

## Economic Analysis of Senate Bill 17-089

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Proposed Colorado Senate Bill 17-089 gives electricity consumers the right to install and use electricity storage systems on their property. This paper will discuss the purpose and the effects of allowing consumers to store electricity. To determine if this bill should be passed, it must be concluded that the effects of increased electricity storage are beneficial to society.

Senate Bill 17-089 ensures consumers the right to install and use electricity storage units without being subjected to regulations or additional utility fees. In Colorado, electricity can be provided via utilities, either private or municipal, and cooperative electric associations. Installed electricity storage systems allow consumers to use electricity during outages or at times when electricity costs are high. By encouraging the installation and use of electrical storage systems, the bill intends to increase the efficiency and reliability of the electrical grid, as well as reduce the production costs of electricity.

Electric storage units serve two primary functions. The first is that installing these units allows consumers to diminish the risk of losing connection with the power grid. In a situation where the power grid goes down, an electric storage unit has the capacity to temporarily sustain a home. By guaranteeing access to electricity, the storage unit provides both a convenience and security benefit. In addition, the consumer has already paid for the stored electricity, which can alleviate potential losses by the producer during the outage. As a result, the more electricity storage units are in use during an outage, the less the financial and social costs of the outage.

The second function of the electrical storage unit is it allows consumers to use cheaper electricity in times of peak demand. In 2013, the average family in Colorado paid 84 dollars for electricity every month<sup>1</sup>. Electricity prices fluctuate based on demand levels, which can vary widely on both a seasonal and day-to-day basis. Prices of electricity are nearly ten percent higher in the summer than in the winter. Based on the average monthly electricity bill and price fluctuations, strategically using saved electricity that was purchased in times of reduced demand can potentially reduce the monthly electric bill by up to ten dollars a month. Being able to use stored electricity effectively allows the consumer to choose the cheapest available price for electricity.

While the individual can benefit from reduced costs by storing electricity, the aggregate effect of widespread energy storage can lead to decreases in the market price of electricity. The primary determinants of electricity prices are the cost of fuel, the number of power plants in operation, maintenance costs, weather conditions, and regulations.

An increase in electricity storage units reduces the demanded electricity at any given moment, which relieves stress on the electrical grid. Reduced stress on the electrical grid decreases the quantity of power plants operating and the grid maintenance required. Power plants are expensive to operate and continual maintenance on the power grid can be expensive. It is estimated that the total cost of maintenance to the U.S. electrical grid over the next 40 years will be close to two trillion dollars<sup>2</sup>. The ability to cut operational and maintenance costs would decrease the market price of electricity.

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<sup>1</sup> "Factors affecting electricity prices", *U.S. Energy Information Administration, 2016*

<sup>2</sup> "Present value cost of the U.S. electricity system", *Rocky Mountain Institute, 2010*

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In addition to decreased operational costs, decreases in total operational power plants would lower the social cost of producing electricity. According to the EPA, “The electric power sector accounted for 32% of U.S. total greenhouse gas emissions ... fossil fuel-fired power plants are the largest source of U.S. CO<sub>2</sub> emissions”<sup>3</sup>. A report on the external costs of coal electricity plants determined that, “combining all of the pollutants into damages per kilowatt-hour of electricity produced ... the median estimate was \$0.14”(Goodkind and Polasky, 2013). For comparison, in Colorado, electricity consumers pay an average price of \$0.12 per kilowatt-hour. This indicates a large negative externality in the production of electricity.

By decreasing power plants in operation, the total social cost produced from these power plants would be reduced as well. This suggests that increasing the cumulative amount of electricity storage systems would mitigate part of the negative externality in the production of electricity, thus positively benefiting society.

Senate Bill 17-089 would accomplish its intended purposes to reduce the production costs of electricity and increase the reliability of the power grid. In addition, increased use of electricity storage systems has a positive externality in reducing the total number of power plants and total greenhouse emissions. For how beneficial the bill is, it may not go far enough in encouraging the installation and use of these devices.

Despite the benefits to both electricity consumers and society as whole, utility companies do not have a powerful incentive to encourage installation of these systems. Electricity provision is a natural monopoly, and as a result there isn't much competition. Without competition, monopolists are price makers and thus control the market.

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<sup>3</sup> “Carbon pollution and power plants”, *United States Environmental Protection Agency*, 2014

However, if consumers are able to store electricity, then they can take advantage of the fluctuating prices and purchase and store low-priced electricity. As a result, consumers with stored electricity then have the choice as to which price to pay for electricity at any given moment, thus restricting the monopolists pricing power.

In response, utilities are incentivized to increase costs against consumers with storage units in order to recoup lost revenue. However, the bill protects electricity storage consumers against additional charges from utility companies. In order for a utility company to impose additional charges on an electric storage user, the same charge must be applied to all similar situated customers who don't have electric storage units. As a result, customers who use storage systems cannot be punished for doing so. In addition, the bill also protects the installation of electricity storage systems from imposed rules from utility companies. The bill states that utility approval processes must be "simple, streamlined, and not cost-prohibitive to the consumer".

Without support from utilities, it is likely that the production and supply of electrical storage systems will not be efficient. Since utilities control the electricity market, electrical storage systems would need to be produced by firms in different markets. The barriers to enter the electric storage market are high, due to the high start up costs and costs of production. Tesla has recently entered this market, but only by investing five billion dollars into a battery factory.

Without increased competition in the supply of electricity storage units, the price of these systems will stay relatively high. The two major producers of electrical storage systems, Tesla and Orison, sell bottom line products for thousands of dollars. Orisons base system, which supplies less than ten percent of average daily household electricity

use, costs \$1,600. Despite the long term potential for saved money, the up-front costs of these products are likely to minimize the total quantity of systems in use.

It would increase the benefit of the bill if amendments were added that included additional incentives to increase the output of electricity storage systems. Amendments could be made to subsidize the production of these systems thereby reducing costs and lowering prices. The second option would be to offer additional incentives to consumers, such as tax credits or write-offs, in order to increase consumption.

While these amendments would increase the output of electrical storage systems, the bill effectively protects consumers who install these units from additional utility fees or other regulations. By doing so, the bill will help reduce stress on the electrical grid and in turn decrease the number of power plants in operation. In addition, consumers will have an increased ability to determine the price they pay for electricity. Due to the net benefit to society, SB17-089 should be passed.