

## Glossary of Electric Utility Terms

**Highlights** indicate that the term is defined elsewhere.

### Energy Regulation Terms

**Cost of Service Regulation** -- most **public utility commissions** regulate the **rates** that **public utilities** charge customers using this concept. It emerged out of the idea that public utilities cannot price-discriminate, and therefore, the fairest way to determine what everyone should pay is to break down their overall costs to figure out how much it costs to provide electricity to similar types of customers. This is accomplished through a “**cost of service study**.”

**Performance-Based Regulation** -- this concept relates to how **public utilities** are regulated by **public utility commissions** and can be used as an alternative to, or an addition to, **cost of service regulation**. It offers various incentives for utility performance. There are several types of performance-based regulation, including:

- **Performance incentive mechanisms** -- these reward utilities financially for meeting certain metrics related to reliability, energy efficiency, or even innovation. Xcel Energy, for example, receives a financial incentive when it provides programs that incentivize its Colorado customers to save a certain amount of electricity through **energy efficiency**.
- **Decoupling** -- ensures that utilities are allowed to recover a certain amount of revenue regardless of how much electricity they sell. This is designed to make the utility neutral to energy efficiency and solar, even though they sell less electricity.
- **Market-based earnings** -- a concept being explored through New York’s Reforming the Energy Vision process, which would reward utilities for supporting customers’ ability to choose energy efficiency, solar, battery storage, and other energy management tools.

**Public Utility** -- an entity that provides a service for the public, often considered a “natural monopoly” where costs are lower if fewer firms are competing to do so. Investor-owned public utilities, which are private companies with shareholders, are regulated to different degrees by **public utility commissions**, which set their rates to prevent them from overcharging customers due to their monopoly status.

**Public Utility Commission (PUC)** -- the state agency that has the authority to regulate the rates and services provided by **public utilities**. While PUCs often prioritize keeping costs low for consumers, they can also consider reliability, safety, environmental impacts, the utility’s opportunity to earn a profit, and other factors when they make decisions.

### Revenue Requirement Terms

**Cost of Service Study** -- A cost of service study is the process by which utilities break down costs that are incurred jointly or commonly by many customers and place them into “buckets” that are recoverable from specific **customer classes** through **rates**. A cost of service study has several steps that involve allocating costs based on whether they are related to power generation, **transmission**, or **distribution**; whether they can be directly assigned to particular types of customers; and whether they are created because of the number of customers or based on how those customers use the electric system.

**Customer Class** -- a grouping of customers that are of a similar type, generally based on how they use the electric system but also based on other characteristics, like whether they are residential or commercial. Residential customers may be considered a single customer class even though they include apartments, single-family homes, efficient users, and “snowbirds.”

**Rate Base** -- the total amount of capital investments the utility makes over time to serve customers, net of accumulated depreciation. Capital investments include physical equipment that the utility installs, like transformers or customers’ meters. This is part of the utility’s annual **revenue requirement** and the utility is authorized to earn a **rate of return** on it.

**Rate of Return (ROR)** -- this is the additional revenue the utility is allowed to collect from ratepayers to incentivize its shareholders to invest in **rate base**, measured as a percentage. The ROR is comprised of a return on equity (to shareholders) and a return on debt (for capital), weighted by the proportion of equity to debt in the utility’s capital structure. Typical utility returns on equity are in the 8-12% range. Utilities are not necessarily guaranteed to receive their return, but they should have a fair opportunity to earn it, according to legal precedent.

**Revenue Requirement** -- the revenue requirement is the amount of money the utility is authorized to recover from customers. It is generally based on a “test year,” which is a historic (but sometimes projected) example of how the utility spent money, and which may be adjusted based on changing circumstances. The components of the revenue requirement are the **rate of return** on the utility’s **rate base** plus its annual operating expenses, such as labor, taxes, and depreciation.

### **Rate Design Terms**

**Base Rates** -- the rates that customers pay to make up the utility’s core **revenue requirement** before applying rate **riders**. (Note: This is different than “**rate base**.”)

