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COMMENT

Electric Vehicles and Time-of-Use Rates: The Impending Role of the New York State Public Service Commission in Regulating our Transportation Future

JAKE SELIGMAN*

I. THE FIGHT AGAINST FUEL INFLEXIBILITY

The United States has a transportation problem. With over 250 million registered vehicles[1] demanding more than seventy percent of the country's total oil supply,[2] the U.S. transportation sector[3] sits precariously at the center of both environmental and national security issues. The sector's overwhelming reliance on

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1. *Table 1-11: Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances*, U.S. DEP'T. OF TRANSP., RESEARCH AND INNOVATIVE TECH. ADMIN., BUREAU OF TRANSP. STATISTICS, http://www.bts.gov/publications/national_transportation_statistics/html/table_01_11.html (last visited Oct. 25, 2010).

2. *Oil: Crude and Petroleum Products Explained*, U.S. ENERGY INFO. ADMIN. http://tonto.eia.doe.gov/energyexplained/index.cfm?page=oil_home# tab2 (last visited Oct. 25, 2010) (the transportation sector consumes 8,997,000 barrels/day (378 million gallons/day)).

3. The transportation sector is comprised of vehicles that move goods or people, including boats, aircraft, and rail. This article focuses on automobiles and light trucks, which account for sixty percent of the transportation sector's energy demand. *See Use of Energy in the United States Explained*, *Energy Use for Transportation*, U.S. ENERGY INFO. ADMIN. http://tonto.eia.doe.gov/energyexplained/index.cfm?page=us_energy_transportation (last visited Oct. 25, 2010).

oil presents the most difficult challenge to achieving the twin aims of energy independence and significantly reduced greenhouse gas (GHG) emissions, not because it is the largest energy-consuming sector (it is not)[4] or because its combustion process produces more GHG emissions than electricity generators' combustion (it does not),[5] but because of its inherent inflexibility.

Unlike electricity generation that can, and increasingly does, come from cleaner domestic options like natural gas, solar, wind, geothermal, and nuclear, the transportation sector is built around the combustion engine, which requires an almost-unwavering commitment to oil. Potential alternatives to oil such as ethanol and biodiesel have yet to conclusively prove their worth on an environmental or economic basis.[6] Hydrogen has continued to remain just beyond the range of feasible fuel alternatives, and investors have made little effort to jumpstart the infrastructure overhaul its widespread use would require.[7] However, the transportation sector is by no means stuck with oil. Indeed, the automobile industry has already developed a viable alternative: electric vehicles.

Within the next four years, nearly every major car company will have a grid-enabled vehicle (GEV)[8] on the market.[9] While

4. *See Use of Energy in the United States Explained*, U.S. ENERGY INFO. ADMIN., http://tonto.eia.doe.gov/energyexplained/index.cfm?page=us_ energy_use (last visited Oct. 25, 2009) (the transportation sector consumes 29% of total energy in the U.S. whereas the industrial sector consumes 30%, the commercial sector consumes 19%, and the residential sector consumes 22%).

5. *See* U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2008 3-6 (2010), *available at* http://www.epa.gov/climatechange/emissions/downloads10/US-GHG-Inventory-2010_Report.pdf (in 2008, total GHG emissions from electricity generation were 2374.3 Tg CO_2 Eq. and total GHG emissions from transportation were 1813.4 Tg CO_2 Eq).

6. *See The Future of Biofuels: The Post-Alcohol World*, ECONOMIST, Oct. 28, 2010, at 84.

7. For a discussion of the failures of hydrogen-fueled vehicles, *see Hydrogen Tries Again*, ECONOMIST, Apr. 23, 2010, *available at* http://www.economist.com/node/15981031.

8. "Grid-enabled vehicle" is a term that includes both electric vehicles, which have only an electric motor, and plug-in hybrid electric vehicles, which can run on gasoline and battery like current full hybrids, but can recharge from an outlet, which greatly increases fuel economy.

diffusion of GEVs in the marketplace is in its nascent stages, their potential market penetration could be great, given the comparable costs to current combustion vehicles, high oil prices, and the increasing awareness of the environmental issues and costs associated with burning fossil fuels. In March 2009, President Obama set aside over two billion dollars in competitive grants for electric vehicle manufacturers in furtherance of his goal of having one million plug-in hybrid electric vehicles (PHEVs) on the road by 2015.[10]

By shifting the source of energy from oil combustion to electricity generation, widespread GEV use would combat the transportation sector's fuel-inflexibility problem. The energy supply of vehicles that rely on the grid for their power is coupled to the electric grid's energy supply, and no longer tied to one fuel. Although much of the country's electricity transmission and distribution grid is fueled primarily by coal combustion[11], the grid (unlike current cars) has options. Not only can policies like carbon regulation and renewable portfolio standards, which mandate renewable energy inclusion in state energy portfolios, help renewable energy increase its role in the electricity supply mix, but converting coal plants into cleaner-burning natural gas facilities makes increasing business sense as the costs of pollution increase and the price of natural gas decreases. Additionally, many electric utilities offer clean energy options, whereby a customer can elect to purchase electrons (or at least credits for those electrons) from renewable sources.[12] In other words, GEV

9. *See* John Halliwell, Plug-in Vehicles: A New Way of Thinking about the Electric Grid, Presentation at the New York State Energy Research and Development Authority's Environmental Monitoring, Evaluation and Protection Conference, (Oct. 15, 2009), *available at* http://www.nyserda.org/programs/Environment/EMEP/conference_2009/presentations/Halliwell_John_Plug-In%20Vehicles%20A%20New%20Way%20of%20Thinking%20about%20the%20Electric%20Grid.pdf (slides from presentation available at this link).

10. *See* Press Release, U.S. Dep't of Energy, Remarks of President Barack Obama at Southern California Edison Electric Vehicle Technical Center (Mar. 19, 2009), *available at* http://www.energy.gov/7067.htm.

11. *See Net Generation by Energy Source: Total (All Sectors),* U.S. ENERGY INFO. ADMIN., http://www.eia.doe.gov/cneaf/electricity/epm/table1_1.html (last visited, Nov. 10, 2010).

