A MICROECONOMIC APPROACH TO ENERGY CONSERVATION

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For industrial users, a bill from the power company is slightly more complicated than the one you and I receive in the mail. Factories use electricity to run their machinery just as we use it to run our households. However, for the industrial user, the charge is divided into two components—the charge for the real power that is actually used to produce work output and the charge for the reactive power that is necessary for the machines to work. For example, real power produces the output of a motor, while reactive power creates the magnetic field that is required for the motor to work at all. Fortunately, it is not really necessary to understand the science to discuss the economics. What matters to us is that one of these components of power (the reactive part) is subject to a penalty based on usage. This penalty is called the power factor (PF) penalty.

PF penalties are becoming more common in the United States and the states which already impose them are increasing them. Fortunately for the industrial user, technology exists to reduce the use of reactive power from the utility, and thus reduce the penalty. My company produces PF correction equipment and we are experiencing increased demand. As the demand curve for such equipment shifts to the right, supply will eventually increase to meet the demand, but it will increase at a slower rate so the price of PF correction equipment is going up.

Of the non-price determinants of demand, the only one that seems relevant in explaining this change is "expectations". Back when power factor penalties were announced, expectations of future costs definitely played a part in the demand shift. Those consumers who were unable to get this equipment in place before the rates changed, are currently experiencing much higher

costs for electricity, so they have moved beyond *expectation* and into the *reality* of higher utility costs.

What is interesting about this market is that the producers have imposed financial penalties on users so that the user's demand for the product will **decrease**. In most every other situation, a supplier would be happy to see their customer increase demand. In a completely free market economy, the supplier could increase prices enough to cover the costs they would incur to increase supply. In the American energy market, however, the producers are not free to do so because the construction of new power plants is regulated by the government. Even with unlimited financial resources, suppliers cannot meet demand by building new power plants whenever they want to. The Federal Energy Regulation Commission (FERC) must give permission (via permits) for construction of new power-generating plants. This government interference would seem to be related to a change in values, a prioritization of environmental concerns over insatiable power consumption at any price. The Office of Energy Policy and Innovation focuses on, among other things… bringing "about reforms that advance the goals of the Commission, taking into account energy and environmental concerns."[1] When utilities request permission to build new plants, FERC scrutinizes the power factor of the utility's customers and if it is deemed lacking, the permit is denied until the power factor issue is addressed.

I believe this arrangement for promoting energy conservation spreads the cost most fairly across all the users. At the first level, the burden seems to fall on the industrial consumer most of all-- he would either have to pay much higher rates to fund construction of new power plants

[1] Federal Energy Regulatory Commission, June 2010
http://www.ferc.gov/about/offices/oepi.asp

or he pays the power factor penalties or he buys new equipment to reduce his consumption. As a result of government regulations, industrial consumers will eventually have install equipment to reduce consumption. If they do not, we will run out of power capacity and it will be impossible to meet the demand. The news is not all bad for the industrial user—as currently priced, the equipment costs the equivalent of two years worth of PF penalties. The equipment has an expected life of 18 years, so the industrial user enjoys the benefit of his initial investment for 16 additional years. The resulting reduction in consumption helps the utilities avoid the need for new construction and furthers the environmental cause by reducing the depletion of the Earth's resources that seems inevitable with the ever-increasing demand for energy.

Although PF penalties are only imposed on industrial users, I think it can be assumed that the additional costs they incur will be passed onto the end-use consumer—i.e. the households who buy what the factory produces.

I think it is most fair when costs are paid by users because users are the ones who actually receive the benefits. Additionally, users are in control at least to some extent because they can control their rate of consumption and therefore, their share of the costs. Through elections, households choose governments and in our mixed economy, governments can impose regulations on firms to further national goals. I believe it can be said that the model described here to reduce energy use may be the best way to spread out the cost of promoting energy conservation among those who will most benefit, humans who will need the limited resources the Earth can provide for a long time to come.