INVERTED BLOCK TARIFFS AND UNIVERSAL LIFELINE RATES:

Their Use and Usability for Delivering Low-Income Electric Rate Relief

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The findings, views and opinions expressed herein are solely those of the author and do not necessarily represent the views of Hydro Quebec.

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Glossary of Terms

Beneficiary incidence: A measure of the extent to which a Lifeline subsidy reaches poor households within a broader population of poor and nonpoor.

Benefit incidence: A measure of how well a Lifeline subsidy mechanism targets dollars of benefits to poor households rather than to nonpoor households.

Extensive utility growth: The growth in utility load that results from an expansion of the number of customers.

Flat rate tariff: A utility tariff under which the same price is charged for all consumption irrespective of the level of consumption or other characteristics of the usage.

Induction meter: A meter that records total energy consumption without assigning such consumption to any particular time period.

Initial block: The first block of consumption within a utility rate structure for which a usage charge is imposed.

Intensive utility growth: The growth in utility load that results from an expansion of the use per individual customer.

Inverted Block Rate: A rate structure under which the utility charges a higher price for each unit of energy as consumption increases. For example, the block of consumption between 501 kWh and 1,000 kWh in a month is priced higher than the block of consumption between 1 kWh and 500 kWh. (Note: inverted block rates and Lifeline rates are used as interchangeable terms throughout this report, unless the context clearly indicates otherwise.)

Inverted block tariff (IBT): See, Inverted Block Rate

Lifeline rate: A rate structure under which an initial block of consumption is priced lower than subsequent and higher blocks of consumption. A Lifeline rate may or may not be priced "below cost." (Note: Lifeline rates and inverted block rates are used as interchangeable terms throughout this report, unless the context clearly indicates otherwise.)

Means-tested: The process by which eligibility for a program is determined by the level of a household's income and/or other household financial resources.

Rate differential: The change in price of one usage block in a block rate tariff (e.g., a non-flat-rate tariff) as compared to the immediately preceding usage block.

Revenue shortfall: The difference in revenue generated through application of an inclining block tariff as compared to application of a standard block rate tariff (e.g., flat rate, declining block rate). The "revenue shortfall" may be a negative number, meaning that the inclining block tariff generates *more* revenue than would the standard block tariff.

Tail block: The final block of consumption within a utility rate structure for which a usage charge is imposed.

Targeted Lifeline: An inverted block tariff that is made available to customers based, in part, on prescribed demographic characteristics of the customer (e.g., income, age, disability status). A targeted Lifeline generally requires a customer to apply for, and be found eligible, in order to take service under such a tariff.

Universal Lifeline: An inverted block tariff that is made available to all residential customers irrespective of the demographic characteristics of the customer.

Volume differentiated tariff (VDT): A rate structure under which the utility prices are priced based on the amount of consumption by the customer. If, however, the customer moves into the higher consumption block, the *entire* amount of consumption is charged at the higher price. A VDT differs from an inverted block tariff (IBT) in that, under an IBT, the different price applies only to that consumption falling in each defined block of usage.

1 Introduction

This report examines universal Lifeline utility rates as one means of delivering rate affordability assistance to the low-income customers of Hydro Quebec. The report will consider whether rate design is an industry tool that is often used to provide rate relief to low-income households. The specific purpose of this inquiry is to determine whether lessons can be learned from utilities that have implemented rate design alternatives, which lessons can be directly applied to a consideration of how, if at all, to modify the current Hydro Quebec rate structure in order to provide affordability assistance for the company's residential customers.[1]

The inquiry below is based on an examination of the experience of other jurisdictions, to date, with Lifeline rates. The lessons learned are derived from evaluations of how such a rate structure would affect residential customers generally and low-income residential customers in particular. The inquiry does not, however, undertake any direct empirical observation or simulation modeling for Hydro Quebec. Instead, by focusing on the discussion of rate designs in recognized publications, and in empirical reports from other jurisdictions, this report seeks not simply to determine the substantive lessons from those jurisdictions, but to determine, also, the extent to which rate design is recognized by the industry as a legitimate mechanism for providing low-income rate relief.[2]

1.1 The Objectives of the Research

The objective of this research is to respond to three fundamental questions:

- What considerations should go into a decision of how, if at all, Hydro Quebec's existing rate structure should be modified to provide further rate relief to low-income households;

- If the existing Hydro Quebec rate structure *is* to be modified, what specific design factors should be considered in deciding what modifications are appropriate; and

- What is the experience of other utilities that have used Lifeline rates to deliver rate relief.

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[1] Lifeline rates are considered by many to be one form of an inverted block rate structure discussed below. To this extent, it should be noted that this report does not consider whether or not to develop an inverted block rate structure for non-residential customers. The report does not determine that inverted block rates are *in*appropriate for non-residential customers. The question of non-residential applicability is simply beyond the scope of the inquiry below.
[2] This secondary research has been supplemented with personal communications, where appropriate and possible, with authors of pre-existing research.

The report is intended to serve as one source of input, among others, into deliberations by policymakers and other stakeholders inside and outside the Hydro Quebec community. Accordingly, this report makes no specific recommendations as to the specific design of a rate structure to be used to deliver low-income rate relief. Instead, the discussion below concludes by making a series of findings relative to the extent to which, if at all, Lifeline rates can be viewed as an effective tool through which to deliver rate affordability assistance. In sum, the focus of the discussion below is on what lessons can be learned from the Lifeline experience of utilities providing residential service.

1.2 The Alternative Forms of Lifeline Rates.

While Lifeline rates can take many forms, the discussion in this report focuses on a universal, non-means-tested, rate that is directed toward the initial block of energy consumption by a residential electric customer. It does *not*, in other words, define a Lifeline rate as a discounted rate for targeted demographic groups (e.g., low-income, the elderly, the disabled), whether or not that discount is directed toward a discrete set of electricity consumption.[3]

In reaching this limitation from the very beginning, the discussion below excludes other forms of Lifeline rates that have been used in other jurisdictions. Some utilities have implemented a Lifeline in the form of a rate freeze in the lowest block of consumption. Other jurisdictions have either reduced, or completely eliminated, fixed monthly service charges as a form of Lifeline rate. These alternative rate structures are considered insufficiently permanent, or insufficiently efficacious, to be examined in detail below.[4]

This report designates the inverted block rate structure as the form of Lifeline that will be assessed. Any reference to a "Lifeline rate" throughout this report should be considered to be a reference to an inverted block rate structure, and vice versa, unless the context clearly denotes otherwise.[5]

In turn, an inverted rate structure may take one of two primary forms.

- A utility may use an "inverted block tariff" (IBT). Under an IBT, the utility charges a higher price for each unit of energy as consumption increases.[6] The block of

[3] Accordingly, the selection of Lifeline rate design alternatives to include in this report does not lend itself to a review of how to define a target population. By design, the report focuses on the universal Lifeline rate design rather than on a targeted Lifeline.

[4] In some instances, such as the Boston Edison rate freeze, the Florida Power and Light "conservation rate break," and the Los Angeles Senior Lifeline, programs are discussed whether or not they meet this specific criterion.

[5] Inverted rates are thus similar to Lifeline rates, and some lifeline structures amount essentially to inverted rate structures. Federal Energy Administration, Office of Energy Conservation and the Environment (February 1977). *Electric Utility Rate Design Proposals*, at 78 - 79, FEA: Washington D.C. Indeed, universal Lifeline rates have been deemed "a concept often indistinguishable from inverted rates." Heather Parmesano and Catherine Martin, "The Evolution in U.S. Electric Utility Rate Design," 1983 *Annual Review of Energy* 45, 80 (1983).

[6] Kristin Komives, et al. (2006). *The Distributional Incidence of Residential Water and Electricity Subsidies*, World Bank Technical Paper WPS 3878, at 4, World Bank: Washington D.C.

consumption between 501 kWh and 1,000 kWh in a month under an IBT is priced higher than the block of consumption between 1 kWh and 500 kWh.