12. *See, e.g., ConEd Solutions NYC*, CMTY. ENERGY, http://www.communityenergyinc.com/NYC (last visited Oct. 25, 2010).

penetration would give drivers access to a wide array of cleaner, more sustainable, domestic fuels.

Increasing reliance on electricity generation for transportation fuel is not without its challenges. For widespread GEV adoption to be successful, battery-charging infrastructure must also be widespread, with an emphasis on in-home charging stations and, to a lesser extent, workplace and publicly accessible charging stations. While the infrastructure implications are exciting, it remains unclear how an electrification ecosystem will actually look. What is clear is that GEVs will add stress to the electric grid, as car owners will demand more electricity.

The size of GEVs' impact on the grid varies along with market share predictions. According to the Department of Energy's Oak Ridge National Laboratory (ORNL), GEVs will have a twenty-five percent share of the automobile market by 2020.[13] ORNL projects that, by 2030, New York[14] alone will have 2.42 million GEVs on the road.[15] The Electric Power Research Institute (EPRI) used twenty percent by 2050 market share as a low estimate, employed a medium market share of sixty-two percent by 2050 and a high market share of eighty percent by 2050 in its study of the environmental benefits of GEVs.[16] Regardless of which market penetration is most likely, the immediate environmental benefits of this shift away from oil combustion are significant (although largely beyond the scope of this article).

As Chart 1 shows, depending on the electricity fuel source, 2010 GHG emission levels could fall by anywhere from twenty-eight percent to sixty-seven percent per vehicle when a GEV is

13. U.S. DEP'T OF ENERGY, OAK RIDGE NAT'L LAB., POTENTIAL IMPACTS OF PLUG-IN HYBRID ELECTRIC VEHICLES ON REGIONAL POWER GENERATION 6 (2008), *available at* www.ornl.gov/info/ornlreview/v41_1_08/regional_phev_ analysis.pdf [hereinafter POTENTIAL IMPACTS OF PLUG-IN HYBRID ELECTRIC VEHICLES].

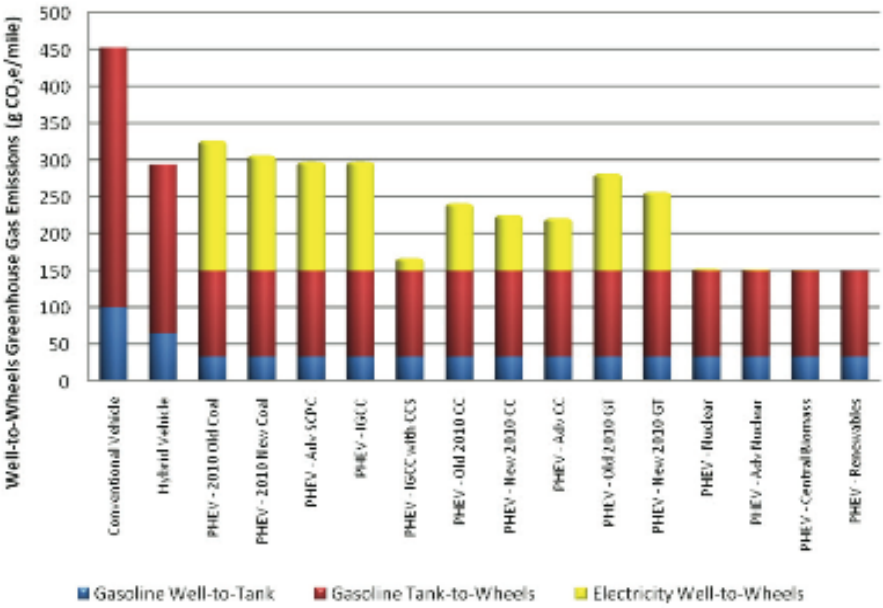
14. This article will continue to focus on New York as an example as it is a state that faces many of the challenges that GEV's pose to the electric grid and regulators.

15. POTENTIAL IMPACTS OF PLUG-IN HYBRID ELECTRIC VEHICLES, *supra* note 13, at 6.

16. ELEC. POWER RESEARCH INST. & NATURAL RES. DEF. COUNCIL, ENVIRONMENTAL ASSESSMENT OF PLUG-IN HYBRID ELECTRIC VEHICLES 4-6 (2007), *available at* mydocs.epri.com/docs/public/000000000001015325.pdf.

substituted for a conventional vehicle.[17] The GHG reductions increase over time and, by 2050, the reductions per car average closer to sixty-seven percent.[18]

Chart 1[19]



Year 2010 comparison of PHEV 20 GHG emissions when charged entirely with electricity from specific power plant technologies (12,000 miles driven per year).

II. PROTECTING ENVIRONMENTAL BENEFITS THROUGH TIME-OF-USE RATES

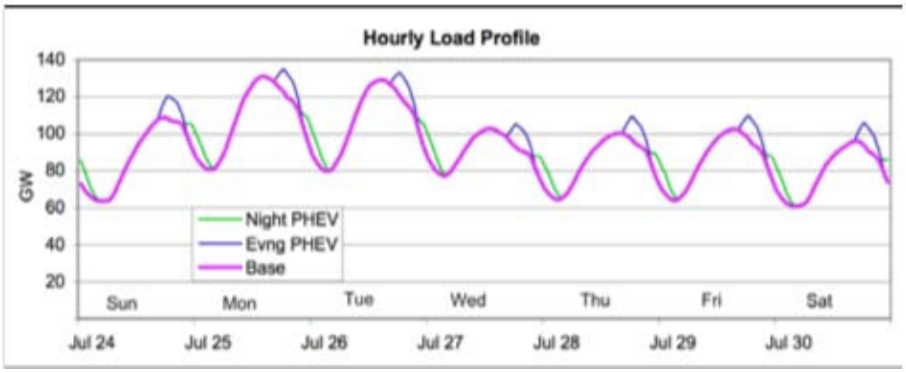
Along with the environmental benefits of market penetration comes the challenge of effectively managing GEV electricity use to ensure that those environmental benefits are realized and that electricity price spikes are avoided. Ironically, these complex threats of price spikes and unrealized environmental benefits

17. *Id.* at 5-2.
18. *Id.*
19. *Id.* (Figure 5-1).

stem from a simple question that GEV owners will have to answer every day: what is the best time to recharge the car?