**Demand Charge** -- A demand charge is a specific type of **rate** that bills a customer based on energy availability, not energy consumption. Demand charges are mostly assessed on commercial and industrial customers, they are rare for residential customers. Demand charges are based on the customer’s coincident or non-coincident peak, measured in kW:

- A coincident demand charge would bill the customer based on their demand at the time the entire base of customers had a peak demand (generally mid- to late-afternoon) (“**peak load**”). Currently, Xcel offers coincident demand charges for large customers with special contracts.
- A non-coincident demand charge would bill the customer based on their personal highest peak in any 15- or 60-minute period (for example, this could occur at night if all of a grocery store’s freezers turn on at once). Generally, commercial and industrial customers in Colorado are assessed non-coincident demand charges.

As an example, a city recreation center may experience daily peaks in the late afternoon due to air conditioning, and pay a rate of \$5-10/kW for a demand of 200 kW per month. However, because the demand rate is non-coincident, a malfunction in the recreation center’s HVAC system that causes its air conditioning to run overnight when it is closed could run up its bills. Xcel’s residential customers do not currently have demand charges, but for comparison, a residential customer’s typical peak demand is 2-4 kW.

**Rate** -- the price that a customer pays for a particular utility service. Rates are often divided into “base rates” and “riders.” The primary types of electric rates are:

- Fixed monthly charges ranging from a few dollars per month for a residential customer to hundreds of dollars per month for a large business;
- Demand charges (see separate definition); and
- Energy charges based on the kWh a customer consumes.

These rates may be differentiated by time of day or time of year, and they can be designed to increase in cost as customers increase their usage, to encourage their efficiency. While a customer class may include a broad group like “small commercial customers,” a utility may offer different types of rates to that group, such as optional “time-of-use” rates that allow customers to save money by reducing the amount of power they use during hot summer afternoons. Rates can differ based on customers’ size or unique characteristics about their usage (for example, some utilities offer special rates for outdoor baseball facilities, large manufacturers, and electric vehicle owners). Electric rates are designed to recover a certain amount of revenues, but they may be designed to meet other needs, such as being understandable to customers or helping them be energy-efficient. A utility lists all of its rates in a tariff, and it must file advice letters for a public utility commission’s approval in order to modify them.

**Rider** -- a rate adder (or sometimes a percentage applied on a portion of the customer’s bill) that passes-through certain costs directly to the public utility’s customers. The utility can adjust riders frequently -- generally annually or quarterly -- because they have been pre-approved. Utilities commonly have riders associated with fuel costs. Xcel Energy, for example, charges a rider called the “Electric Commodity Adjustment” (ECA) that is equal to about \$0.03/kWh per residential customer to pay for coal, natural gas, and portions of renewable energy contracts.

**Tariff** -- a book of rates and rules for providing service for a utility’s customers. For example, an electric tariff book would include the rates that a residential customer will pay each month to purchase electricity, as well as other fees for service (like the cost of reconnecting service that was cut off) and various rules applicable to different customers (such as the process to follow to extend a service line to a new facility).

### **Electric System Terms**

**Capacity** -- the maximum output that a generator can supply, usually in kilowatts (kW) or megawatts (MW). Nameplate capacity is the generator’s capacity under factory-specified conditions. A generator that operates consistently near its nameplate capacity has a high “capacity factor.” Natural gas and coal generators typically have higher capacity factors than renewable energy generators.

**Distribution System** -- the system for stepping down electricity from the high-voltage transmission system and bringing it to end-use customers. The primary distribution system generally runs from substations down to transformers, and the secondary distribution system is lower-voltage and runs from transformers to customers’ premises. The distribution system may be above-ground or underground.

**Kilowatt (kW) vs. kilowatt-hour (kWh)** -- kilowatts and kilowatt-hours both refer to the availability of 1,000 watts, but a kilowatt is a measure of energy use (demand) or output (**capacity**) at a given moment, whereas a kilowatt-hour is energy used or generated over time.

**Line Losses** -- electricity that is generated gets lost the farther it gets from its source of origin. Upgrading the **distribution system** by adding equipment to manage voltage can reduce line losses.

**Load Factor** -- the ratio of average load to **peak load**. A customer with a consistent power need, like a data center, has a high load factor, whereas a customer in an apartment who is gone most of the day at work may have a low load factor.