- A utility may use a volume differentiated tariff (VDT). Under a VDT, the utility prices are again based on the amount of consumption by the customer. If the customer moves into a higher consumption block, beyond the limits of the Lifeline rate, however, rather than simply charging the additional consumption at a higher rate, the *entire* amount of consumption is re-priced at the higher rate.[7]

The focus of this discussion is on the inverted block tariff (IBT) Lifeline form. Moreover, while the focus of the discussion will be on Lifeline rates used for electric service, the pricing of water service is not uncommonly based on the principles underlying a universal Lifeline rate. The discussion below thus considers water pricing where such an inquiry offers important lessons to be learned.

[7] Distributional Incidence, at 4.

2 Using a Universal Lifeline to Deliver Rate Affordability Assistance

In considering whether to use a Lifeline rate as an integrated part of a utility's rate structure, the first critical task to perform involves articulating the objectives to be achieved through such a decision. In many jurisdictions, these objectives are –or are at least argued to be— determinative of the outcome to challenges of whether such a rate structure is lawful under jurisdictional ratemaking constraints.[8] In other jurisdictions, the objectives have substantial political implications, providing reasons for who might support and who might oppose the Lifeline proposal.

In *all* jurisdictions, the specific objectives sought to be attained should, and often do, have a direct impact on how the rate is actually structured.

Finally, of course, without articulating the objectives sought through a Lifeline rate, it is not possible to assess after-the-fact whether the rate is "effective" in achieving its desired outcomes. The question "was the Lifeline effective" must, of course, be met with the further question "effective at doing what?" Hydro Quebec stakeholders should have an answer to that question.

2.1 Establishing Lifeline Objectives: The Intersection of Policy and Empirical Inquiry.

In discussing Lifeline rates, it is important to directly address, at the front-end of any deliberation, several fundamental policy questions. The first question involves articulating the basic objective(s) of the Lifeline rate. Several competing objectives can be articulated. The primary set of competing objectives is whether the Lifeline rate is designed to alleviate low-income hardships or whether it is primarily a conservation tool.

Efforts to alleviate low-income hardship and to incentivize energy conservation may, but are not necessarily, compatible. Pursuing the goal of "hardship alleviation" arises by reducing "the utility bills of low-income households [. . .] to a level where 'essential energy needs' can be met within the household's limited budget."[9] In contrast, pursuing the goal of "energy conservation" generally involves providing lower rates in the first rate block and higher rates in the tail blocks.

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[8] These challenges may be less likely given an initial decision to pursue a "universal," rather than a "targeted," Lifeline as described in the first section.

[9] Cleveland State University (1980). *Lifeline Electric Rates and Alternative Approaches to the Problems of Low-Income Ratepayers: A Cross-Program Analysis*, DOE/RG/1006-003, at 9 – 10, National Technical Information Service: Washington D.C.

Increasing rates in the tail block will not impede an objective of alleviating low-income hardship if certain conditions exist. "If one makes the assumption that low-income households generally use smaller amounts of electricity and limit their monthly consumption so as not to exceed the first block, conservation rate breaks or inverted rates are compatible with alleviating the special problems of low-income individuals."[10]

However, some (but not all) analysts argue that there is no basis for this assumption. Indeed, if low-income customers do *not* have lower consumption, or even have higher consumption than average, there will be a direct conflict between the two goals.

2.1.1 The California experience: A change in terminology

A utility need not even address, let alone resolve, this issue of whether the level of household income, and the level of household electricity consumption, are associated with each other sufficiently to justify using a non-targeted "universal" Lifeline as a mechanism to deliver low-income energy assistance. Sometimes, the difference between the objective of hardship alleviation and the objective of energy conservation is viewed as being largely semantic. "Sometimes the concept of lifeline rates has gained acceptance simply by changing its label to something else such as 'conservation rate breaks.'"[11]

In California, for example, Lifeline advocates generated support for their Lifeline rate proposal by emphasizing its conservation impact rather than its social implications. In California, this semantic solution was proposed by a group called Toward Utility Rate Normalization (TURN). After failing in its efforts to obtain low-income discount rates for many years, TURN sought to dispel the notion that unjustified subsidies or welfare considerations were involved. TURN proposed to correct this "misunderstanding" by changing the term "Lifeline" rate to "baseline" rate.

In making this change, TURN sought to affirm that the purposes of the Lifeline legislation were "conservation and economic equity." Unchanged, under the TURN proposal, would be the discount for energy purchased in the first, or "baseline" block.[12] Under the new legislation, the baseline amount was defined to be 50% to 60% of the average residential consumption.[13] The "essential needs" covered by this baseline amount included space heating, water heating, lighting, cooking and food refrigeration.[14] The new "baseline" rate was adopted in California.

What the California experience teaches us is that, in considering a universal Lifeline rate structure, the *motivation* for the universal Lifeline rate (*e.g.*, to deliver low-income rate

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[10] Cross Program Analysis, at 10.
[11] Heather Parmesano and Catherine Martin, "The Evolution in U.S. Electric Utility Rate Design," 1983 *Annual Review of Energy* 45, 81 (1983),
[12] Evolution in Rate Design, at 81.
[13] Michael Hennessy and Dennis Keane, "Lifeline Rates in California: Pricing Electricity to Attain Social Goals," 13 *Evaluation Review* 123 (1989).
[14] In fact, the baseline was defined to be from 60% to 70% of the residential average during the winter months for customers with all-electric homes. Lifeline Rates in California, at 124.

affordability assistance) may well be different from the *regulatory justification* for the rate (*e.g.*, to deliver conservation price signals).

2.1.2 Impacts on design decisions

Despite this California experience, resolving the conflict between the goals of "hardship alleviation" and "energy conservation" is not simply playing with words. The resolution not only can, but should, have a direct effect on very concrete decisions with respect to the design and operation of a universal Lifeline/inverted block tariff rate.

- A targeted Lifeline or a universal Lifeline rate: A decision on whether the ultimate objective of the Lifeline rate is "hardship alleviation" or "energy conservation" will affect the targeting (or not) of Lifeline benefits. If conservation is the "paramount objective,"[15] a "universal Lifeline rate" is pursued, with lower rates for all usage-qualified residential customers. In contrast, however, if the alleviation of hardship is the paramount objective, the Lifeline rate is "targeted"[16] so that "essential utility services" are delivered at lower rates "to a selected category of eligible households."[17] A universal Lifeline rate structure, involving an inverted block rate applicable to all residential customers, can be used to generate rate affordability assistance to low-income customers. To do so, however, involves the trade-off of also providing rate relief to customers that do not particularly need such relief.[18]

- Cost justifying the "discount" on an initial usage block: A decision on whether the ultimate objective of the Lifeline rate is "hardship alleviation" or "energy conservation" will affect the perceived need to offer a cost-basis for the reduced price to be applied to the initial block of consumption. If hardship alleviation is the primary purpose, whether a proposed discount on the initial block has a cost-basis becomes less important. Advocates for a universal Lifeline rate, however, need not necessarily concede that reduced pricing for the initial block of essential service would require that such pricing be "below cost." After noting that "proponents of lifeline rates have refined their arguments," one analyst observed that such proponents "now assert that low volume users impose proportionately lower costs on a utility system than high volume users."[19] Under this reasoning, a low-priced initial block within a universal Lifeline rate, in other words, may well be cost-based.

The immediate lesson to be learned from the discussion above is that a utility should be careful in limiting the justification for a Lifeline rate, particularly a universal Lifeline rate, to the pursuit

[15] Cross Program Analysis, at 11.
[16] Cross Program Analysis, at 11.
[17] Cross Program Analysis, at 11.
[18] Another perspective on this result lies with the conservation impact of a universal Lifeline program. As described in greater detail below, a Lifeline program will likely result in a reduction in the energy consumption of the residential customer class as a whole. Under such circumstances, it might be that a utility will agree that some portion of its rate affordability assistance is not targeted very well, but accept such an impact because of the positive conservation impacts the rate has in any event.
[19] Evolution in Rate Design, at 81.

of a single objective. A universal Lifeline rate will likely deliver rate affordability assistance to low-income customers. Whether such assistance is exclusively, or even disproportionately, delivered to low-income customers, however, is a question that need not be resolved so long as the utility further acknowledges that the universal Lifeline rate serves a conservation objective, as well as perhaps being cost-justified in its own right.