GEV owners will likely want to plug in as soon as they are near a suitable outlet in order to keep their cars charged for future use.[20] For many GEV owners this will mean plugging in their cars when they return home from work and pull into their garages. Unfortunately, this occurs during the evening peak in electricity demand,[21] which usually falls between the hours of 4:00 P.M. and 7:00 P.M.[22] During these hours (along with the morning peak hours),[23] electricity demand is at its highest. As the blue line in Chart 2 shows, GEVs charging in the evening hours would cause a substantial spike in the electricity demand curve.[24]

Chart 2[25]



20. *See* POTENTIAL IMPACTS OF PLUG-IN HYBRID ELECTRIC VEHICLES, *supra* note 13, at 9.

21. *See id.*

22. *See Frequently Asked Questions- Electricity*, U.S. ENERGY INFO. ADMIN., http://www.eia.doe.gov/ask/electricity_faqs.asp#peak_demand (last visited Dec. 23, 2010) (providing access to daily load/demand profiles for various Independent System Operators).

23. Typically from 7:00 A.M. until 9:00 or 10:00 A.M. *See id.*

24. POTENTIAL IMPACTS OF PLUG-IN HYBRID ELECTRIC VEHICLES, *supra* note 13, at 16.

25. *Id.*

In a restructured state like New York, where generating facilities bid into the wholesale electricity market at their respective market-clearing prices, as demand for electricity increases, so does the wholesale price of electricity.[26] As the wholesale price of electricity rises, more expensive generating facilities can profitably bid in at a market-clearing price.[27] Therefore, by adding to the peak demand for electricity, GEVs would drive up the peak electricity price, ultimately leading to higher rates for customers. From an environmental perspective, the results are even less desirable, as the plants that come online only to meet peak demand tend to be the least efficient and dirtiest facilities on the grid (i.e. old oil generators).[28]

The question then becomes: how do utilities and regulators, who represent the links between GEV owners and the wholesale generation market, smooth out the evening peak to mitigate these undesirable economic and environmental results? The simple answer is: by designing electricity rates to encourage GEV owners to plug-in during off-peak hours when there is plenty of cheaper base-load capacity available.

In June 2009, the New York Independent System Operator (NYISO), a not-for-profit corporation that manages New York's electricity transmission grid and oversees the state's wholesale electricity market, conducted a study on the potential impacts of GEVs on the grid, and recognized the importance of reducing the predicted spike in peak demand.[29] As peak demand for electricity tends to be as much as fifty percent greater than off-peak demand, the grid has "a significant amount of excess generation

26. *See* James M. Griffin & Steven L. Puller, *A Primer on Electricity and the Economics of Deregulation*, *in* ELECTRICITY DEREGULATION: CHOICES AND CHALLENGES 1, 12-14 (James M. Griffin & Steven L. Puller eds., 2005). *See also* Paul L. Joskow, *The Difficult Transition to Competitive Electricity Markets in the United States*, *in* ELECTRICITY DEREGULATION: CHOICES AND CHALLENGES 31, 38-39 (James M. Griffin & Steven L. Puller eds., 2005) (illustrating the components of a competitive electricity market).

27. *See* Griffin & Puller, *supra* note 26, at 12-13.

28. *See* POTENTIAL IMPACTS OF PLUG-IN HYBRID ELECTRIC VEHICLES, *supra* note 13, at 19-25. *See also* Griffin & Puller, *supra* note 26, at 13 (demonstrating the electricity supply profile at various levels of marginal cost).

29. N.Y. INDEP. SYS. OPERATOR, ALTERNATE ROUTE: ELECTRIFYING THE TRANSPORTATION SECTOR: POTENTIAL IMPACTS OF PLUG-IN HYBRID ELECTRIC VEHICLES ON NEW YORK STATE'S ELECTRICITY SYSTEM 11 (2009).

capacity compared to demand" during off-peak hours.[30] In other words, off-peak electricity is substantially cheaper than peak electricity as there is far less demand for it.

If given the choice between paying to charge their GEVs during peak pricing hours or off-peak pricing hours, car owners would have a strong incentive to charge off- peak.[31] But, residential customers typically do not face that choice. Currently, almost all residential customers pay a flat rate all day and night, and thereby have no incentive to reduce usage during peak hours. The type of rate schedule that allows for a more sophisticated, informed choice is called "Time-of-Use,"[32] and by opting in to this rate schedule, utility customers pay one of two electricity prices depending on the time of day.[33] In most cases, the peak and off-peak prices differ widely (with peak prices being much higher than off-peak prices),[34] heavily incentivizing the customer to shift use away from the peak hours and on to the off-peak times. While each utility defines its off-peak price and hours differently, generally off-peak hours are from 10:00 P.M. until 7:00 A.M., and sometimes again in the midday hours for residential customers.[35] Weekends are almost always considered off-peak.[36]

Although all major utilities offer voluntary time-of-use rate schedules, the vast majority of residential customers do not opt in. For example, according to Con Edison, a New York utility providing electricity to roughly 3.2 million customers,[37] "[a]s of

30. *Id.* at 9.

31. Con Edison's summertime peak rate is 26.19 c/kWh, while its off peak rate is 1.01 c/kWh. *See* CONSOL. EDISON, INC., SERVICE CLASSIFICATION NO. 1: RESIDENTIAL AND RELIGIOUS 3 (2008), *available at* http://www.coned.com/documents/elec/201-210.pdf [hereinafter SERVICE CLASSIFICATION NO. 1].

32. Guy R. Newsham & Brent G. Bowker, *The Effect of Utility Time-Varying Pricing and Load Control Strategies on Residential Summer Peak Electricity Use: A Review*, 38 ENERGY POL'Y 3289, 3290 (2010).

