

**APPENDIX 16A. REGULATORY IMPACT ANALYSIS SUPPORTING  
MATERIAL**

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## APPENDIX 16A. REGULATORY IMPACT ANALYSIS SUPPORTING MATERIAL

### 16A.1 BACKGROUND ON MARKET PENETRATION CURVES DEVELOPED BY XENERGY

Xenergy, Inc. developed a re-parameterized, mixed-source information diffusion model to estimate market impacts induced by financial incentives for energy-efficient appliances. The basic premise of this mixed-source model is that information diffusion drives technology adoption.

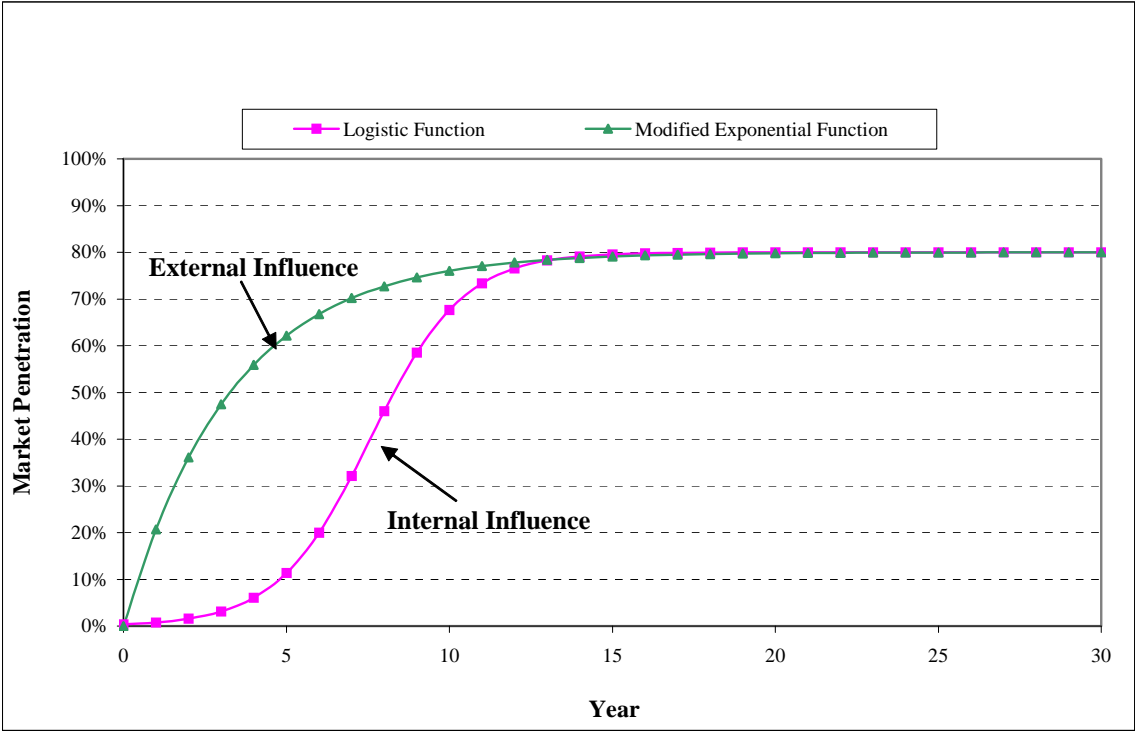
There is extensive economic literature on the diffusion process of new products as technologies evolve. Some of the literature focuses primarily on the development of analytical models of diffusion patterns of new products for individual consumers or for technologies from competing firms.<sup>1,2,3</sup> One study records researchers' attempts to investigate underlying factors that drive diffusion processes.<sup>4</sup> Because of the distinct characteristics of diverse new products, few studies have conclusively developed a universally-applicable model. Some key findings, however, have seemed to gain wide recognition in academia and industry.

First, new technologies may not be adopted by all potential users, regardless of their economic benefits and technological merits. Therefore, a ceiling on the adoption rate exists for many products. Second, not all adopters purchase new products at the same time; some act earlier after the introduction of a new product, while others respond slowly, waiting for products to become more mature. Third, diffusion processes can be approximately characterized by asymmetric S-curves, depicting three stages of diffusion: starting, accelerating, and decreasing as the adoption ceiling is being reached.