While there may be a natural tendency to view the articulation of the objectives of a Lifeline rate as a political or semantic process, the discussion above supports the conclusion that that tendency should be resisted.

2.2 Framing the Low-Income "Hardship Alleviation" Objective.

A universal Lifeline rate can be used to alleviate the rate affordability hardships posed by household electric bills. Rate relief in pursuit of this objective is provided by pricing initial blocks of electricity at lower rates, with the resulting revenue shortfall made-up through price increases for usage at high blocks. While not a "universal" Lifeline rate as defined above, the objective articulated for the Los Angeles senior Lifeline rate nonetheless captures the underlying purpose of the hardship alleviation objective:

> In Los Angeles, it was widely felt that the senior citizens, many of whom live on meager fixed incomes, should receive some protection against rising energy costs. Although escalating energy prices were the focus, the basic problem of the elderly was poverty. Their fixed incomes contrast sharply with the rising cost of living. Unlike many other poor groups, their age excludes them from many jobs and they can do little to change their situation. An energy assistance plan should seek to meet the basic objective of improving the economic well-being of low-income senior citizens.[20]

Typical approaches to pursuing this hardship alleviation objective include either pricing an initial block of "essential" service at the lower rate; or pricing an initial block of "average" service at the lower rate.

Articulating the "objective" for a universal Lifeline rate in this manner, however, does not end the discussion. This is true for several reasons:

- Articulating this "hardship alleviation" objective has certain facts implicit within it. Using a universal Lifeline to deliver affordability assistance, for example, carries with it certain assumptions about the relationship between the level of a household's income and the level of usage that might be expected to result from that low income.

- Articulating one specific objective may, or may not, be consistent with articulating a different objective or pursuing a particular design for the Lifeline rate. The objective to provide a certain minimum level of "essential" electricity needs at a low-cost may

[20] Timothy Sullivan (1979). *The Los Angeles Senior Citizen Lifeline Electricity Rate*, at 2 – 3, Rand Corporation: Santa Monica (CA).

be consistent with the use of a targeted Lifeline rate. It is, however, also consistent with a universal Lifeline rate, since the essential nature of a minimum level of electricity does not depend on the income of the household.

- Articulating the hardship alleviation objective may or may not fully reconcile the overall motivation for pursuing a universal Lifeline rate with the regulatory *justification* for the rate. The *motivation* for a Lifeline rate may, for example, be to deliver rate affordability assistance to low-income households. This motivation, however, need not detract from the fact that the specific regulatory objective might nonetheless be to increase the ability of rates to reflect the lower costs that low-use customers impose on a utility system.

Having made these high level observations, the discussion below begins by examining the use of a universal Lifeline rate to pursue the objective of delivering rate affordability assistance. The discussion will continue, however, to examine other alternative Lifeline objectives and how they may affect, or be affected by, this desire to improve rate affordability.

In addition to considering the use of a universal Lifeline rate to help alleviate the ability-to-pay hardships of low-income customers, the discussion will examine the extent to which such a "hardship alleviation" objective is consistent with the use of a universal Lifeline to provide for essential needs for <u>*all*</u> customers; to mitigate the reverse subsidy that generally flows <u>*from*</u> small consumers <u>*to*</u> large consumers through normal utility ratemaking; and to promote conservation and energy efficiency through price signals.[21] The desire to use a universal Lifeline rate as a means of pursuing a "hardship alleviation" objective does not detract from the need to understand the interrelationships and interplay with these other potential Lifeline objectives.

2.3 Addressing the Factual Inquiry underlying a "Hardship Alleviation" Objective

The use of a universal Lifeline (or inverted block) rate schedule as a mechanism to alleviate bill payment hardships imposed on low-income customers squarely introduces the empirical dispute over whether a sufficient relationship exists between income and usage to justify the use of universal Lifeline rates as a tool to achieve the objective.[22]

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[21] In considering these objectives of a Lifeline program, and the interrelationships between those objectives, it should be self-evident that "not all parties to a rate design effort embrace all objectives. Furthermore, some parties may define the objectives differently." John Boland and Dale Whittington (2000). "The Political Economy of Water Tariff Design in Developing Countries: Increasing Block Tariffs versus Uniform Price with Rebate, *in* Ariel Dinar (2000). *The Political Economy of Water Pricing Reforms*, at 220, Oxford University Press: New York (NY).
[22] For purposes of this study, targeted Lifeline rates, involving inverted block rates for groups of customers distinguished by certain demographic characteristics (e.g., low-income, elderly, disabled) have been largely (although not entirely) set side. This report focuses on the "universal Lifeline" rate, under which an inverted block rate is provided to all customers irrespective of demographics.

2.3.1 Acknowledging the factual dispute

If low-income status and low-usage status are closely intertwined, delivering electricity with lower rates directed toward initial blocks will have the *effect* of assisting the poor whether or not explicitly targeted based on income. In contrast, if income status and usage status are *not* associated with each other, providing lower prices on initial consumption blocks may not only fail to provide rate relief to low-income households, but may also instead provide rate relief to higher income households, with the increased rates at higher consumption being paid by the poor.

The issue has been posited as one of "inclusion" and "exclusion." For the "hardship alleviation" objective to be fully served, the Lifeline rate must *include* the poor and *exclude* the nonpoor.

The relationship between income and usage has been argued and studied in detail over the years. One of the better studies was performed in Oklahoma. This study empirically evaluated the impact of Lifeline rates on low-income customers.[23] It considered the "effectiveness" of Lifeline rates;[24] "effectiveness is assessed in terms of the relative significance of family income as a factor enabling households to benefit from the two[25] rate structures. The effectiveness of Lifeline rates is examined through an analysis of the relationship between family income and kWh use."[26]

The Oklahoma study identified the policy and empirical issues as flowing from the fact that, even though the intent was to deliver benefits to the poor, universal Lifeline rates are usage-based rather than income-based. Accordingly, "affluent, low volume energy use households may benefit from the rates, while low-income, high volume users may not qualify for them."[27]

The Oklahoma study sought to discover whether this misapplication of universal Lifeline rates did, in fact, happen. The study was based on data from 822 owner-occupied single family households.[28] The independent variables included family income,[29] number of persons in the

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[23] The study was based on a survey prior to the implementation of a program. It was not an evaluation of an existing program.
[24] Lester Taylor (Spring 1975). "The Demand for Electricity: A Survey," *The Bell Journal of Economics*, Vol. 6, No. 1, at 74 – 110.
[25] In addition to the Lifeline rates, the study considered the impact of time-of-use rates on low-income households.
[26] Demand for Electricity, at 69, 74.
[27] Demand for Electricity, at 71, 72.
[28] One might question whether the exclusion of renters narrowed the range of income. Homeowners ubiquitously have higher incomes than do renters.
[29] To this extent, the study was flawed, in that it considered income and household size as separate independent variables. The low-income status of a household in the United States is generally assessed by viewing income taking into account household size. The measure involves the Federal Poverty Level. The Federal Poverty Level recognizes that two households with identical gross household incomes can have different levels of being poor. A four-person household with an income of $8,000, in other words, is "poorer" than a two-person household with an income of $8,000. In 2007, the Federal Poverty Level was $13,690 for a two-person household, and $20,650 for a four-person household. So, too, for example, is the low-income status of a household in Canada based on gross household income taking into account household size. The Low-Income Cutoff (LICO) for a two-person household is lower, in dollar terms, than the LICO for a four-person household. In 2005, the Canadian LICO for an urban area

household, age of household head, and number of persons in the home during daytime hours. The dependent variables included household electricity use (kWh) and current appliance use patterns for the study of Lifeline rates. The study posited that "to the extent that income explained significant variations in the dependent variables, statements may be made about the relative benefits of the rate structures for the low-income population as a whole."[30]

Despite its shortcomings, the study reported that its data "support the argument that electricity use is directly related to income. . .The fact that kWh use declined significantly with income indicates that Lifeline rates would provide some assistance to the general category of low-income households in coping with rising energy costs."[31] The study concluded further, however, that "the data. . .indicate that smaller low-income households headed by older persons would benefit most from lifeline rates."[32] It concluded:

> Family income was found to explain a significant amount of variation in household electricity use levels. In support of lifeline rates, it may be said that, in a general sense, the rates would benefit low-income households, since income is the strongest predictor of kWh usage. . .
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> * * *
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> The foregoing analysis showed that lifeline rates could lessen the severity of. . .lifestyle cutbacks[33] among half of the low-income sample, with major benefits going to the elderly in small households. These rates, in combination with an adequate weatherization program, would significantly decrease the energy price burdens on the elderly poor and would lessen their need for utility bill subsidies, thus reducing their dependence on welfare.[34]

In sum, the use of a universal Lifeline rate as a mechanism to deliver rate affordability assistance to low-income households poses one major empirical hurdle. Is the low-income status of the population sought to be primarily benefited sufficiently related to low levels of consumption that a utility can feel justified in using low levels of consumption as a surrogate for determining who should benefit from the Lifeline rate. One should not conclude that the Oklahoma study cited above is determinative of the issue of the issues of "inclusion" and "exclusion" within the context of Lifeline rates.

