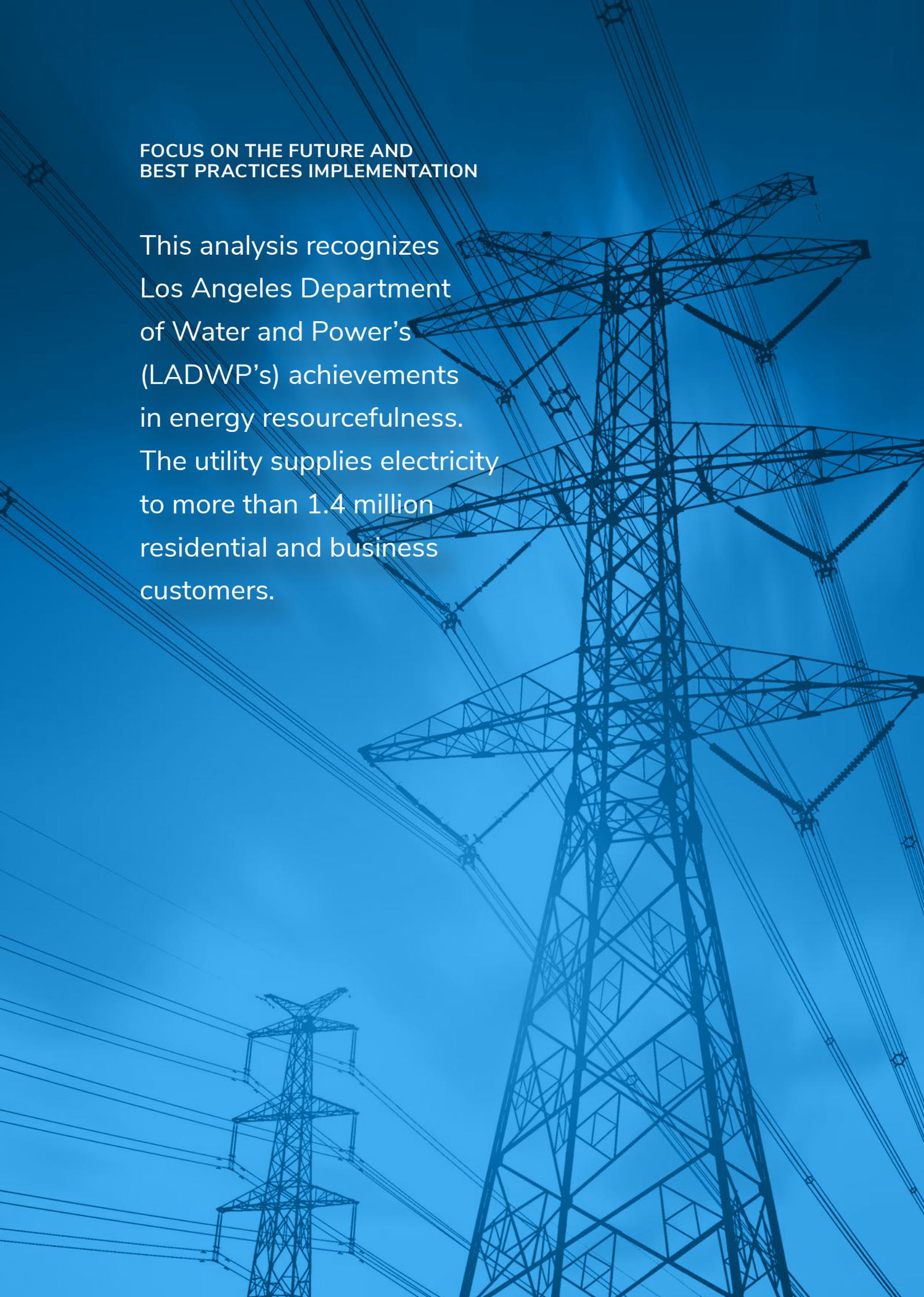
Frost & Sullivan estimates that in the United States, annual added capacity for grid-scale and behind-the-meter energy storage will increase from 1,680 MW in 2020 to 18,255 MW by 2030, reflecting a compound annual growth rate (CAGR) of 27% between those years. During this same period, annual added capacity for solar photovoltaic (PV) energy will grow from 17,119 MW to 24,367 MW whereas natural gas is going to experience a negative CAGR of 2%.

Given these changes, along with the pressure to improve grid resiliency and grid hardening against age and severe weather conditions, electricity distribution CAPEX will continue to increase at a CAGR of 5.7% for the next 10 years. Investments are increasing at a faster pace than electricity sales and end-user points. In fact, research indicates that many of these early and ongoing smart grid investments are directly resulting in lower operation and maintenance (O&M) growth projections.

Frost & Sullivan's Excellence in Resourcefulness recognizes the ability of either an investor-owned utility (IOU) or municipal utility to implement advanced smart grid technology and achieve a successful transition to clean energy.



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**FOCUS ON THE FUTURE AND
BEST PRACTICES IMPLEMENTATION**

This analysis recognizes Los Angeles Department of Water and Power's (LADWP's) achievements in energy resourcefulness. The utility supplies electricity to more than 1.4 million residential and business customers.