33. *Id.*

34. *See* Severin Borenstein, *Time-Varying Retail Electricity Prices: Theory and Practice*, *in* ELECTRICITY DEREGULATION: CHOICES AND CHALLENGES 317, 327 (James M. Griffin & Steven L. Puller eds., 2005).

35. *Id.*

36. *Id.*

37. *Investor Information*, *Corporate Profile*, CONSOL. EDISON. INC., http://investor.conedison.com/phoenix.zhtml?c=61493&p=irol-homeprofile (last visited Oct. 25, 2010).

June 30, 2009, there were 2,337 customers taking service under the SC 1 voluntary time-of-day rate program."[38] Disregarding the lack of public awareness that time-of-use rates are even an option, this underutilization makes intuitive sense because most customers require electricity at peak times and their demand is relatively inelastic.

For instance, while residential customers could shift activities such as using laundry machines or dishwashers to off-peak hours, appliances like refrigerators stay on regardless of the time of day. Similarly, many activities like using a blow dryer in the morning or turning on the lights after getting home from work can only take place during peak hours. Moreover, even if a residential customer decided that he could shift much of his electricity use to off-peak hours, the calculation to determine whether switching to time-of-use rates would be cheaper than staying on a fixed rate would be a complicated endeavor. A customer would have little certainty as to whether switching to time-of-use rates would actually prove to be cheaper.

But, there has rarely been a situation that so clearly calls for the adoption of time-of-use rates as the impending growth in GEV ownership. The amount of electricity required to charge a GEV, coupled with how easy it would be to charge one during off-peak hours, would make GEV owners ideal candidates for time-of-use rates. Incentivizing GEV charging away from the peak would not only alleviate some of the environmental problems associated with the dirtier generating units that are only economical during peak hours, but it would also increase demand for cheap generation that runs during off-peak hours.[39]

In New York, much of this cheap, off-peak generation comes from wind, a clean, renewable source of energy that produces most of its electricity during off-peak hours, as wind tends to blow more consistently at night.[40] Not only would charging GEVs off-peak help reduce greenhouse gas emissions, but the increased demand (and concurrent increased price) for wind energy would

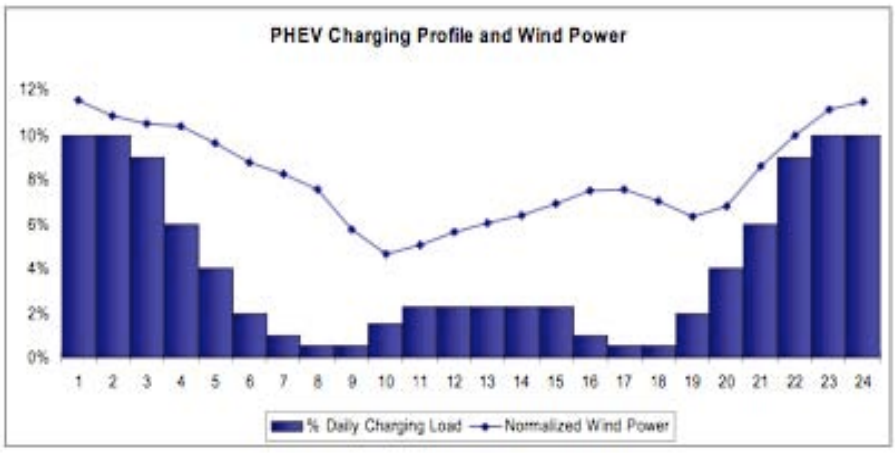
38. Response to Interrogatories, Case No. 09-E-0428 (July 28, 2009) (on file with author).

39. *See* Griffin & Puller, *supra* note 26, at 13 (demonstrating the electricity supply profile at various levels of marginal cost).

40. *See* N.Y. INDEP. SYS. OPERATOR, *supra* note 29, at 8.

also make it more economically viable as an investment for developers. This ideal situation of wind-GEV synergy in New York, illustrated by Chart 3, can only work if GEV owners do most of their charging off-peak.

Chart 3[41]



III. CREATING A RATE CLASS AND THE REGULATORY COMPACT: A BRIEF OVERVIEW

How, then, can regulators ensure that utilities charge GEV owners on a time-of-use rate schedule rather than the traditional flat-rate residential schedule? The simple answer is by grouping GEV owners into a new rate class, or group of customers charged on the same basis. To fully display the legal and political implications of creating a rate class, this section will discuss ratemaking generally and, then, more specifically, it will explore the powers of a regulatory body to create a new rate class. Again, the focus will be on New York as an example, although most of the legal and political issues will arise in any state with a significant market penetration of GEVs.

Electric utilities are regional monopolies that distribute electricity to consumers from either a wholesale market or their own generating units. In exchange for this state-granted

41. *Id.*

monopoly power, utilities accept regulation by the state.[42] Utilities are further characterized by their service to the public interest, their duty to serve all members of the public in their respective territories, and their burden to charge reasonable rates.[43] This regulatory compact is fundamental to understanding the underpinnings of rate regulation, as it forms the basis for the regulatory relationship between the public and a utility. To manage this regulatory relationship, each state has created an agency charged with regulating utilities, and, in New York, the Public Service Commission serves this function.[44]

The bulk of a utility regulatory agency's job is to resolve the central issue of "how much total revenue the utility should be permitted to collect through the rates charged for its services."[45] This total revenue figure is generally called a revenue requirement. The components of a revenue requirement are: the amount of money that an agency allows a utility to earn on its assets based on a risk level necessary to attract investors, plus the utility's operating expenses.[46] The asset component of this rate calculation is also called a rate base, and usually consists of fixed investments that a utility has made on behalf of its customers (e.g., poles, wires, transformers, substations, electricity-generating units, and service trucks).[47] Once the agency has held a rate proceeding and determined the total revenue requirement it then designs electricity rates for each customer class in order to generate the required revenue.[48]

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42. For a classic discussion of the nature of public utilities in the United States, *see generally* Proprietors of the Charles River Bridge v. Proprietors of the Warren Bridge, 36 U.S. 420 (1837); Munn v. Ill., 94 U.S. 113 (1877); Smyth v. Ames, 169 U.S. 466 (1898).