The purpose of our discussion here is not to *resolve* the issue of whether a universal Lifeline/inverted block rate structure meets the tests of inclusion and exclusion. Instead, the purpose of this discussion is simply to establish that hardship alleviation is one legitimate

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of between 30,000 and 100,000 persons was $22,139 for a two-person household and $33,046 for a four-person household.

[30] Demand for Electricity, at 75.

[31] Demand for Electricity, at 75 - 76.

[32] Demand for Electricity, at 76. *But see*, footnote 29, supra, for a plausible explanation for this finding.

[33] See, e.g., E. Dillman, E.Rosa, and J. Dillman (1983). "Lifestyle and home energy conservation in the United States: the poor accept lifestyle cutbacks while the wealthy invest in conservation," *Journal of Economic Psychology* 3:299-315.

[34] Demand for Electricity, at 79, 80, 81.

objective of a universal Lifeline rate and that certain empirical issues are raised when such an objective is articulated within the context of a universal, rather than a targeted, Lifeline rate.

2.3.2 A mechanism for measuring the targeting (or lack of targeting) of "Hardship Alleviation"

While the Oklahoma study provides excellent data-based analysis, it is perhaps unreasonable to expect a utility to perform such an extensive evaluation of each proposed universal Lifeline rate structure. The research of the World Bank helps fill this evaluation void. The World Bank provides a mechanism to use in measuring the targeting of rate relief delivered through a universal Lifeline rate structure. While much of the research by the World Bank on electric rate subsidies is inapplicable to Hydro Quebec –for example, one important study on the distributional incidence of electric and water subsidies examines 45 electricity subsidies from 37 utilities and 32 water subsidies from 13 utilities, but all were from developing countries—[35] the *conceptual* framework set forth by these World Bank researchers is nonetheless helpful in framing a way to measure how inverted block rates might affect low-income customers.

The World Bank proffers two tests for measuring the impact that subsidies distributed through a universal inclining block rate structure might have on the poor:

- The beneficiary incidence, which measures the extent to which the subsidy reaches poor households; and

- The benefit incidence, which measures how well the subsidy mechanism targets benefit dollars to the poor rather than to other households.[36] The research calculates a term, called Ω, which "measures the share of the subsidy benefits received by the poor divided by the proportion of the population in poverty."[37] A value of 1.00 for Ω means that "the distribution of the subsidy across income classes is neutral, with the share of benefits going to poor households equal to their share of the population."[38] In contrast, a value greater than 1.00 indicates that the poor are receiving a share of the benefits that exceeds their proportion in the overall population.

The calculation of Ω forces the designer of the inverted block rate to focus on those attributes of a low-income customer that would exclude the customer from receiving a subsidy. While the

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[35] With water utilities, at least, one researcher reports that "increasing block tariffs (IBTs) are now the tariff structure of choice in developing countries. . .Most recent water tariff studies for developing countries propose IBT structures." John Boland and Dale Whittington (2000). "The Political Economy of Water Tariff Design in Developing Countries: Increasing Block Tariffs versus Uniform Price with Rebate," *in* Ariel Dinar (2000). *The Political Economy of Water Pricing Reforms*, at 215, Oxford University Press: New York (NY). In a 1993 survey of urban water utilities in Asia, the Asian Development Bank found that 20 of the 32 water utilities queried used an increasing block rate structure. Id., at 217 – 218.

[36] Distributional Incidence, at 6.

[37] Distributional Incidence, at 7.

[38] Distributional Incidence, at 7. Accordingly, for example, if 40 percent of the population is poor, then a neutral targeted mechanism would deliver 40 percent of the subsidy to the poor. Id.

reasons in developing countries[39] may substantively differ from those in Quebec, the lessons learned should nonetheless not be ignored.

The primary reason for low-income households not receiving the subsidies in the study countries involved the lack of connection to the water or electric system at all. ". . .in almost all cases, the poor are less likely than others to be connected and thus less likely to be eligible for the subsidies. This occurs either because the poor are more likely to live where no water network or electricity grid is present or because they are less likely than the non-poor to connect even [if] they live in proximity to a network." [40] Moreover, the World Bank research found that "a third factor that could explain the poor performance of quantity-based subsidies is the limited extent of household metering."[41]

> The effective application of increasing block tariffs . . . requires households to have functioning meters to measure water and electricity use. Thus, to benefit from the subsidies delivered through these types of tariffs, households must have not only a connection but also a meter. . .Because utilities often charge households for the installation and maintenance of a meter, one might expect to find that poor households with connections are less likely to have meters than richer households with connections.[42]

While the lack of connection to the utility system is not likely to be present in Quebec, the conceptual issue really can present itself in other ways. The lack of "connection" might occur, for example, through rental properties where tenants pay for electric service as an undifferentiated part of rent. The lack of metering may present itself not through an absolute lack of meters, but rather through master-metering where tenants do not have a direct measurement of their electricity consumption.

In sum, while the *specifics* of the World Bank research may be inapplicable to Hydro Quebec, the *lessons* from the study should be carefully considered. Many of the issues identified by the World Bank as applicable to developing countries can find their counterparts in Canada as well. In addition, the two tools offered as a means of measuring targeting –(1) the beneficiary incidence; and (2) the benefit incidence—are valuable analytic tools available to evaluators.

2.3.3 A cautionary sidenote: Resolving the empirical dispute over targeting

One fact about deliberations over a Lifeline rate, irrespective of the objective[s] established for such a rate, is that there not only <u>*may be*</u> empirical disputes, but there are <u>*likely to be*</u> empirical disputes. Is low-income status positively associated with low consumption? Does large consumption imply high peak demand? Are small users subsidizing large users?

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[39] In the World Bank study of the distributional impacts, researchers examined subsidies in countries such as Guatemala, Rwanda, India, Cape Verde, Honduras, Peru, Nepal and Sri Lanka.
[40] Distributional Incidence, at 11 – 12.
[41] Distributional Incidence, at 12.
[42] Distributional Incidence, at 12.

As can be seen, basic differences exist in the possible approaches to resolving such empirical conflicts. For example, the Los Angeles evaluation found that "while not perfect," the relationship between low-income and low-usage was strong. In contrast, the Cleveland State study asserts that only if "one is willing to make the assumption that low-income households use smaller amounts of electricity," can it be found that Lifeline serves the conservation and hardship alleviation goals at the same time.[43]

In seeking resolution of these empirical disputes, several myths should be noted with respect to frequent critiques of Lifeline rates (whether targeted or universal). These "myths," while not empirical in nature, are worthy of repetition. With grateful acknowledgement to Professor Michael Hennessy,[44] his observations are presented somewhat condensed, but more or less intact.[45]

2.3.3.1 The myth of complete knowledge and perfect research

> This first myth often translates into a discussion of not how much we know, but how much residual error there remains to be explained. More importantly, the myth of perfect knowledge is often used as an implicit criticism of a particular research effort rather than a measure of our general ignorance. The implication is often given that *other* researchers, *other* data bases, or *other* methodologies would have provided a more accurate, more complete, or more valid set of results. Of course, these alternative researchers, data or methods are never produced, so the actual research is always compared with some idealized concept of the possible – a sort of ideal type research design with no flaws. Given this theoretical comparison, obviously any particular research study can be found seriously defective.
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> * * *
>
> Such techniques of research defamation have two negative consequences. First, they give the misleading impression that unflawed research is possible. McGrath has cogently argued that given the constraints of the research process and the inherently contradictory demands of "good research," it is impossible to maximize all positive features in any single research design. Hence, all research will be flawed. In fact, it is not possible to do an unflawed study. . .The power of the idealized study is contrasted nicely with the flawed (but empirical) method when McCloskey discusses theory testing. He says, "a conceivable but practically

[43] One warning is to pay attention to those conflicts which are empirical and those which are not. As Cleveland State observed in its multiple case studies of Lifeline rates, "some of these issues are empirical in nature and can be addressed through observation and descriptive analysis. Others. . .are fundamentally normative in character and will continue to generate controversy as long as different individuals hold to different criteria of equity in the regulatory process." Cross Program Analysis, at 12.