LADWP’s partnership with Itron , a market veteran in developing critical infrastructure digital solutions, dates back to 2012 and has sprouted multiple grid modernization initiatives focused on improving load flexibility, successfully supporting environmental stewardship, and preserving resilience, all while optimizing operational efficiency. The latest smart grid on distribution automation is essential for supporting the city’s ambitious goal of achieving 100% renewable electricity by 2045 and becoming carbon free by 2035.

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The following table lists the key criteria Frost & Sullivan used to measure LADWP’s success in achieving Energy Resourcefulness Excellence Best Practices.

	1-3 Poor	4-6 Fair	7-8 Good	9-10 Excellent
SOCIETAL IMPACT				
Improving customer awareness and participation				✓
Enabling behavioral change for reducing waste through customer engagement and technology-driven programs				✓
BUSINESS IMPACT				
Strengthening a utility’s brand image as a leader in sustainability				✓
Achieving operational efficiency as a result of a successful sustainability strategy				✓

Societal Impact

Improving Customer Awareness and Participation

Utilities figure critically in ensuring successful customer participation and adoption of clean energy and in fulfilling an energy-efficiency strategy. LADWP is among the early adopters of a digital-enabled energy conservation strategy. The utility is adopting a multi-prong approach to ensure service reliability, and its competitive rates are maintained during this transition. It took this approach to ensure that new systems are compatible and that new systems can be easily integrated with existing assets. Furthermore, it was important to ensure that the utility has full visibility from a cyber-security perspective, which made the appropriate testing and justifying of technologies essential before going fully live.



LADWP kicked off its strategy with a smart grid demonstration project consisting of Itron smart electric and water meters tied to cellular and IPV6 communication networks. The utility then transitioned to a full advanced-time-of-use and net-time-of-use electric metering contract with Itron. This project uses Itron's cellular network for its feed in tariff (FiT) program—an instrumental step to enable time-of-use rates rollout. The FiT rollout has since allowed the city to take the national lead in solar power. On the residential side, approximately 6% of all single family homes have solar rooftop systems, which total approximately 390 MW. By 2045, LADWP estimates

that between 22% and 38% of all existing single family homes will adopt solar rooftop systems, which will equate to between 2.8 GW and 3.9 GW.

The full rollout of advanced meter infrastructure consists of advanced meters, a communication network, and a data management system. To prepare for the transition, LADWP has been fully automating its distribution system, which includes the following:

- ▶ A radio frequency (RF) mesh communication network that will serve as the back bone for advanced metering infrastructure (AMI) as well as provide network support to future devices.
- ▶ Distribution automation devices, such as line sensors and automatic reclosers, to help ensure optimal visibility into the electric grid and detect and monitor any abnormalities that might occur on the distribution system.
- ▶ A data management system that will store and manage metering data and provide data derived insight to key personnel for them to make informed decisions.

Enabling Behavioral Changes for Reducing Waste through Customer Engagement and Technology-driven Programs

LADWP expects demand for electricity to increase continually during the next couple of decades as a result of hotter weather caused by climate change and higher penetration of electric vehicles coming online. AMI will help advance programs related to energy efficiency, solar, and electric vehicle charging programs. In addition, LADWP has formed a partnership with SoCal Gas to offer home upgrade financing options. Through this program, called Residential Energy Efficiency Loan (REEL),² customers can finance up to 100% of energy-efficient windows/window film; heating, ventilation, and air conditioning (HVAC) systems; LEDs; pool pumps; cool roofs; insulation; washing machines; and water heaters.



² Residential Energy Efficiency Loan Program (ladwp.com)

Business Impact

Strengthening the Utility's Brand Image as a Leader in Sustainability

In the coming years 10 years, great Los Angeles will garner major attention as one of first few cities committed to achieving 100% renewable electricity by 2045 and becoming carbon free by 2035.

A study conducted in collaboration with the National Renewable Energy Laboratory (NREL), called LA100,³ confirms that LADWP is on the right path towards achieving its goals. Technologies such as AMI, distribution automation, and distribution equipment upgrades will be instrumental in ensuring the city achieves its goals.

Achieving Operational Efficiency as a Result of a Successful Sustainability Strategy

A lack of visibility on flexible load can have detrimental consequences for the grid. Through combination of AMI and distribution automation project, the municipality can automate and improve the visibility of all circuits and feeders across its substation and down to the edge of the grid network. In return, the system will ensure proper integration of solar and storage onto LADWP distribution power network.

Completion of this state-of-the-art communication infrastructure is set for 2022. It will serve as the backbone for enabling stakeholder access to real-time and actionable data across multiple divisions, including system operators, energy demand/supply, the outage management team, planners, and the engineering team. In return, this communication platform will ensure improved transparency across different divisions pertinent to grid operations.



CONCLUSION

LADWP has drafted a clear vision of its approach to becoming carbon free in a way that is affordable, reliable, and equitable. The utility's dedication and passion to its cause is evident through its investments in distribution automation and AMI and partnerships with companies such as Itron. For its overall strong performance, LADWP has earned Frost & Sullivan's Excellence in Resourcefulness for Energy recognition.

³ 100% Renewable Energy Study (ladwp.com)

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