

NewGen *NEWS*

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Feature Article: Load Shape Forecasting & NewGen's Load Shape Analysis Model©



Today's power system electricity consumption profiles are changing as a function of Distributed Energy Resources (DER), such as solar photovoltaic (PV) and electric vehicles (EV), as well as innovations in utility rate design. These consumption profiles in many respects guide system operation and planning, and are commonly called "load shapes" in reference to the varying daily energy usage shapes displayed in graphical form.

Traditional system planning and load forecasting methods are ill equipped to accurately estimate a load shape across certain customer segments and resultant impacts.

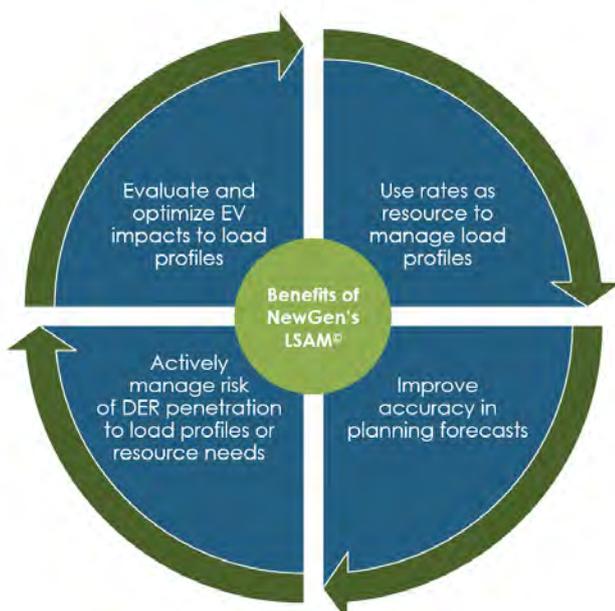
Evaluating the potential impacts to a utility's system hourly load profile (shape) and overall

system demands provides greater insight into operational risks, optimal asset investment strategies, and cost recovery and rate design strategies. More accurate load shape forecasts that incorporate rate design and advanced metering infrastructure (AMI) data analysis likely improve estimates of the cost to operate the system. Improved accuracy with respect to costs can lead to improved financial planning and budgeting. Due to the number of external factors impacting load shapes, forecasting evolving load shapes is an increasing area of concern and analysis for electric utilities and systems.

Part and parcel to the issue with forecasting load shapes is the ability to develop a rooftop solar adoption forecast that relies on industry-tested methodologies to estimate customer uptake, and an analysis of historical solar customer economics to determine customers' willingness to invest in solar going forward.

Moreover, load shape forecasts require a degree of iteration between solar adoption forecasts with evolving retail electric rates, including Time-of-Use (TOU) rate design to show how solar adoption is impacted based on planned changes to rates, but also how that adoption impacts load shapes.

EVALUATING THE POTENTIAL IMPACTS TO A UTILITY'S SYSTEM HOURLY LOAD PROFILE (SHAPE) AND OVERALL SYSTEM DEMANDS PROVIDES GREATER INSIGHT INTO OPERATIONAL RISKS, OPTIMAL ASSET INVESTMENT STRATEGIES, AND COST RECOVERY AND RATE DESIGN STRATEGIES.



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To address this issue, NewGen has developed a proprietary Load Shape Analysis Model (LSAM®), which forecasts evolving load shapes as a function of customer adoption of PV, EV, and customer energy usage changes responding to TOU pricing. NewGen's LSAM® platform is capable of projecting planning-level, hourly load shapes reflecting forecasts of distributed solar generation (DSG) and EV penetration levels, along with estimates of energy demand elasticity in response to utility time- or season-differentiated energy pricing signals.

DISTRIBUTED ENERGY RESOURCES ARE CHANGING THE PEAK DEMAND TIMING, LEVEL, AND RAMPING REQUIREMENTS DIFFERENTLY AMONGST VARIOUS CUSTOMER CLASSES, INFLUENCING A UTILITY'S COINCIDENT PEAK AND LEADING TO A CHANGE IN THE AMOUNT AND TYPE OF CAPACITY RESOURCES REQUIRED

The LSAM® dashboard is designed with usability in mind, and allows the user to easily manipulate TOU pricing (on- and off-peak hours, seasons, pricing, etc.) to determine impacts of load shapes and utility revenue in real-time. For utilities, leveraging the LSAM platform can aid in more accurate system planning forecasts and operational needs, as well as help identify ways in which to manage risk associated with distributed resources while at the same time meeting customer needs.



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ENERGY INSIGHTS

Clean Power Plan Withdrawn

The U.S. Environmental Protection Agency (EPA) has withdrawn the Clean Power Plan stating they did not believe the agency had the authority to enact the Plan under the Clean Air Act. The agency now plans to solicit feedback from the industry to replace the rule at a later date. The cost-benefit analysis used, and recently modified, to calculate costs of the Plan will also be overhauled. New York state has already threatened to sue to reinstate the rule.