[44] Through the power of the Internet, even though these comments were authored nearly 25 years ago, Professor Hennessy was located and interviewed. These comments are presented herein with his permission.

[45] Michael Hennessy. "The Evaluation of Lifeline Electricity Rates: Methods and Myths," 8 *Evaluation Review* 327 (1984).

impossible test takes over the prestige of the real [but flawed] test, but free of its labor."

The apparent perfection of simulation studies is another case in point here. Of course, in these studies, there are no flaws at all since the studies are not sullied by authentic (but recalcitrant) empirical data. The appeal of simulations is exactly that they remain pristinely abstract and quite amenable to the will of the researcher. McCloskey, however, also points out that the difference between simulations being *amenable* to the will of the researcher and simply *being* the will of the researcher is often vanishingly small. (emphasis added).

However, the Myth of Complete Knowledge and Perfect Prediction is more than jut an academic parlor game. If that were all, the myth would be merely amusing rather than pernicious. But if policy makers accept the premise of this myth, their reliance on the flawed, incomplete and partial knowledge provided by empirical research will ever decrease. And this will inevitably change the basis of rational decision making over to other even more incomplete, error-filled and partial methods like [special favors based on political connections], special pleading by interest groups, and bureaucratic rationales of system maintenance.

2.3.3.2 The myth of maximum benefit and minimum burden

The second "myth" identified by Professor Hennessy is that sufficiently detailed inquiry will result in the discovery of "a potential policy that benefits all and burdens none." He dismisses the search for such a policy as not only bound to fail, but also as being harmful in the meantime.

The pervasiveness of this particular myth in the lifeline literature is quite amazing. The review of survey simulations. . .shows that in virtually every case lifeline rates are superior to the alternative rate structure, with greater percentages of targeted households benefiting and lesser proportions of nontargeted households burdened. Yet lifeline rates are routinely criticized (and rejected) for always producing some proportions of the targeted who are burdened and some proportions of the nontargeted who are benefited. As Berg states; "opportunities are missed when our lack of complete understanding causes unnecessary delays. The goal of perfect policies is one of the greatest enemies of the achievement of good policies."[46]

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[46] Methods and Myths, at 340. Contrast this discussion of "research myths" to the decision of the Minnesota Public Service Commission, which held in approving a Conservation Rate Break for customers consuming less than 300 kWh per month: "There is no question that lifeline is a blunt edged sword in attacking the utility problems faced by low-income users. The Commission readily admits that it will favor some persons who do not need the favor and provide only modest assistance to others who need much more. However, the Commission believes that these infirmities are far outweighed by the overall benefits to the large number of needy persons who are able to conserve energy usage. . .We are not required to choose between issuing an order which reduces all evils or issuing no order at all." Cleveland State University (1980). *Lifeline Electric Rates and Alternative Approaches to the Problems of Low-Income Ratepayers: Ten Case Studies of Implemented Programs*, at 253, National Technical Information

2.4 Aligning "Hardship Alleviation" with Other Public Purposes

While a primary objective (perhaps *the* primary objective) of a universal Lifeline rate may be to deliver rate relief to low-income customers, other important public purposes can be served through implementation of such a rate as well. Helping low-income households obviously is not the only objective of a utility's rate design. Where a utility seeks to use its rate design to achieve multiple objectives –providing conservation price signals is an example of one such additional objective—it is necessary to reconcile the multiple objectives one with another. This reconciliation will identify not only the points of commonality, but the aspects of conflict as well.

The discussion below considers three public purposes served by an inverted block tariff/universal Lifeline rate in addition to delivering rate relief to low-income customers:

- Providing essential electric needs;
- Eliminating reverse subsidies by improving the cost-reflectivity of electric rates; and
- Promoting usage reduction.

Consideration of these other public purposes is important in several respects. To the extent that they may conflict with the "hardship alleviation" objective of the universal Lifeline rate, that conflict should be addressed and minimized to the extent possible in order to preserve the ability of the universal Lifeline to achieve its "hardship alleviation" objective. Just as importantly, to the extent that these public purposes may reinforce and provide synergies with the "hardship alleviation" objective of a universal Lifeline, those commonalities should be supported and strengthened in order to maximize the impacts of the Lifeline in achieving its objectives.

The discussion below finds that the public purpose of providing a minimum level of electricity service for essential needs facilitates, but does not necessarily strengthen, the "hardship alleviation" objective. The discussion concludes that improving cost-reflectivity can significantly strengthen the regulatory and policy rationale for using a universal Lifeline rate. Finally, the discussion below concludes that there are not necessary conflicts, and many potential synergies, between a universal Lifeline rate having a "hardship alleviation" objective and a universal Lifeline rate having a "usage reduction/energy conservation" objective.

Center: Washington D.C. See a more detailed discussion of the Northern States Power Company Conservation Rate Break below.

2.4.1 The interrelationship of "Hardship Alleviation" with "Meeting Essential Needs"

Closely related to the hardship alleviation objective, but nonetheless distinguishable, is the belief that Lifeline rates should achieve the objective of providing electricity for a certain level of basic needs at a minimum price. This Lifeline rate objective posits not only that some minimum level of electricity consumption is needed by *any* household for "essential needs," but also that this level of consumption should be available at an affordable price irrespective of who is consuming.

The focus of this objective is on the nature of the use of electricity rather than on the economic hardship that arises when a household cannot afford to pay for such electricity. A higher level of income, in other words, does not detract from the essential nature of the specified minimum electricity consumption deemed to be essential to a household. Note that in this formulation of the Lifeline objective, it is the "essential" nature of electricity, standing alone, not the essential nature of electricity in combination with the likelihood of deprivation due to inability-to-pay, which forms the basis for the articulation of the objective.

Formulating the Lifeline rate objective in this regard simplifies any consideration of a universal Lifeline rate. One need not consider income. One need not consider the relationship between usage and income. One need not consider at what point inability-to-pay will result in deprivation of the service required for essential needs. One need not consider whether the poor are included in the rate while the non-poor are excluded. As one commentator said:

> If electricity is an "essential need" (such as water), then the rationale for lifeline is not the indirect redistribution of income, but a natural outcome of a philosophical and moral position. Lifeline rates based on essential need would be universally applied to all residential customers."[47]

Under the "essential needs" objective of a Lifeline rate, this commentator concluded, "the only empirical question concerning Lifeline is to model the household sources of electricity demand such that the size of the Lifeline or 'essential need' block can be established."

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[47] Michael Hennessy, "The Evaluation of Lifeline Electricity Rates: Methods and Myths," 8 *Evaluation Review* 327, 329 (1984), *citing*, H. Petersen (1982). "Gainers and losers with lifeline electricity rates," *Public Utilities Fortnightly*, November 25, 1982.

Other commentators, however, do not agree that the issue is quite so simple. Indeed, opposition to inverted rates has been predicated on the burdens such rates would impose on high users. One analyst argued, for example, that "the use of inverted rates for a class of customers such as residential appears to be based on the assertion that certain uses characterized by customer requirements up to a particular level are necessary and should have a lower rate, while usage beyond that point are luxuries or are less necessary and therefore should be charged a higher price."[48] This analyst noted that would "result in homes that use electricity for water or space heating being especially hard hit."

