An Economic Analysis of HB17-1232

House Bill 17-1232 will increase the options public utilities have to sell natural gas and electricity for motor vehicles. Currently, under Colorado Law, public utilities can sell electricity and natural gas for vehicles as an unregulated entity. This bill will allow public utilities to establish refueling stations as a regulated entity or an unregulated entity. For public utilities that establish fueling station as a regulated entity, the bill sets standards for the rates that can be applied to the fuels sold. The law notes that the costs shall be established based on the utilities' return on equity for electric vehicle charging stations and on the utilities' weighted average cost of capital and return on equity, as approved by the Public Utilities Commission, for natural gas fueling stations. The bill further stipulates that recovery of costs must be made in a method similar to the recovery of distribution system investments.

Alternative fuel vehicles have enjoyed increasing popularity over the past few years (Chamberlin, 2017). As a class, alternative fuel vehicles are those that run exclusively on either electricity or natural gas, but not both. Costs of both electricity and natural gas have fallen, making them more cost effective to operate (Mello, 2013). And while the initial investment can be high, tax credits provided by the state and federal government make purchasing an electric vehicle an attractive option for many vehicle owners (Chuang, 2016). Increased demand for alternative fuel vehicles also means increased demand for the fuel that powers them.

The most obvious location to refuel an alternative fuel vehicle is at home. Electricity for electric vehicles and natural gas for natural gas vehicles can be drawn directly from the home's utilities (Shahan, 2015). But like all vehicles, alternative fuel vehicles have a maximum range

before they must be refueled or recharged. Ranges for these vehicles are somewhere between 100 and 300 miles, depending on the make and model (Mello, 2013).

As a point of reference, Americans drive 37 miles on average in one day ("The Asphalt's Getting Crowded," 2013). While this is well with-in the range of most alternative fuel vehicles, individuals may periodically find themselves making longer trips that require refueling. Ensuring such trips are possible means ensuring adequate access to refueling stations for these vehicles.

Currently, electric vehicle charging stations are not nearly as ubiquitous as gas stations, but they have been growing in popularity. Options for natural gas vehicles by comparison are much more limited both in rural and urban settings. There are only 35 compressed natural gas refill stations in the entire state of Colorado ("Alternative Fuels Data Center," 2017).

The producers and marketers of natural gas and electricity for consumption in Colorado are public utilities. Because they are a monopoly, public utilities are rightfully regulated. The government sets restrictions on how much the public utility can charge customers for electricity and natural gas.

Under Colorado law, public utilities can currently operate refueling stations for vehicles as an unregulated entity only. This means that they must buy the electricity from themselves at a fair market price before reselling it. In doing so, public utilities are effectively put on the same playing field as any other private reseller of electricity or natural gas. The one caveat is that when operating as an unregulated entity, public utilities cannot subsidize their operations. This means they can only establish refueling stations in locations where demand justifies its presence. By operating as a regulated entity, a public utility could choose to place a refueling station in an underserved market and subsidize its operation.

This bill addresses two key economic challenges. First, by allowing public utilities to establish regulated refueling stations, it increases options for consumers. But simply allowing public utilities to operate regulated refueling stations could create a market imperfection if the pricing regulations are not effective. To address this challenge, the bill will establish criteria to determine the selling price of alternative fuels. This analysis will explore and address the effectiveness of such regulations.

Public utilities own and operate the transmission and gas pipelines and are therefore in the best position to set up refueling stations where they see fit. Allowing public utilities to sell electricity and natural gas as a regulated entity would increase the number of refueling stations, thereby increasing options for consumers.

While opening the market up to increased competition is efficient and desirable, opening it up to a monopoly power has the potential to be very bad. It is not clear what the price for fuel at a fueling station operated by a public utility would be or how it would compare to existing stations. That said, Excel Energy, one of the largest public utilities in the state, reported a return on equity of 10.10% in 2015 (Schell, 2015). Installing an electric vehicle charging station is estimated to cost around $9000 for materials and labor (Agenbroad & Holland, 2014). In Colorado, electricity costs on average 11.2 cents per kilowatt hour (Jiang, 2011). Assuming the charging station is occupied by a vehicle for 16 hours a day, a public utility would have to charge $1 p/hour to achieve a 10.10% return on equity.

Directly comparing this value to other resellers is tricky because there isn't a set market price for electricity at vehicle charging stations. Charging an electric vehicle is nothing like refueling a gas vehicle. Refilling a gasoline vehicle takes minutes while charging an electric

vehicle take hours. As a result, the location of a recharging facility is an important factor for consumers. Consumers are most likely to use charging stations with-in walking distance of their destination. The price for charging at a specific station is affected by both the location and the market price of electricity.

Typical charging station prices range anywhere from free to $4 per hour ("PlugShare," n.d.). Given that the public utility would be required to charge $1 per hour, they would be on the low to middle end of the market. One concern for public utilities being priced so far below the competition is that they may take away market share from private entities. But, given the importance of charging station location in consumer choice, this may not be the case.