An important diffusion model, the epidemic model, is widely used in marketing and social studies on diffusion. It assumes that a) consumers value the benefits of a new product identically and b) the cost of a new product is constant or declines monotonically over time. What induces a consumer to purchase the new product is information about the availability and the benefits of the product. In other words, it is information diffusion that drives new product adoption by individual consumers.<sup>3</sup> The model incorporates information diffusion from both internal sources (news spread by word of mouth from early adopters) and external sources (the "announcement effect" by government, other institutions, or commercial advertising) by superimposing a logistic function with an exponential function.<sup>1,4</sup>

The relative degree of influence by internal or external sources determines the general shape of the diffusion curve of a specific product.<sup>1,4</sup> For instance, if the adoption of one particular product is more influenced by external sources of information diffusion (announcement effect) than by internal sources (word of mouth among earlier adopters to prospective adopters), the rate of diffusion at the beginning stage of the diffusion process is much higher. This reflects the immediate information exposure to a significant number of prospective adopters brought about by external sources, in contrast to the more gradual exposure to internal sources such as news propagation by earlier adopters, a small proportion of the population, to other prospective adopters. Graphically speaking, a relatively

dominant external source of information diffusion gives an immediate jump-start to the adoption of a new product in the first years, forming a concave curve with respect to the Y axis (see the exponential curve in Figure A.1). Adoption of a new product with a stronger influence by internal sources of information diffusion (such as a socially-tightened network formed by prospective adopters) may start with a few early adopters and gradually increase as the number of adopters grows, and thus form a convex curve (see the logistic curve in Figure 17A.1.1).



**Figure 16A.1.1 Comparison of Exponential and Logistic Curves Showing External and Internal Influences on Consumers**

**16A.2 UTILITY REBATE PROGRAMS FOR NEMA PREMIUM ELECTRIC MOTORS**

Table 17A.2.1 presents a summary of rebate program amounts offered throughout the U.S. for NEMA Premium three-digit frame series electric motors. Since there have not been rebate programs for small electric motors, DOE studied rebate programs for larger motors as an analogous product.

DOE found 48 agencies with programs for 1 HP NEMA Premium electric motors. Rebates for this product have been offered by electric utilities and municipal and regional agencies. Table 17A.2.1 shows the agency names, States, rebate amounts, and program websites. Multiple entries in the table indicate that an agency offers two rebate amounts, one for new motor purchases and one for replacements. The average rebate amount is a simple average of the wide range of all of the agencies.