**Peak Load** -- also called peak demand, this refers to the period of time in which the utility's customers require the most power. While some utilities have summer and winter peaks, most--including those in Colorado--have summer peaks. Generally this is due to air conditioning use. Even though peak load often occurs for only a short period of time, it is the basis for sizing the utility's **distribution system** and purchasing power, meaning that reducing peak load can reduce everyone's costs.

**Reliability** -- ensuring that there is enough electricity to meet customers' needs, and that it is of sufficient quality that it will not impact customers (including energy-intensive customers like manufacturers or data centers). Industry-standard metrics measure utilities' reliability performance based on the frequency and duration of outages, and the number of customers impacted.

**Transmission System** -- the high-voltage system for transmitting power from electric generators to substations. The Federal Energy Regulatory Commission requires that the transmission system is open-access, meaning that utilities that own transmission must provide other parties with access to it on a comparable basis to what they provide themselves.

### Energy Resources Terms

**Avoided Costs** -- the cost the utility would have paid to provide an additional unit of something, generally energy or **capacity**. This could be measured over a short term (such as avoided fuel costs) or a long term (such as avoided infrastructure). Defining and quantifying different types of avoided costs is an important factor in determining the value of **energy efficiency** and **distributed generation**.

**Electric Resource Planning (ERP)** -- the process of determining a utility's energy resources needs over near-term and long-term time horizons. Generally, a utility will evaluate its current energy resources and its forecast of how much energy it will require to meet its customers' needs over a period of up to 40 years, trying to factor in uncertainty. After it identifies how much energy and **capacity** it needs, often through sophisticated modeling software, it will seek competitive bids. Generally the bidders are "independent power producers" who propose to build wind, natural gas, or solar generating units under contract with the utility, but the utility may try to compete with them by building its own generation. Bids are selected based on cost, but may consider other factors, like fuel diversity, flexibility (for example, a fast-starting natural gas turbine that can start if the wind stops blowing), and environmental impact. In Colorado, ERPs focus only on electric supply, whereas in integrated resource planning processes, utilities in other states may accept **demand-side management** resources as well to meet their needs. The Colorado process is designed to

receive low-cost, competitive bids -- the utility may bid self-owned projects as well -- that meet a variety of long-term needs, including diversity of resources, flexibility to balance renewable energy requirements, low cost, and low carbon.

**Carbon Price** -- a carbon price is the amount that must be paid to emit one unit of carbon dioxide into the atmosphere. It is often measured in metric or short tons of “carbon dioxide equivalent” (converting other greenhouse gases into carbon emissions). A carbon price is designed to internalize externalities, i.e., to add costs to fossil fuels to make up for their impact on human health, agriculture, weather risk, and other climate impacts. When engaging in **electric resource planning**, many utilities look at one or more scenarios that have carbon prices to determine whether it would be more costly to have a low-carbon resource portfolio. Carbon offset programs, which reduce carbon emissions in one place to compensate for adding emissions in another place, are one way to put a carbon price into action as the offsets can be purchased on the market. As with **RECs**, there are programs that provide guidance for how to track and retire offsets from initiatives like carbon capture and storage, although programs must be operated stringently to ensure there is a permanent, verifiable carbon reduction.

**Renewable Energy** -- resources that are naturally replenishing. Some resources may be variable (wind, solar) while others may be dispatchable on command (geothermal, hydroelectric). In Colorado, renewable energy can come from “sunlight, the wind, geothermal energy, hydrodynamic forces, and organic matter available on a renewable basis such as forest residues, agricultural crops and wastes, wood and wood wastes, animal wastes, livestock operation residue, aquatic plants, and municipal wastes.”<sup>1</sup> For purposes of meeting Colorado’s **Renewable Energy Standard**, the broader term “eligible energy resources” applies, and also includes recycled energy, greenhouse gas neutral coal mine methane projects, and hydrogen fuel cells.<sup>2</sup>

### **Customer Programs Terms**

**Community Solar Garden (CSG)** -- CSGs are slightly larger solar installations where customers can purchase a “share” of their output, like with a community garden. Generally, subscribing customers receive a credit on their bills for a portion of the energy generated by their panels, and developers may receive **renewable energy credit** payments or other incentives. Developers may charge an upfront fee for customers to purchase panels, or customers may lease a share and pay over time. CSGs can provide an alternative for customers whose homes or businesses are too shaded for solar, or for residents in apartments where they do not own their roofs. CSGs are a type of **distributed generation**.