Battery Storage Project's Rapid Growth

As renewable energy continues its behind the meter and utility scale expansion, the application and interest in energy storage is also increasing. Beyond Tesla's Powerwall product paired with their rooftop solar applications, utility scale solar is increasingly cited in resource plans and goals throughout the U.S. This growing interest is seen in the dramatic increase in installations in recent years. According to the Department of Energy, since 2000, nearly 400 energy storage projects have been developed around the U.S., with the vast majority of those projects completed in the last four years. The cumulative rated power of the energy storage projects installed since 2000 exceeds 1.6 Gigawatts (GW), with almost all that capacity realized since 2012. While there are several storage technologies and batteries, lithium-based batteries are the predominant choice for projects. Evidence of the growing size of projects is seen with San Diego Gas & Electric's recently unveiled 30 megawatts (MW) battery project with 120 megawatt-hours (MWh) of storage, and Southern California Edison's plans for a 100 MW project with 400 MWh of storage in the coming years. Public power utilities in Florida, Connecticut, Massachusetts, and American Samoa have also invested in battery storage projects in the past two years.

ENERGY PROJECT HIGHLIGHT

Hourly Load Shape and Customer Technology Analysis

Riverside Public Utilities

NewGen was recently awarded a contract from Riverside Public Utilities to quantify the future need for fast-ramping generation or demand-side

resources as a function of forecasted changes to power system load shapes resulting from increasing adoption of customer-sited solar PV, EV, and changes to consumer energy consumption stemming from the utility's evolving rate design strategy. The project will employ technology diffusion modeling techniques to forecast PV and EV adoption, while modeling how rate design changes may impact customer economics and technology adoption. The resulting analysis will be used to augment the utility's Integrated Resource Plan to provide the utility greater insight into the impacts of distributed energy resources over the long-term.



WATER, WASTEWATER, AND STORMWATER INSIGHTS

U.S. EPA Provides "Clearinghouse" to Search for Funding

This summer, the U.S. EPA launched an effort to make it simpler for communities to find financial assistance for water, wastewater, and storm water infrastructure projects. The Agency's Water Infrastructure and Resiliency Finance Center created the Water Finance Clearinghouse (the Clearinghouse) as a searchable online database to help utilities identify federal, state, and local funding resources. The Clearinghouse offers users other support tools, such as reports and best practices in securing funding. This service is a great starting point and should help get more eligible projects matched up with available funds. Check out the U.S. EPA's web site for more information and a webinar on how your organization could benefit from this free resource.

Under New Management – California Groundwater

In California, the implementation of the Sustainable Groundwater Management Act (SGMA) is just getting started, despite being passed in 2014. This summer, the state formed basin-specific, local groundwater sustainability agencies, or GSA's. Basins at risk of depletion have each been assigned a GSA, and are expected to significantly change the way groundwater is used in California. Surface water will continue to be governed under the current water rights system.

Plastic in the Water?

Plastic is all around us and research now shows it is in us too. New research has revealed microscopic

Water, Wastewater, and Stormwater Insights cont.

plastic fibers, known as microplastics, are very common in our drinking water. A study conducted by the University of Minnesota tested tap water in a number of areas around the world. In its results, the study found over 80% of samples contained the microplastics. While not the highest country, the faucet water samples tested in the U.S. showed 94% containing the fibers. Currently, the effects of these plastics in our bodies is unknown, but more research is underway.

Securing Water for Colorado Becoming More Expensive

Based on the latest estimates of the Colorado Water Conservation Board, \$40 billion is needed to implement the State's Water Management Plan. This figure has doubled since original estimates were released in 2015. Contributing to the increased figure is the inclusion of public education programs and conservation initiatives. The current source and timing of the needed funding has yet to be determined.

Water Conservation Coordinator Requirement in Texas

House Bill 1648, which was passed during the most recent session of the Texas Legislature, requires that utilities with more than 3,300 connections designate a water conservation coordinator. The names of appropriate individuals, who can be existing employees of the utility, must be provided to the Texas Water Development Board (TWDB) effective September 1, 2017. House Bill 1573 also requires that individuals performing annual water loss audits must receive specialized training, which is available from the TWDB.

WATER, WASTEWATER, AND STORMWATER PROJECT HIGHLIGHT

Long-Term Raw Water Cost of Service and Rate Forecast

Titus County Fresh Water Supply District No. 1

NewGen was retained by Titus County Fresh Water Supply District No. 1 (District) to conduct a long-term raw water cost of service and rate forecast. The District had been approached by the City of Mount Pleasant (City) to discuss the possibility of entering into a new long-term contract for the purchase of 30,000 acre feet of raw water from the District.