A different analyst identified a similar issue in a slightly different context. A Lifeline directed toward initial blocks, with lost revenue being recovered from later blocks, would violate "the good faith criterion" involving a "promise of stable or declining rates." The issue involves the question of whether customers were misled. "This criterion is particularly appropriate to high volume customers who established their consumption patterns under pre-Lifeline rates and who would [now] be penalized by the imposition of a significant rate surcharge."[49]

A detailed discussion of a consideration of the cross-over point for receipt of net benefits is presented below.[50]

2.4.2 The interrelationship of "Hardship Alleviation" with "Improving Cost Reflectivity" for low-users

One important finding of recent research on inverted block tariff/Lifeline rates is that historic concerns about providing rate relief to low-income customers, irrespective of the legitimacy of those concerns in the first place, may no longer be well-founded.[51] Indeed, the association between the contribution of high usage customers to high demand, and the contribution of high usage customers to high utility generation costs, provides a strong justification for universal Lifeline rates independent of the "hardship alleviation" objective regarding low-income customers. Rather than providing the initial reduced-price consumption block "below cost," in other words, the impact of a universal Lifeline rate is to remove the implicit subsidies flowing from low-users to high-users when rates do not reflect the difference in peak load utilization.

In this respect, Lifeline rates (inverted block rates) are not only beneficial in delivering rate affordability assistance, they are also _**needed**_ to improve the cost-reflectivity of residential rate structures. As a result, a utility may help alleviate the low-income hardship associated with inability-to-pay without needing to create a rate subsidy flowing to these small users.

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[48] Robert Sarikas and Henry Herz (1976). *Electric Rate Concepts and Structures: A Report to the Bonneville Power Administration*, at 1, National Technical Information System: Washington D.C.
[49] Cross Program Analysis, at 44.
[50] The "cross-over" point is that level of consumption where the increased prices in the higher consumption blocks equal or exceed the reduced prices in the initial consumption block. When a residential customer exceeds the cross-over point, he or she become a net payer, with an average bill that is higher under the Lifeline rate than it would have been without the Lifeline rate.
[51] In reaching this conclusion, it may no longer be necessary to determine whether arguments over whether the legality of universal Lifeline rates were "right" or "wrong" under traditional discrimination law.

Integral Energy, an Australian electric distribution utility, framed the issue like this: "in general, current network tariffs do not provide customers with the right price signals and are not equitable. At present, customers who are not contributing to the network peak are bearing the costs associated with those that are."[52] The inclining block tariff proposal of Australia's electric suppliers was "aimed at improving the cost reflectivity and. . .equity in network tariffs for residential and small business customers."[53]

The staff of the Australian utility regulatory body overseeing regulated residential rates in New South Wales (Australia) agreed. In a "Secretariat Discussion Paper" examining inverted block rates, the Staff of the New South Wales Independent Pricing and Review Tribunal (IPART) articulated the cost-reflectivity issue as follows:

> The current single flat rate energy charge structure for residential and small business customers means that customers contribute to the cost of providing capacity in proportion to their energy consumption. Larger customers pay a larger share of costs by virtue of their higher consumption. Underlying this charge structure is an implicit assumption that if a customer consumes say 20 percent of total energy then they utilize 20 per cent of system capacity. If this were the case, then the single rate structure would likely be cost-reflective. . .
>
> The current charge structure is therefore likely to lead to cross-subsidies across different kinds of residential and small business customers. Customers that impose demands on system capacity that are disproportionately less than indicated by their energy consumption will tend to cross subsidize those with disproportionately greater demand for capacity. . . For example, a customer may represent around 2 per cent of total energy but because they have a need for this energy during peak time, might represent around 5 per cent of system capacity. Under the current system, ignoring the impact of fixed service availability (access) charges, that customer would be facing only 2 per cent of costs. The remainder would be spread across other customers that utilize capacity disproportionately less.[54]

The cross-subsidy from small users to large users can be substantial. One Australia utility found that "the cross-subsidy is in the range [of] $80 to $110 million –or one-third of total sales to the residential and small business sectors. If this subsidy is smeared across all of the remaining consumption by these groups, it equates to 1.5 cents/kWh to 2.0 cents/kWh relative to a marginal rate of 4.85 cents/kWh."[55]

These observations were confirmed in the context of a Canadian province as well. An analysis by the Energy Research Group, a research institute within the Department of Electrical and

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[52] Independent Pricing and Regulatory Tribunal of New South Wales (IPART) (June 2003). *Inclining Block Tariffs for Electricity Network Services: Secretariat Discussion Paper*, Discussion Paper DP64, at 6.
[53] Inclining Block Rate Tariffs--NSW, at 8.
[54] Inclining Block Rate Tariffs--NSW, at 8.
[55] Inclining Block Rate Tariffs--NSW, at 9.

Computer Engineering (Dalhousie University, Halifax, Nova Scotia), presented to the Nova Scotia Utility and Review Board (UARB), explained:

> The customer's price per unit of energy is obtained, in part, from the costs associated with the different types of generation. If the energy supplier meets the non-peak demand with low-cost, base-load energy and the system peak with a combination of base-load and expensive peak load energy, the price per unit of energy must be a combination of the two. Although both customers pay the same price per unit of energy, the first customer pays disproportionately more per unit because the second customer consumes more energy generated during the (expensive) system peak. In short, one finds that:
>
> - Customers with a large portion of their demand that is not coincident with the system peak are overcharged for the price of a unit of energy.
>
> - Customers with a large portion of their demand that is coincident with the system peak are undercharged for the price of a unit of energy.
>
> In other words, the flat rate structure does not reflect the cost of generation and can result in cross-subsidies.[56]

Historically, one primary objection to the use of Lifeline rates –be they a universal Lifeline rate or a targeted Lifeline rate—has been based on the argument that providing an initial block of low-cost usage would conflict with principles of cost-causation. Such a low-cost initial block, the argument went, would be, at best, bad public policy and, at worst, a violation of laws prohibiting "discrimination" in ratemaking.

The argument against providing a low-cost block of initial consumption gained further credence as the electric industries in North America, Europe and Australia became more competitive. On the one hand, providing such non-cost-based rates would impede competition for the small user, when competitive service providers would be unable to compete against the artificially low "subsidized" rate. On the other hand, providing such non-cost-based rates would impede competition for the larger user when competitive service providers could cherry-pick large-user customers, who were being charged higher rates than would be charged by companies that did not bear the same social obligations as the public utilities.

The research cited above alleviates those concerns. Rather than creating a subsidy flowing to small users, the universal Lifeline/inverted block tariff rate would eliminate the cross-subsidy and improve cost reflectivity.

The adverse impact of high, non-cost-based rates on low-income customers would make this ability to achieve the "hardship alleviation" objective, while at the same time serving the public purpose of improving cost-reflectivity, even more compelling from a policy perspective. If low-income customers cannot afford to pay their bills, and some portion of those bills is related to

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[56] Larry Hughes (2004). *The Inverted Block Rate: An Alternative to Flat Billing*, at 6 - 7, Energy Research Group, Department of Electrical and Computer Engineering, Dalhousie University: Halifax (Nova Scotia).

costs they did not cause the utility to incur, the design of a Lifeline (inverted block) rate would serve both the objective of improving price reflectivity and the objective of alleviating low-income hardships.[57]

2.4.3 The interrelationship of "Hardship Alleviation" with "Usage reduction/Energy conservation"

A third potential objective for Lifeline utility rates is the promotion of energy conservation.[58] The goal of this objective is, for environmental, production cost, or some other reason[s], to encourage a *reduction* in energy consumption. An inverted block rate structure sends a strong conservation price signal to large consumers.[59] One asserted impact of the Lifeline rate is that increasing the rates in the higher consumption blocks will "increase incentives to conserve energy, even though the initial block's prices will be reduced."[60]

2.4.3.1 Reducing energy (kWh) consumption

The need to incentivize reduced electricity consumption through a Lifeline (or inverted block) rate structure is based primarily on environmental considerations today. Reducing electricity consumption, and the corresponding need for power production is considered a fundamental strategy in the control of carbon emissions and the environmental footprint of electricity generation.