**Demand-Side Management (DSM)** -- actions to reduce energy use on customers’ premises, which can include:

- **Conservation**, which involves using less energy, such as by turning off a light.
- **Energy efficiency**, which means using less energy for the same service, such as by installing an LED light bulb to replace a CFL light bulb.
- **Demand response**, which involves reducing energy use at particular times, generally when customer demand is at its highest--for example, by installing a switch in your air

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<sup>1</sup> C.R.S. 40-1-102(11).

<sup>2</sup> C.R.S. 40-2-124(1)(a).

conditioning that allows the utility to shut it off just long enough to reduce a **peak load** that could cause outages, but not to warm your house, on an extremely hot day.

DSM, and particularly energy efficiency, is a low-cost resource (i.e., cheaper than building or purchasing new energy resources). Because of this, utilities are frequently incentivized to invest in customer DSM programs even though it reduces their revenues, through **performance-based regulation**. The size of a DSM program tends to be based on its overall cost-effectiveness, which may include consideration of non-energy benefits (such as avoided carbon costs) over the lifetime of various energy efficiency measures (e.g., an LED that will last 10 years).

**Distributed Generation (DG)** -- an energy-generating system that is small and/or located close to the customer load it is intended to serve. In Colorado, resources are considered DG if they are less than 30 MW in nameplate **capacity**.<sup>3</sup> Retail DG is interconnected on the customer's side of the electric meter (like rooftop solar) whereas wholesale DG is not (like **community solar gardens**). DG is sometimes considered part of the larger suite of distributed energy resources (DERs), which can include solar, battery storage, electric vehicles, **energy efficiency**, and other tools used by a customer to manage energy use at their residence or business.

**Renewable Energy Credit (REC)** -- sometimes called a renewable energy certificate, a REC represents the “green” attributes of renewable energy, such as carbon reduction. Usually one REC equals 1,000 kWh (1 MWh) of renewable energy generation. Like a **carbon price**, a REC is designed to put a price on externalities like job creation and air quality, which might not otherwise be “valued.” In Colorado, utilities must retire RECs to comply with the **Renewable Energy Standard**. RECs are also retired in voluntary green pricing programs, where customers pay a premium to receive the right to claim that they are purchasing all-renewable energy. RECs can be tracked, traded, and purchased, and can only be retired once.

**Renewable Energy Standard (RES)** -- the state law that requires electricity providers to obtain a minimum percentage of their power from **renewable energy** sources. Colorado passed the first voter-approved RES in 2004, and the requirements have been increased since then. An investor-owned electric utility like Xcel Energy or Black Hills Energy must procure 30% of their power (based on retail sales to customers) from renewable energy sources by 2020. There are “carve-outs” in that 30%, meaning that a portion must come from **distributed generation**, including rooftop solar. Compliance with the RES is measured by retiring different types of **RECs**. Certain types of renewable energy, such as community-based projects, can receive multipliers so that their RECs are worth more.<sup>4</sup>

### **Sources for Terminology**

- Regulatory Assistance Project -- [Electricity Regulation in the US: A Guide](#) (2011)
- National Association of Regulatory Utility Commissioners -- [Electric Utility Cost Allocation Manual](#) (1992)
- Energy Information Administration -- Online [Glossary](#)

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<sup>3</sup> C.R.S. 40-2-124.

<sup>4</sup> In recent years, several pieces of legislation have been introduced seeking to extend how long the multipliers are available for or to allow them for different renewable resources.

- Tim Woolf & Mark Lowry, LBNL -- [Performance-Based Regulation in a High DER Future](#) (2016)
- New York Department of Public Service -- [Staff White Paper on Ratemaking and Utility Business Models](#) (Reforming the Energy Vision Proceeding, Case 14-M-0101) (2015)