Parking lots are the most convenient location for vehicle charging station and because parking lots are private property, it may be difficult or impossible for public utilities to establish charging stations at these locations. Private providers will continue to offer a competitive product simply because they are located in parking lots and parking garages. Public Utilities meanwhile, can help fill the service gap by operating fueling stations in areas that may not have enough demand to justify a private supplier, such as along roadways or in rural cities.

Should electric vehicles become more ubiquitous and consumers less concerned with charging station location, it is possible the public utilities will obtain an unfair competitive advantage, even with the bill's price restrictions in place. Law makers should continue to monitor the market to ensure this does not occur and pass legislation to rectify this market failure if it does occur.

Natural gas refueling stations face slightly different regulations because the cost of gas is determined based on both the return on equity and average cost of capital. This is prudent

because establishing a natural gas refueling station is substantially more expensive than establishing an electric vehicle charging station. In 2015, Excel Energy reported a cost of capital of 7.66% (Schell, 2015). Combined with the companies return on equity of 10.10% and an estimated cost for a natural gas refueling station of $800,000, the sale price would be $1 per GGE (Gallon of Gasoline Equivalent) (Smith & Gonzales, 2014). Most private stations in the Colorado sell natural gas at a price between $1.50 and $3.00 per GGE ("CNG Stations," n.d.).

Natural gas refueling stations are less common then electric vehicle charging stations and users often must go out of their way to gain access ("Alternative Fuels Data Center," 2017). Given that public utilities own the gas pipelines, they could easily and inexpensively set up a natural gas refueling station in locations they see fit. This, combined with the fact that there are so few natural gas refueling stations in Colorado to begin make this a natural area for a monopoly. Natural gas vehicles are not very common so it is unlikely private providers will operate enough stations to make operating a natural gas vehicle convenient. Public utilities can more effectively serve consumers by operating more stations at a lower price than private sellers. It would therefore be better to make natural gas refueling stations a full regulated monopoly and exclude private sellers.

This bill presents an effective solution to both rectify a market imperfection and reduce an externality. That said, I would recommend the committee adopt an amendment to eliminate private players from the natural gas refueling market. This amendment, combined with the existing text, will ensure adequate access to refueling stations for alternative fuel vehicles in Colorado.

Works Cited

Agenbroad, J., & Holland, B. (2014, March 3). EV Charging Station Infrastructure Costs. Retrieved March 21, 2017, from https://cleantechnica.com/2014/05/03/ev-charging-station-infrastructure-costs/

Alternative Fuels Data Center. (2017, March 14). US Department of Energy. Retrieved from http://www.afdc.energy.gov/fuels/electricity_locations.html

Chamberlin, T. (2017, February 23). The price is right. Retrieved March 14, 2017, from https://www.durangotelegraph.com/news/top-stories/the-price-is-right/

Chuang, T. (2016, May 17). Buying an electric car in Colorado just got $5,000 cheaper. The Denver Post. Retrieved from http://www.denverpost.com/2016/05/17/buying-an-electric-car-in-colorado-just-got-5000-cheaper/

CNG Stations. (n.d.). CNG Now. Retrieved from http://www.cngnow.com/stations/Pages/information.aspx

Jiang, J. (2011, October 28). The Price Of Electricity In Your State. Retrieved March 21, 2017, from http://www.npr.org/sections/money/2011/10/27/141766341/the-price-of-electricity-in-your-state

Mello, T. B. (2013, February 3). Ownership costs of traditional versus alternative fuel vehicles: Department of Energy calculator breaks down pricing. Retrieved March 14, 2017, from http://autoweek.com/article/car-news/ownership-costs-traditional-versus-alternative-fuel-vehicles-department-energy

PlugShare. (n.d.). Retrieved March 14, 2017, from https://www.plugshare.com/

Schell, M. (2015, March 3). Direct Testimony and Attachments of Mary P Schell. Excel Energy. Retrieved from https://www.xcelenergy.com/staticfiles/xe-responsive/Admin/Managed%20Documents%20&%20PDFs/CO-Regulatory-Schell-Direct-Testimony-Attachments.pdf

Shahan, Z. (2015, September 10). Electric Car Charging 101 — Types of Charging, Charging Networks, Apps, & More! Retrieved from Electric Car Charging 101 — Types of Charging, Charging Networks, Apps, & More!

Smith, M., & Gonzales, J. (2014, September). Costs Associated With Compressed Natural Gas Vehicle Fueling Infrastructure. US Department of Energy. Retrieved from http://www.afdc.energy.gov/uploads/publication/cng_infrastructure_costs.pdf

The Asphalt's Getting Crowded. (2013, January 25). Retrieved March 14, 2017, from http://www.facethefactsusa.org/facts/the-asphalts-getting-crowded-video-