**Table 16A.2.1 Rebate Programs for NEMA Premium Electric Motors**

Utility or Agency	State	New 1 HP Motor Amount	Replacement 1 HP Amount (if different)	Website
Tuscon Electric Power	AZ	\$10		<a href="http://www.tepcommercialenergysolutions.com/ProjectCenter/">http://www.tepcommercialenergysolutions.com/ProjectCenter/</a>
SRP	AZ	\$30		<a href="http://www.srpnet.com/energy/powerwise/business/standardrebate.aspx">http://www.srpnet.com/energy/powerwise/business/standardrebate.aspx</a>
Riverside Public Utilities	CA	\$35		<a href="http://www.riversideca.gov/utilities/busi-efficientmotors.asp">http://www.riversideca.gov/utilities/busi-efficientmotors.asp</a>
Southern California Edison	CA	\$35		<a href="http://www.sce.com/ExpressEfficiency/premium-efficiency-motors.htm">http://www.sce.com/ExpressEfficiency/premium-efficiency-motors.htm</a>
Silicon Valley Power	CA	\$35		<a href="http://www.siliconvalleypower.com/bus/?sub=rebate-motor">http://www.siliconvalleypower.com/bus/?sub=rebate-motor</a>
Connecticut Municipal MotorUp (multiple utilities)	CT	\$45		<a href="http://www.grotonutilities.com/elec_conserv_comm_motor.asp">http://www.grotonutilities.com/elec_conserv_comm_motor.asp</a> (for example)
Progress Energy	FL	\$5		<a href="http://progress-energy.com/custservice/flabusiness/efficiency/efficiencyservices.asp">http://progress-energy.com/custservice/flabusiness/efficiency/efficiencyservices.asp</a>
Tampa Electric	FL	\$2.50		<a href="http://www.tampaelectric.com/business/saveenergy/energyefficientmotors/">http://www.tampaelectric.com/business/saveenergy/energyefficientmotors/</a>
Hawaii Electric	HI	\$15		<a href="http://www.heco.com/vcmcontent/StaticFiles/pdf/RebateSummarySheet010809.pdf">http://www.heco.com/vcmcontent/StaticFiles/pdf/RebateSummarySheet010809.pdf</a>
Avista	ID, WA	\$10		<a href="https://www.avistautilities.com/business/rebates/washington_idaho/Pages/incentive_12.aspx">https://www.avistautilities.com/business/rebates/washington_idaho/Pages/incentive_12.aspx</a>
Rocky Mountain Power	ID	\$45		<a href="http://www.rockymountainpower.net/Navigation/Navigation82820.html">http://www.rockymountainpower.net/Navigation/Navigation82820.html</a>
Ameren Illinois	IL	\$7		<a href="http://www.actonenergy.net/business-programs-motor-system-incentive.asp">http://www.actonenergy.net/business-programs-motor-system-incentive.asp</a>
ComEd	IL	\$7		<a href="http://www.comed.com/businesssavings/programs/incentives/prescriptiveincentives/motors.htm">http://www.comed.com/businesssavings/programs/incentives/prescriptiveincentives/motors.htm</a>
MidAmerican Energy	IL	\$15 to \$25		<a href="http://www.midamericanenergy.com/html/energy6g_1.asp">http://www.midamericanenergy.com/html/energy6g_1.asp</a>
Alliant	IA	\$25 to \$30		<a href="http://alliantenergy.com/UtilityServices/ForYourBusiness/ProductsServices/BusinessRewardsIncentives/IowaBusinessIncentivePrograms/015192">http://alliantenergy.com/UtilityServices/ForYourBusiness/ProductsServices/BusinessRewardsIncentives/IowaBusinessIncentivePrograms/015192</a>
Duke Energy	IN	\$10		<a href="http://www.duke-energy.com/indiana-business/energy-management/motor-incentive.asp">http://www.duke-energy.com/indiana-business/energy-management/motor-incentive.asp</a>
Duke Energy	KY	\$10		<a href="http://www.duke-energy.com/kentucky-business/energy-management/motor-incentive.asp">http://www.duke-energy.com/kentucky-business/energy-management/motor-incentive.asp</a>
Linn County REC	IA	\$20		<a href="http://www.linncountyrec.com/cgi-script/csarticles/articles/000004/000428.htm?191">http://www.linncountyrec.com/cgi-script/csarticles/articles/000004/000428.htm?191</a>
Kansas City Power & Light	KS, MO	\$50		<a href="http://kcpl.programprocessing.com/content/prescriptiverebates">http://kcpl.programprocessing.com/content/prescriptiverebates</a>
Efficiency Maine	ME	\$45		<a href="http://www.efficiencymaine.com/business_programs_energywise.htm">http://www.efficiencymaine.com/business_programs_energywise.htm</a>
Baltimore Gas & Electric	MD	\$45		<a href="http://conservation.bgesmartenergy.com/business/energy-solutions-business/motors">http://conservation.bgesmartenergy.com/business/energy-solutions-business/motors</a>
Massachusetts MotorUp (multiple utilities)	MA	\$45		<a href="http://www.nstar.com/business/energy_efficiency/electric_programs/construction_solutions.asp">http://www.nstar.com/business/energy_efficiency/electric_programs/construction_solutions.asp</a>
Unitil	MA	\$75		<a href="http://services.unitil.com/fge/bus_energy_efficiency_programs.asp?t=2">http://services.unitil.com/fge/bus_energy_efficiency_programs.asp?t=2</a>
Southern Minnesota Municipal Power Agency (multiple utilities)	MN	\$25	\$100	<a href="http://www.smma.org/">http://www.smma.org/</a>
City of North St. Paul	MN	\$5	\$16.50	<a href="http://www.ci.north-saint-paul.mn.us/index.asp?Type=B_BASIC&amp;SEC={F5C1E5FE-1ADD-49AF-ACD8-59C3FB4192FF}">http://www.ci.north-saint-paul.mn.us/index.asp?Type=B_BASIC&amp;SEC={F5C1E5FE-1ADD-49AF-ACD8-59C3FB4192FF}</a>
Connexus Energy	MN	\$7.50	\$20	<a href="http://www.connexusenergy.com/busrebates.htm">http://www.connexusenergy.com/busrebates.htm</a>
Dakota Electric	MN	\$10	\$20	<a href="https://www.dakotaelectric.com/business/programs/rebates_grants_and_loans/adjustable_speed_drive_and_motor_rebates">https://www.dakotaelectric.com/business/programs/rebates_grants_and_loans/adjustable_speed_drive_and_motor_rebates</a>
City of Hutchinson	MN	\$15		<a href="http://www.hutchinsonutilities.com/rebatecomm.html">http://www.hutchinsonutilities.com/rebatecomm.html</a>
Minnesota Power	MN	\$5		<a href="http://www.mnpower.com/powerofone/one_business/powergrant/rebates.htm">http://www.mnpower.com/powerofone/one_business/powergrant/rebates.htm</a>