43. *See generally* Charles River Bridge, 36 U.S. 420; Munn, 94 U.S. 113; Smyth, 196 U.S. 466.

44. *About the Department of Public Service*, N.Y. STATE PUB. SERV. COMM'N, http://www.dps.state.ny.us/New_aboutdps.html (last visited Nov. 1, 2010).

45. Richard D. Cudahy & J. Robert Malko, *Electric Peak Load Pricing: Madison Gas and Beyond*, 1976 WIS. L. REV. 47, 48-9 (citing PAUL J. GARFIELD & WALLACE F. LOVEJOY, PUBLIC UTILITY ECONOMICS 44-50 (1964)).

46. *See id.* at 49.

47. *See* JAMES C. BONBRIGHT ET AL., PRINCIPLES OF PUBLIC UTILITY RATES 159-63 (1961).

48. *See id.* at *52.*

At their most basic, customer/rate classes, or groups of users who pay the same electricity rates as fellow class members, are broken down into residential, commercial, and industrial units.[49] There are a host of factors that a regulatory agency may consider when designing rate classes, the most important of which tend to be consumer demand characteristics and usage type.[50] Geographic concerns come into consideration as well.[51] To avoid charging customers for assets and services that they do not use, and to make cost allocation easier, agencies ideally try to define rate classes so that customers with similar demand profiles and usage types (e.g., GEV owners) are grouped together.[52] Once an agency defines a rate class, it is then able to design rates to charge the customers in that class.

IV. ACHIEVING REGULATORY GOALS THROUGH TIME-OF-USE RATES

A regulatory agency designs rate structures, as well as rate classes, to further the general goals of rate regulation. As enumerated by Congress in the Federal Public Utilities Regulatory Policies Act (PURPA), rate regulation should seek to conserve energy, optimize the efficiency of facilities and resources, and provide consumers with equitable rates.[53] The Supreme Court has deferentially echoed these goals, hinging its constitutionally-informed, rate-related decisions on whether given rates are just and reasonable.[54]

In his oft-cited book, PRINCIPLES OF PUBLIC UTILITY RATES, economist James C. Bonbright developed eight criteria for

49. *See, e.g., Service Classifications, Statements, Addenda*, CONSOL. EDISON, INC., http://www.coned.com/rates/elec-sched3.asp (last visited Dec. 23, 2010).

50. *See* JONATHAN A. LESSER & LEONARDO R. GIACCHINO, FUNDAMENTALS OF ENERGY REGULATION 144 (2007).

51. *See id.*

52. *See* BONBRIGHT, *supra* note 47, at 291-305 (discussing regulatory objectives of rate structure).

53. Public Utilities Regulatory Policies Act of 1978, 16 U.S.C. §§ 2601, 2611 (2006).

54. *See, e.g.,* Duquesne Light Co. v. Barasch, 488 U.S. 299, 307 (1989); Fed. Power Comm'n v. Hope Natural Gas Co., 320 U.S. 591, 602 (1944).

creating and evaluating a sound rate structure.[55] These criteria are:

> 1. The related "practical" attributes of simplicity, understandability, public acceptability, and feasibility of application.
> 2. Freedom from controversies as to proper interpretation.
> 3. Effectiveness in yielding total revenue requirements under the fair-return standard.
> 4. Revenue stability from year to year.
> 5. Stability of the rates themselves, with a minimum of unexpected changes seriously adverse to existing customers.
> 6. Fairness of the specific rates in the apportionment of total cost of service among the different consumers.
> 7. Avoidance of "undue discrimination" in rate relationships.
> 8. Efficiency of rate classes and rate blocks in discouraging wasteful use of service while promoting all justified types and amounts of use.[56]

According to Bonbright, the three most important criteria to a sound rate structure are the third, sixth, and eighth.[57] By ensuring a proper return on a utility's asset base, successfully fulfilling the third criterion provides for the economic viability of the regulated corporation, clearly an important component of ratemaking.[58] The sixth criterion, referring to a regulator's ability to fairly spread the total revenue requirement across rate classes, highlights the basic principle behind rate class structure: a customer should not have to pay for the utility investments that he does not use. For example, industrial customers tend to have different needs than residential customers, requiring different infrastructure investments from a utility, such as a new substation in an industrial area to handle high loads from which a residential customer might draw no benefit. Different rate schedules should, and do, reflect this divergence in needs. The eighth criterion, echoed by Congress in PURPA,[59] stresses the

55. *See* BONBRIGHT, *supra* note 47, at 291; Cudahy & Malko, *supra* note 45, at 49.
56. Cudahy & Malko, *supra* note 45, at 49.
57. *See id.* at 50.
58. *See* BONBRIGHT, *supra* note 47, at 291.
59. *See* 16 U.S.C. § 2601.

significance of resource efficiency in utility regulation while taking into account both environmental concerns about pollution and economic concerns about resource scarcity.

It is important to judge the soundness of time-of-use rates as an option with these criteria in mind, as "they remain the best available guide to evaluating a particular rate design."[60] In their 1976 article *Electric Peak Load Pricing: Madison Gas and Beyond*, Richard D. Cudahy[61] & J. Robert Malko applied these criteria, and found a host of benefits from implementing time-of-use rates.[62] For instance, by implementing time-of-use rates, which are much closer to the utilities' actual costs of providing service, regulators can decrease peak demand, conserve limited energy resources, and provide an incentive to develop technologies such as more efficient home appliances.[63]

Overall, time-of-use rates enable "the individual customer to contribute to the efficiency of the system and thereby achieve favorable rate treatment."[64] Time-of-use rates are so effective at meeting the broad goals of rate regulation that Congress sought to promote their widespread implementation when it passed PURPA.[65] PURPA's Section 2621(d)(3) reflects the high hopes that Congress had for time-of-use rates:

> The rates charged by any electric utility for providing electric service to each class of electric consumers shall be on a time-of-day[66] basis which reflects the costs of providing electric service to such class of electric consumers at different times of the day unless such rates are not cost-effective with respect to such class, as determined under section 2625(b) of this title.[67]

60. Cudahy & Malko, *supra* note 45, at 50.

61. Richard D. Cudahy, Senior Judge for the U.S. Court of Appeals for the 7th Circuit, wrote this article while chairman of the Wisconsin Public Service Commission.