A universal Lifeline rate generates a reduction in energy consumption (kWh) even though the Lifeline rate provides reduced prices for customers' initial block of monthly usage. This occurs for two reasons. First, the price elasticity of usage is greater among higher-use customers. Accordingly, the price increase imposed on high-use customers will generate a greater proportionate downward adjustment in rates than the price decrease made available to low-use customers. Second, the absolute number of higher use experiencing increased bills is much higher than the number of low-use customers experiencing an overall price decrease through the universal Lifeline. Accordingly, even if the per-customer consumption decrease is small, the systemwide decrease in energy consumption resulting from a universal Lifeline rate can be expected to be quite substantial.

Aside from the environmental considerations, reducing energy consumption has specific utility cost reduction implications as well. Energy usage reductions are generally viewed as helping a utility to control its generation costs. With new generation costing significantly more than the

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[57] One should note, again, of course, the discussion above regarding the interrelationship between low-income status and low-user status.
[58] This objective is to be contrasted to the pursuit of energy efficiency. While energy efficiency focuses on uses energy better, energy conservation focuses on using energy less.
[59] As used here, the term "large consumers" is ***not*** synonymous with "commercial" and/or "industrial" consumers. There may be "large consumers" in any given customer class, including the residential customer class.
[60] Rate Design Proposals, at 78.

embedded costs of generation,[61] increasing energy consumption leading to the need for capacity expansion is viewed as one fundamental cause of increasing electricity rates.

The need for price signals to incentivize energy conservation among large users is not unique to Canada. The efficacy of using rate structures to send such conservation price signals is recognized internationally. According to the Independent Pricing and Regulatory Tribunal (IPART) of New South Wales (Australia), for example, price signaling can play an important role in "signaling congestion costs and reducing the need for costly network augmentation."[62]

2.4.3.2 The positive impacts of reducing peak demand (kW)

While inverted block rates are directed generally toward usage reduction, it is not exclusively large *consumption* (kWh) that is of concern in this regard.[63] In fact, it is high ***demand*** (kW) that inverted block rates are often (if not generally) designed to address. Australia's IPART noted:

> For residential and small business customers, options for network price reform are somewhat limited in the shorter term. These customers typically have accumulation type meters that do not differentiate when consumption occurs (peak or off-peak periods) and so the ability of [electricity suppliers] to set tariffs that directly target consumption during peak periods is reduced. However, the [electricity suppliers] have estimated that a significant proportion of the recent growth in peak demand has been due to growth in demand in the residential sector. In particular, rapid growth in the penetration rates of air conditioning among residential customers is likely to be a significant driver of peak demand among those customers.[64]

An analysis presented to the Nova Scotia Utility and Review Board (UARB) emphasizes this *demand* price-signaling role for inverted block rates as well. According to Professor Larry Hughes,[65] some suppliers report a high correlation between high consumption and high demand.[66] In particular, customers with air conditioning tend to have both high energy consumption and high contribution to peak demand.

As with the relationship between income and consumption discussed above, the correlation between high consumption (kWh) and high demand (kW) is not complete. Nonetheless, the

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[61] This sets aside the entire concept of "full cost pricing" as is currently being debated in the water industry today. See generally, Roth, Eva (2001). *Water Pricing in the EU: A Review*, European Environmental Bureau: Brussels (Belgium) (general discussion of "full cost pricing" of water service).
[62] Inclining Block Rate Tariffs—NSW, at 2.
[63] By improving cost-reflectivity, the Lifeline/inverted block rate helps to control utility costs in both the short and long-term. The Lifeline/inverted block rate will help the utility to control costs both "(1) by changing the level of consumption of electricity, [and] (2) by changing the load pattern for a given consumption level." Rate Design Proposals, at 95.
[64] Inclining Block Rate Tariffs--NSW, at 3 (internal notes omitted).
[65] Energy Research Group, Department of Electrical and Computer Engineering, Dalhousie University, Halifax, Nova Scotia.
[66] Inverted Block Rates in Nova Scotia, at 12.

association is generally acted upon as a basis for inverted block rates. As IPART noted: "The inverted block tariff levies a higher price for consumption above a specific threshold. As such, larger customers will tend to face higher bills—regardless of whether they consume large amounts of electricity in peak periods or not."[67]

To this extent, inverted block rates are one alternative to time-of-day pricing.[68] ". . .the inclining block tariff is largely a second best means of sending price signals to residential and small business customers. However, [the electricity suppliers'] position is that an inclining block tariff sends *better* signals for reducing consumption than the current single flat rate structure."[69] One advantage of the inverted block rate is that one can "overcome the limitations of the flat rate model while still using induction meters."[70]

The ability to address peak load problems[71] while not investing in new metering technology has been identified as one major advantage of the use of Lifeline rates. Utilities have historically been reticent to install new metering technology. Given the speedy change in technology, manufacturing capacity for any particular meter is reduced and the potential for new investment quickly to be rendered technologically and/or economically obsolete is enhanced. Moreover, the need to install new technology introduces the further need to weigh the benefits of the demand reduction against the costs of the new technology. Lifeline rates removes this weighing as an issue. As one analyst noted:

> A significant investment in new metering devices may be required for certain rate structures (e.g., time of use rates). The cost of metering a customer's use of electricity tends to increase with the complexity of the rate structure. Therefore, careful analysis is needed to assure the metering costs of implementing a rate do

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[67] Inclining Block Rate Tariffs--NSW, at 3.

[68] The purpose of time of day pricing is not simply to increase rates to reflect higher prices at the time of peak demand. It is to accurately reflect both the *higher* costs at times of peak demand and the *lower* costs at times of non-peak. The impact that non-cost-reflective rates generate for network utilization is two-fold:

- There is an over-consumption of network capacity at peak times. "Since customers are paying less than the cost of providing peak capacity, they have no incentive to seek out other alternatives that might be able to satisfy their demand for electricity during peak times at a lower cost than network capacity."

- There is an under-consumption during non-peak times. "During off-peak periods, customers pay more than the cost of supplying that capacity and will tend to consume too little."

Inclining Block Rate Tariffs--NSW, at 9. Both of these consumption impacts result in higher rates for consumers. The effect of the first result is to force a utility into the procurement (through either construction or purchase) of high cost peak-load generation. The effect of the second result is to minimize the off-peak kWh over which the fixed costs of generation can be spread.

[69] Inclining Block Rate Tariffs--NSW, at 3 (emphasis added).

[70] Inverted Block Rates in Nova Scotia, at 3. An induction meter records total energy consumption without assigning such consumption to any particular time period.

[71] "By introducing the inclining block tariff, the [distribution utilities] are seeking to better signal the costs of providing the capacity to meet this demand and provide incentives to customers to reduce peak demand." Inclining Block Rate Tariffs--NSW, at 6.

> not outweigh the associated benefits."[72] When time-of-use metering is not considered to be cost-effective, inverted block rates are frequently considered to be an appropriate substitute.[73]

While the avoidance of metering investment is perhaps not the *objective* of the inverted block rate –the objective is to reduce consumption as well as to control peak demand—it is a positive, and not insubstantial, side-effect of such rates.

2.4.3.3 The potentially negative impacts on peak demand

Despite the *expected* positive outcomes of a universal Lifeline rate identified immediately above, it is important to acknowledge that inverted rates *may*, in fact, have an adverse effect on a utility's load factor. Due to higher prices associated with inverted rates, total electricity usage is likely to decline. However, "it has been argued that even though peak period kWh usage may *in total* (emphasis in original) be responsive to increases in price, it does not necessarily follow that kW demand during extreme weather conditions (*e.g.*, the hottest hour of the hottest day of the year) would be reduced. This concern is reflected in the "needle peaking" problem, often referred to by the utility and cited in support of the assertion that time of use rates would not reduce capacity requirements."[74] If total electricity usage declines, but kWh usage declines faster than kW demand declines, then overall load factors will be impaired rather than improved, with increasing costs to the utility and its ratepayers.