Utility or Agency	State	New 1 HP Motor Amount	Replacement 1 HP Amount (if different)	Website
Minnesota Valley Electric Cooperative	MN	\$7.50	\$20	<a href="http://www.mvec.net/business/grants_rebates.asp">http://www.mvec.net/business/grants_rebates.asp</a>
Stearns Electric Association	MN	\$7.50	\$20	<a href="http://www.stearnselectric.org/grantsbus.htm">http://www.stearnselectric.org/grantsbus.htm</a>
Shakopee Public Utilities	MN	\$20	\$100	<a href="http://www.shakopeeutilities.com/commrebates.htm">http://www.shakopeeutilities.com/commrebates.htm</a>
Otter Tail Power Company	MN	\$20		<a href="http://www.otpc.com/SaveEnergyMoney/commercialMotorsEEP_SD.asp">http://www.otpc.com/SaveEnergyMoney/commercialMotorsEEP_SD.asp</a>
Public Service of New Hampshire	NH	\$45	\$75	<a href="http://www.psnh.com/Business/Efficiency/default.asp">http://www.psnh.com/Business/Efficiency/default.asp</a>
Nebraska Public Power District	NE	\$20		<a href="http://www.nppd.com/energy_efficiency/energywise/business.asp">http://www.nppd.com/energy_efficiency/energywise/business.asp</a>
NorthWestern Energy	MT	\$13		<a href="http://www.northwesternenergy.com/display.aspx?Page=Motor_Rebate_MT">http://www.northwesternenergy.com/display.aspx?Page=Motor_Rebate_MT</a>
Empire District Electric	MO	\$50		<a href="http://empire.programprocessing.com/content/Home">http://empire.programprocessing.com/content/Home</a>
Progress Energy	NC	\$10		<a href="http://www.progress-energy.com/custservice/carbusiness/efficiency/programs/eebiz/details.asp">http://www.progress-energy.com/custservice/carbusiness/efficiency/programs/eebiz/details.asp</a>
NYSERDA	NY	\$45		<a href="http://www.nyserda.org/Programs/Existing_Facilities/default.html">http://www.nyserda.org/Programs/Existing_Facilities/default.html</a>
Long Island Power Authority	NY	\$45		<a href="http://www.lipower.org/efficiency/commercial.pre.html">http://www.lipower.org/efficiency/commercial.pre.html</a>
Energy Trust of Oregon	OR	\$10		<a href="http://www.energytrust.org/pe/manufacturing.html">http://www.energytrust.org/pe/manufacturing.html</a>
Eugene Water & Electric Board	OR	\$20		<a href="http://www.eweb.org/content.aspx/2e86bdb8-4143-499a-82b0-80cc676dd8c3">http://www.eweb.org/content.aspx/2e86bdb8-4143-499a-82b0-80cc676dd8c3</a>
Austin Energy	TX	\$15		<a href="http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Commercial/Commercial%20Energy/motors.htm">http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Commercial/Commercial%20Energy/motors.htm</a>
Tacoma Public Utilities	WA	\$15		<a href="http://www.mytpu.org/customer-service/your-business/rebates-promotions/motor-drive-rebates.htm">http://www.mytpu.org/customer-service/your-business/rebates-promotions/motor-drive-rebates.htm</a>
Puget Sound Energy	WA	\$8		<a href="http://www.pse.com/solutions/forbusiness/pages/comRebates.aspx?tab=5&amp;chapter=2">http://www.pse.com/solutions/forbusiness/pages/comRebates.aspx?tab=5&amp;chapter=2</a>
Pacific Power	WA	\$45		<a href="http://www.pacificpower.net/Navigation/Navigation71829.html">http://www.pacificpower.net/Navigation/Navigation71829.html</a>
Focus On Energy	WI	\$5		<a href="http://www.focusonenergy.com/Incentives/Business/Motor.aspx">http://www.focusonenergy.com/Incentives/Business/Motor.aspx</a>
Carbon Power & Light	WY	\$13		<a href="http://www.carbonpower.com/rebates.htm">http://www.carbonpower.com/rebates.htm</a>
Number of Agencies	48			
Average Rebate Amount			\$26	

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