62. *See* Cudahy & Malko, *supra* note 45, at 57-58, 68-72.

63. *See id.* at 58 (citing Charles J. Cicchetti, *The Design of Electricity Tariffs*, 96 PUB. UTIL. FORTNIGHTLY (1975)).

64. *Id.* at 69.

65. *See* 16 U.S.C. §§ 2621(d)(3), 2625(b).

66. "Time-of-day" rates and "time-of-use" rates are synonymous.

67. 16 U.S.C. § 2621(d)(3).

Pursuant to section 2625(b), time-of-use rates are cost-effective "if the long-run benefits of such rate to the electric utility and its electric consumers in the class concerned are likely to exceed the metering and communications costs and other costs associated with the use of such rates."[68]

Utilities can recover their investment in smarter meters, which are capable of measuring a customer's usage based on the time of day, through a slightly higher customer charge on a time-of-use customer's monthly bill.[69] Depending on how much load they can shift off-peak, time-of-use customers should see monthly savings immediately. Put simply, for customers that can shift their load, time-of-use rates are "cost-effective" under PURPA[70] and, as Cudahy & Malko describe, further the broader goals of utility regulation.[71]

V. CREATING A GEV RATE CLASS IN NEW YORK STATE

Given all the benefits of time-of-use rates, one might wonder why they have not been more widely implemented among residential customers. The answer is simple: not all residential customers can shift their energy use to off-peak hours so as to lower their electricity bills. In fact, residential customers who are unable to shift enough energy use off-peak could end up paying a higher bill under a time-of-use rate schedule. This is where the impending market penetration of GEVs presents a unique situation. GEV owners will, for the most part, be residential customers who pay a flat electricity rate. But, the electricity demand of a person who uses a GEV will no longer match the demand profile of most other residential customers. GEV owners can, as already discussed, shift much of their electricity use to off-peak hours. In light of this fundamental schism in the demand profile of residential customers, utility regulatory bodies should

68. 16 U.S.C. § 2625(b).

69. For a comparison of residential customer charges and time-of-use customer charges, *see generally* SERVICE CLASSIFICATION NO. 1, *supra* note 31.

70. *See* 16 U.S.C. § 2625(b).

71. *See* Cudahy & Malko, *supra* note 45, at 68-72.

carve out a separate rate class for GEV owners and mandate that such a class be billed under a time-of-use rate schedule.

Utility regulatory agencies, including the New York State Public Service Commission (PSC), have the power to create a new rate class.[72] According to the New York Public Service Law:

> The commission shall have power to require each. . .electric corporation to establish classifications of service based upon the quantity used, *the time when used*, *the purpose for which used*, the duration of use and upon *any other reasonable consideration*, and to establish in connection therewith just and reasonable graduated rates and charges; and it shall have power, either upon complaint or upon its own motion, to require such changes in such classifications, rates and charges as it shall determine to be just and reasonable.[73]

By expressly delegating to the PSC the authority to create a rate class based on the time of day when electricity is used and/or based on the purpose of that use, the statute gives the PSC the power to create a new rate class for GEV owners and to set the rates for that class. Even if the New York Public Service Law were not clear in its intent on the issue of rate class designation, the discretion afforded to the PSC (and utility regulators in general) in interpreting and applying such statutory guidance is extremely high and would allow for the PSC to make such a decision.[74]

The Supreme Court has held, with respect to ratemaking, that "[t]he Constitution is not designed to arbitrate these economic niceties."[75] In *Federal Power Commission v. Natural Gas Pipeline Co.*, the Supreme Court found that once a hearing has been held and proper findings have been made, "the courts cannot intervene in the absence of a clear showing that the limits of due process have been overstepped."[76] The Court further held

72. *See* N.Y. PUB. SERV. § 66(14) (2005).

73. *Id.* (emphasis added).

74. *See, e.g.,* 16 U.S.C. § 2621 (providing broad goals to be achieved by state regulatory bodies, but not mandating how, specifically, to regulate).

75. Duquesne Light Co., 488 U.S. at 314.

76. Fed. Power Comm'n v. Natural Gas Pipeline Co., 315 U.S. 575, 586 (1942) ("The Constitution does not bind rate-making bodies to the service of any single

that "[i]f the Commission's order, as applied to the facts before it and viewed in its entirety, produces no arbitrary result, our inquiry is at an end."[77]

This high level of deference to agency decision-making in regulating the utility industry has been consistent at the New York State level as well. In delineating the role of the court in reviewing PSC decision-making, the Appellate Division and the Court of Appeals of New York have found that:

> "The business of rate making has been confided by the legislature to a body of experts with powers of inquiry and modification adequate to the task." However, once rates have been established, it is for the courts to interpret the schedules, to determine whether the schedules are applied as the Public Service Commission established them, and to enforce those schedules.[78]

Therefore, once the PSC has gone through its decision-making process, New York courts will only determine whether the PSC's decision is being applied and enforced, and will not review the merits of the PSC's decision. Thus, given this highly deferential standard of review, the PSC would not exceed its statutory authority by creating a separate rate class for GEV owners.

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formula or combination of formulas. Agencies to whom this legislative power has been delegated are free, within the ambit of their statutory authority, to make the pragmatic adjustments which may be called for by particular circumstances. Once a fair hearing has been given, proper findings made and other statutory requirements satisfied, the courts cannot intervene in the absence of a clear showing that the limits of due process have been overstepped. If the Commission's order, as applied to the facts before it and viewed in its entirety, produces no arbitrary result, our inquiry is at an end.").