NewGen was retained to conduct a 50-year revenue requirement forecast (for the period fiscal year (FY) 2017 to FY 2066) that incorporated all operation and maintenance (O&M) costs, as well as the development of a 50-year capital improvement plan in coordination with the District's consultant engineer. The study incorporated a review of the

District's existing reserves and forecast the financial impact on the District's reserves of entering into a cost of service based per acre foot (AF) raw water agreement. The study included the establishment of three separate reserves – an Operating Reserve, a Capital Reserve, and a Wetlands Mitigation Reserve. The current reserve balances of the District were allocated between these reserves based on discussions with the District's Board of Directors, the Executive Director, and input by NewGen. The final deliverable included the development of a 50-year cost of service based per acre foot raw water rate forecast that is being used to assist in negotiating a long-term raw water contract between the District and the City.



How will China's Proposed Ban Impact the U.S.?

The U.S. recycling industry is watching closely as China states that it wants to begin prohibiting certain plastic and paper imports from other countries. China's complaint about not wanting to "become the world's dumping ground" for contaminated bales of recyclables has definitely gained the U.S. recycling industry's attention. The Chinese government has offered little clarification on the finer points of what materials would be banned. However, U.S. companies are still taking the news very seriously. Waste Management (WM) believes they will feel the biggest impact in the market for plastics Nos. 3-7. Most of WM's Post-consumer Polyethylene Terephthalate (PET) and High-Density Polyethylene (HDPE) are used in the U.S., but China is a larger outlet for the lower-grade plastics. A spokesman said it was important to note that the Chinese ban, as it is presently understood with regard to paper, is focused on "unsorted" paper bales. WM said there was still a strong demand from its Chinese mill buyers for higher-quality sorted paper, which is all that WM produces.

The Closed Loop Fund Invests in Companies that Use Curbside Recyclables

A group that leverages corporate dollars to improve municipal recycling has backed a Pennsylvania glass aggregate manufacturer, which is part of a larger effort to bolster buyers of curbside recyclables. Thus far, most of the Closed

Solid Waste and Recycling Insights cont.

Loop Fund's (Fund) investments have been focused on expanding municipal recycling programs or expanding sorting facilities for recyclables. However, in 2017 the Closed Loop Fund is beginning to invest in users of recyclables. In the summer of 2017 the Fund invested in IntegriCo Composites, which manufactures plastic composite railroad ties. It has also funded, with a \$3 million loan, GreenMantra Technologies, a Canadian company that is recycling plastics into wax products. Finally, the Fund has most recently announced an investment in Aero Aggregates, a U.S. company that is creating construction materials out of recycled glass.

The Close Loop Fund is a \$100 million fund created by some of the largest consumer brand companies in the U.S. to invest in manufacturing companies that are building end markets for recyclables and creating regional jobs.

SOLID WASTE AND RECYCLING PROJECT HIGHLIGHT

Solid Waste Workshop Series

Capital Area Council of Governments

NewGen was retained by the Capital Area Council of Governments (CAPCOG – Austin, Texas) to conduct three workshops for local government officials on the following relevant solid waste topics:

- 1. Full Cost Accounting for Municipal Solid Waste Services (June 21, 2017)** – Provide attendees with a system for collecting cost data and establishing rates, which reflect the full cost of providing solid waste services.
- 2. Cost of Illegal Dumping (July 26, 2017)** – Provide attendees with an opportunity to: discuss a regional approach to combating illegal dumping; evaluate the costs, and associated benefits, of an illegal dumping/ environmental enforcement program; discuss legal issues (public versus private property); and share with other entities regarding illegal dumping efforts.
- 3. Commercial Food Waste Collection and Diversion (August 24, 2017)** – The following topics were covered during this workshop:
1) A background on food waste; 2) Recently completed commercial food waste collection and diversion studies and the associated

findings; and 3) Best management practices for large institutions and food generators.

As a result of the successful completion of the CAPCOG workshops, NewGen was later retained by the South Plains Association of Governments (Lubbock, Texas) to conduct two workshops on the topics of full cost accounting and commercial food waste collection and diversion.

If you would like a copy of the presentations described herein, please contact Mandy Sines at msines@newgenstrategies.net or 512.651.1309.



Texas Rural Water Association (TRWA) – Fall Management Conferences

Mr. Dave Yanke, President – Environmental Practice, spoke at the TRWA's Fall Management Conferences held in San Antonio October 2017 and will speak at the conference in Allen/Dallas (November 1-2). The sessions, "Capital Project Financing – What are Your Legal and Financial Options?," discuss the various financial options available to water supply corporations and special utility districts (SUDs) with regard to funding capital projects with impact fees, equity buy-in fees, and connection fees.

State of Texas Alliance for Recycling (STAR) Summit Conference

Mr. Yanke, President – Environmental Practice, spoke at the STAR Summit Conference held in Austin on October 23 -25, 2017. The "Mapping Food Recovery in the H-GAC Planning Region" presentation discusses Mr. Yanke's recently completed project, in conjunction with the Houston-Galveston Area Council (H-GAC), to develop a geographic information system (GIS)-based mapping mechanism that allows generators, collectors, and processors of food waste to find each other via a 13-county mapping mechanism. The goal is to encourage the diversion of food waste to either food rescue or composting facilities, versus landfilling.