77. *Id.*

78. Columbia Gas of N.Y., Inc. v. N.Y. State Elec. & Gas Corp., 289 N.Y.S.2d 339, 344 (N.Y. Sup. Ct. 1968) (quoting Judge Cardozo in City of Rochester v. Rochester Gas & Elec. Corp., 134 N.E. 828, 832 (N.Y. 1922)). *See* N.Y. State Council of Retail Merchants v. Pub. Serv. Comm'n, 45 N.Y.2d 661, 669-670 (N.Y. 1978) ("[W]e cannot say that the courts are entitled to substitute their judgment for the evaluation of the commission, giving fair consideration to the expertise possessed by the commission in weighing the impact of rate-fixing factors on both the utilities and the consuming public and reaching the ultimate determination as to how appropriately to proceed in this given instance.").

VI. STATUTORY IMPEDIMENTS TO A GEV RATE CLASS ON A TIME-OF-USE RATE SCHEDULE

Even if the PSC were to create a new rate class for GEV owners, one roadblock to implementing a time-of-use rate schedule for those owners might still remain; the PSC's interpretation that Section 66(27)(a) of New York's Public Service Law[79] does not grant it the authority to mandate time-of-use rates for a residential rate class.[80] However, given the legislative history of Section 66(27) and the broad discretion afforded the Commission, were the PSC to prudently change its position and mandate time-of-use rates for GEV owners, it could do so both within its discretion and in conformity with legislative intent.

As New York State's utility regulatory body, the PSC has only those powers conferred upon it by the legislature and those powers that are "incident thereto and or necessarily implied therefrom."[81] Given this limitation, the PSC has been given both "a broad mandate to ensure that all New Yorkers have access to reliable and low-cost utility services,"[82] and the power to carry out this mandate with broad discretion.[83] As previously discussed, the impending adoption of GEVs will lead to higher rates and the possible need for "significant additional generation capacity," unless time-of-use rates or a similar incentive to charge off-peak is implemented.[84]

In order to avoid such consequences, the PSC must encourage off-peak charging by requiring that all GEV owners be billed for their electricity consumption on a time-of-use rate schedule. Unfortunately, the explicit statutory authority allowing the PSC to mandate time-of-use rates "where it deems such rates to be in

79. *See* N.Y. PUB. SERV. § 66(27)(a).

80. *See, e.g.,* *In re* Competitive Opportunities Regarding Elec. Serv., 2006 WL 2346389 at *7, *n.15 (Aug. 1, 2006).

81. Brooklyn Union Gas Co. v. Pub. Serv. Comm'n, 478 N.Y.S.2d 78, 82 (N.Y. App. Div. 1984). *See* Niagara Mohawk Power Corp. v. Pub. Serv. Comm'n, 388 N.Y.S.2d 157 (N.Y. App. Div. 1976); Kovarsky v. Brooklyn Union Gas Co., 3 N.Y.S.2d 581 (N.Y. App. Div. 1938), *aff'd*, 18 N.E.2d 287 (N.Y. 1938).

82. *About the Department of Public Service*, N.Y. STATE PUB. SERV. COMM'N, http://www.dps.state.ny.us/New_aboutdps.html (last visited Nov. 1, 2010).

83. *See generally* Fed. Power Comm'n, 315 U.S. 575.

84. *See* N.Y. INDEP. SYS. OPERATOR, *supra* note 29, at 4.

the public interest" was removed from the New York Public Service Law in 1997.[85]

The section of the state Public Service Law pertinent to time-of-use rates currently reads:

> Each electric corporation with annual gross revenues in excess of two hundred million dollars shall offer the option of paying charges on the basis of time-of-use rates for service to its residential customers. . .Such electric corporations shall periodically send a notice explaining the rates and informing such customers and organizations that the rates are available.[86]

Before the 1997 Amendment, section 66(27)(a)'s final sentence read, "Nothing in this section shall prohibit the commission from mandating such time-of-use rates where it deems such rates to be in the public interest."[87]

Although there is no language in the Public Service Law that actively prohibits the PSC from mandating time-of-use rates for residential customers, the PSC has interpreted the 1997 amendment to have that effect.[88] Given the circumstances surrounding the amendment and the legislative history, the PSC appears to be carrying out New York State legislative intent through its refusal to mandate time-of-use rates.[89]

However, as the legislative history also shows, widespread electric vehicle adoption was not within the minds of the amendment drafters in 1997.[90] Thus, the PSC could, and should, in light of the potential economic and environmental benefits to ratepayers, reinterpret Section 66(27) of the New York Public Service Law as not precluding the implementation of mandatory

85. S. Bill 4467, 1997-1998 Sess. (N.Y. 1997).

86. N.Y. PUB. SERV. LAW § 66(27)(a).

87. N.Y. S. Bill 4467.

88. *See* N.Y. PUB. SERV. LAW § 66(27)(a); *In re* Competitive Opportunities Regarding Elec. Serv., 2006 WL 2346389 at *7, *n.15 (stating that "The Commission is not authorized to mandate time-of-use rates for residential customers" and "Chapter 307 of the Laws of 1997 amended Public Service Law § 66(27)(a) to delete a provision authorizing the Commission to mandate time-of-use rates for residential customers, in the public interest.").

89. *See* N.Y. S. Bill 4467.

90. *See id.*

time-of-use rates for residential GEV owners, who were clearly beyond the foresight of the New York Legislature in 1997.

According to its Senate Bill Jacket, the 1997 amendment of Section 66(27) of the New York Public Service Law constituted "an act to amend the public service law, in relation to prohibiting the public service commission from mandating the use of certain rates for customers of electric corporations."[91] The overwhelming concern of the legislature was that "many customers, especially large residential users and religious organizations are adversely affected by time-of-use rates since they are not able to shift energy usage to non-peak periods."[92] The concern is a valid one. Requiring users who could not shift their loads off-peak to take on time-of-use rates that would cost them more is undesirable.

This change of policy followed an attempt by Con Edison to implement a broad mandatory time-of-use rate schedule promulgated by the PSC to promote energy conservation among high-usage residential customers.[93] The negative consumer response from these efforts is what ultimately drove the legislature to amend the Public Service Law.[94] The PSC and Con Edison had wrongly assumed that high-usage residential customers would adapt to the new rates, and the public backlash was strong.[95] Accordingly, the PSC has held that a residential customer's voluntary consent is particularly important in time-of-use rate programs targeting submetered residential buildings; the concern being that tenants might unknowingly be put on time-of-use rates at their landlords' behests.[96]

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91. *Id.*

92. *Id.* (Introducer's Memorandum in Support).

93. *See* BARBARA ALEXANDER, SMART METERS, REAL TIME PRICING, AND DEMAND RESPONSE PROGRAMS: IMPLICATIONS FOR LOW INCOME ELECTRIC CUSTOMERS 5, 52 (2007), *available at* http://www.pulp.tc/Smart_Meters__Real_Time.pdf (report prepared for U.S. Department of Energy).

94. *See* N.Y. S. Bill 4467 (Memorandum to Council to the Governor from General Counsel for Department of Public Service).

95. *See* ALEXANDER, *supra* note 93, at 5 ("New York previously had a mandatory time of use rate for very high usage residential electric customers. Despite the presumed ability of very high usage customers to adapt to time of use rates, the program was so unpopular the state legislature amended the law to make any residential time of use program voluntary.").

96. Declaratory Ruling on the Submetering of Residential Customers at Time-of-use Rates, No. 04-E-1335, 2005 WL 1353616, at * 4 (N.Y. Pub. Serv.

Thus, the overriding theme behind the legislature's 1997 amendment, and the PSC's interpretation of it, has been a desire to protect the often under-informed and non-consenting consumer from paying higher electric bills because of an inability to shift usage off-peak after having been placed on a time-of-use rate schedule. But, GEV owners, by their very nature, do not fall into this class of customers that the 1997 amendment aimed to protect.

For one, GEV owners would be more informed than the average residential customer, let alone the uninformed submetered tenant. Purchasing a GEV necessitates interaction with a utility. A GEV owner will typically need to install a new high amp wall charger in his home for overnight charging. The utility will be involved in this process. Moreover, rather than being a passive consumer whose electricity bill might be changed by a utility under a mandatory time-of-use schedule, a GEV owner will have presumably thought about the electricity billing implications of plugging in his car, and would likely even be aware of the environmental benefits of plugging in during off-peak hours.

The second concern with regard to imposing time-of-use rates on residential customers is that those customers will not be able to shift their energy use off-peak. Similarly, this concern does not apply to GEV owners as it might to average residential customers. GEV owners can inherently shift a large portion of their electricity use off-peak with minimal effort. At the most burdensome, a GEV owner would plug in his car at 10:00 P.M. instead of at 6:00 P.M. when he came home from work. More likely, though, the owner could install a timer on his charging outlet and set it for 10:00 P.M. when he arrives home. Ideally – and in the not-too-distant future, realistically – the GEV will be integrated with smart grid technology and the owner could

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Comm'n June 8, 2005), *available at* http://www3.dps.state.ny.us/pscweb/WebFileRoom.nsf/0/81EAF848232FE1C7852570 1900470935/$File/04e1335.06.08.05.pdf?OpenElement ("Submetering plans proposing to implement . . . TOU rates must provide a means for customers to actively choose whether or not they wish to take service under such rates. Submeterers also should hold informational meetings with residents to explain the proposed . . . TOU rates and to answer residents' questions.").

manage her usage on a real-time basis from a computer or smart-phone.

VII. A PATH FOR THE PSC

The impending adoption of GEV's throughout New York State poses a new challenge to regulators – one that was not addressed by the legislature's 1997 amendment "prohibiting the public service commission from mandating the use of certain rates for customers."[97] The challenge is to effectively mitigate the potential price spikes and increased GHG emissions stemming from GEV-related peak demand increases.

While currently available voluntary time-of-use rates may encourage some owners to switch rate schedules, historical data show that customers will not take advantage of such rates.[98] Therefore, to ensure that GEV owners – who, in their decision to drive a GEV have demonstrated, at minimum, an awareness of environmental and energy costs – actually help the environment and realize lower energy costs, the PSC should interpret the 1997 amendment to Section 66(27) of the New York Public Service Law with particular attention to its twin underlying concerns: the desire to protect (1) uninformed ratepayers who (2) cannot shift load off-peak. The PSC need not worry about either concern with respect to GEV owners and should view this novel class of ratepayers as beyond the intent and purview of the 1997 amendment, enabling the Commission to require that owners of GEVs pay for their electricity on a time-of-use rate schedule.

Seen from a macro perspective, a move by the PSC to put GEV owners on time-of-use rate schedules would send a message that New York State is serious about reaping the environmental and economic benefits of the coming boom in electric vehicle use. Creating a GEV-owner rate class that can easily shift its electricity demand to times when demand is low, and encouraging

97. N.Y. S. Bill 4467.

98. *See* SERVICE CLASSIFICATION NO. 1, *supra* note 31, at 3. One reason that customers have failed to switch to time-of-use rates is because of a lack of accessible data to show that such a switch would be economically wise. Utilities may be in the best position to single out which customers would benefit from voluntary time-of-use rates but few utilities have taken this step.

that rate class to make that shift, would not only decrease peak use and the concurrent need for dirty, inefficient generators, but also provide built-in demand for homegrown wind energy.

Ultimately, the PSC is charged with protecting consumers from high electricity rates. Creating a time-of-use rate schedule for a GEV owner rate class would protect residential customers from rate increases. GEV owners have different needs and demand profiles from those of residential customers. If kept in a residential rate class on a flat rate schedule, GEV owners would have no incentive to charge off-peak. Peak demand would increase on an already-stressed electric grid, leading to the expanded use of older, less efficient, dirtier, more expensive generators, which, in turn, would lead to higher rates and more air pollution. The PSC should not allow the near-term solution to the transportation fuel inflexibility problem to lead to rate increases and environmental degradation. Creating a new rate class for GEV owners and charging that class on time-of-use rates would help avoid these problems, and ultimately help New York State become more energy independent and environmentally benevolent, while setting an example for other states to follow.