Several early studies "suggest that peak kW demand may be less responsive to changes in price than kW demand at other times."[75] Moreover, "it is sometimes argued that residential class demand would be unresponsive to higher prices during system peak hours."[76]

The study of inverted block rates in New South Wales (Australia) more than twenty years later confirms this as a legitimate concern. This study notes that "the inclining block tariff offers no direct incentive for reductions in consumption to be concentrated in peak periods." It then reports:

> Whether consumption is reduced in peak periods, off-peak periods, or a combination of both will depend on individual consumer preferences. To the

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72 Rate Design Proposals, at 96.

73 Heather Parmesano and Catherine Martin, "The Evolution in U.S. Electric Utility Rate Design," 1983 *Annual Review of Energy* 45, 66 (1983), citing, Charles T. Main, Inc. (1980). *The accounting cost basis for evaluating block rates*, Electric Utility Rate Design Study, Rep. 68, Palo Alto, CA; Electric Power Research Institute; National Economic Research Associates (1979). *Block rate structures based on marginal costs*, Electric Utility Rate Design Study, Rep. 81, Palo Alto, CA; Electric Power Research Institute; Putnam Hayes and Bartlett, Inc. (1980), *A framework for evaluating the cost-tracking capability of alternative residential rate structures*, Electric Utility Rate Design Study, Rep. 83, Palo Alto, CA: Electric Power Research Institute.

74 Rate Design Proposals, at 110 – 111.

75 Rate Design Proposals, at Appendix C.

76 Rate Design Proposals, at 111 – 112. This assertion "ignores the long-term responsiveness of electricity usage to price, the potential change in appliance stock and efficiency that can occur over time, the empirical data from rate experiments, and the potential demand reduction resulting from load controls." Id., at 112.

> extent that large consumers tend to consume disproportionately more in peak periods, then it is possible that any demand response would also [be] concentrated in the peak. However, if consumers value peak consumption more highly than off-peak consumption, for example, air conditioning is valued most on the hottest days, then it is also possible that any reduction in consumption would be more focused on off-peak or shoulder periods. In this situation, there would be little deferral of capital expenditure with reduced consumption during non-peak times, capacity utilization could be worsened –the reduction in electricity consumption could lead to higher costs per kWh than current levels.[77]

The Australian evaluation of the inverted block rate, however, concluded that these impacts are not likely. The IPART evaluation carefully considered the price elasticity of demand for residential customers. It reported "some broad conclusions that can be drawn from the literature. . ."

- Consumption of electricity may be relatively unresponsive to price.
- Responsiveness to price tends to be larger in the long-run, albeit still inelastic, as the appliance stock turns over and building standards change.
- Households with air conditioning tend to be more price responsive than those without, although consumption is still price inelastic.
- Consumption in peak periods is more elastic than consumption in off-peak periods, in the context of time varying tariffs.
- Peak and off-peak consumption tend to be substitutes, a rise in the peak period price tends to lead to shifting of consumption away from the peak and into the off-peak period.[78]

The IPART study concluded explicitly that "the findings that households with air conditioning tend to be more price responsive and that demand in peak periods is likely to be more elastic than in off-peak suggest that any price response would likely have relatively more impact on peak period demand than off-peak. This would be consistent with the objectives of the pricing proposal."[79]

[77] Inclining Block Rate Tariffs--NSW, at 19.
[78] Inclining Block Rate Tariffs--NSW, at 23.
[79] Inclining Block Rate Tariffs--NSW, at 24. However, IPART warned that "the elasticity estimates refer to energy rather than demand. At a recent Pricing Issues Consultation Group meeting, it was suggested that the inclining block tariff might lead to a situation where customers might attempt to constrain their usage to a more limited time frame, which would have the effect of lowering energy consumption (and revenue) but not have much impact on system demand at the peak (which drives cost)." After empirical study, however, IPART concluded that this is not likely to occur. Inclining Block Rate Tariffs--NSW, at 24.

3 Considerations in How to Structure a Universal Lifeline Rate

The discussion below moves from an examination of factors to consider in deliberating *whether* to implement a universal Lifeline rate to an examination of factors to consider in deliberating *how* to structure a universal Lifeline rate. Three basic design decisions must be addressed when a utility chooses to pursue a universal Lifeline:[80]

- Setting the size of the initial block;
- Setting the total number (and size) of usage blocks; and
- Setting the rate differential between blocks.[81]

3.1 The Size of the Initial Block

One of, if not *the* key task[82] in establishing a Lifeline rate structure is to establish the size of the initial block of energy consumption. The initial block of consumption is that block of usage to which reduced price is applied. The factors to be considered in setting the initial block of consumption in an inverted block tariff differ depending on the objective sought to be achieved by the inverted block rate.

3.1.1 Factors to consider in establishing a "hardship alleviation" block.

To the extent that the objective of the Lifeline rate is to alleviate hardships to low-income customers, the initial block should be set with an explicit consideration given to the dollars of benefit generated by the Lifeline rate. A 2.0 cent per kWh discount on 500 kWh, in other words, delivers a $10 monthly discount, a level which some within the low-income community might consider a legitimate annual benefit ($120). In contrast, a 1.5 cent per kWh discount on the first 200 kWh delivers only $3.00 per month, an amount that might reasonably be questioned as minimal.

Moreover, if the objective of the Lifeline rate is to deliver "hardship alleviation" to low-income customers, the designer of that rate should not establish an initial block that is too low. Benefits

[80] As reported above, this report does not consider the merits of a targeted Lifeline rate and thus need not consider the targeting factors.
[81] The Political Economy of Water Tariff Design, at 217.
[82] "Determining the threshold at which the per unit price of energy begins to rise is the key to inverted rates." Temurjan Nasirov, et al. (August 2007). *The Outlook for the Development of Renewable Energy in Uzbekistan*, at 53, United Nations Development Program: Tashkent, Uzbekistan.

only arise to consumers in an inverted block rate if the price reduction in the initial block is not offset by the price increases in higher blocks. The point at which a customer is neither better nor worse off is called the "break-even point." Above the break-even point, the customer actually pays a higher bill even though he or she has received a price reduction in the initial block.

The smaller the initial block, the lower will be the break-even point all other things equal. If the size of the initial block is decreased, without a corresponding increase in the rate differential between the first and second blocks, the less likely the Lifeline rate will deliver any benefits at all to the low-income customer. Careful attention to the bill distribution curve will help avoid setting an initial block that delivers phantom benefits through a low break-even point.

In sum, if the objective of the universal Lifeline is to deliver "hardship alleviation," setting the size of the initial block should take multiple factors into account:

- The degree to which the initial block delivers substantial benefits to low-use, low-income customers;
- The degree to which low-use and low-income status correspond;
- The degree to which the benefits delivered through the initial block are offset, in whole or part, by higher rates in subsequent blocks;
- The degree to which "essential energy usage" can be defined and quantified;
- The degree to which usage corresponds with ability-to-pay.

3.1.2 Two methodologies to consider

Two related methodologies can be used to determine the appropriate level of the initial block in a universal Lifeline rate for which "hardship alleviation" is the primary objective. The first method considers the degree to which low-income and low usage correspond. A bill distribution of low-income customers serves as the starting point for such a process. Beginning with the point of central tendency in this distribution, the Lifeline designer would expand the first block of consumption increasingly into the right tail of consumption until he or she reaches that point which, as a matter of policy determination, is deemed to be a reasonable rate of inclusion. No objective measure has been established for whether a Lifeline "should" include 50% of low-income customers, or 80%, or some other proportion. Some care must be taken in generating the desired rate of inclusion. The block should not be set so high that it includes 80% of the total residential base.

The second method more explicitly involves a balancing of the process of inclusion and exclusion as discussed above.[83] This method of setting an initial Lifeline block compares the bill distribution curves of low-income and non-low-income customers. Assuming that the

[83] The process of "inclusion and exclusion" is discussed above within the context of setting objectives.

proposition that low-income and low-usage are related, the point of central tendency for the two populations will be distinct and discernible. The low-income, low-use customers will have a central tendency to the left of the non-low-income. The point at which the right tail of the low-income intersects with the left tail of the non-low-income customers can be the starting point of deciding what the first block of consumption should be. Adjustments based on evaluations of the issues of including more low-income households without including "too many" non-low-income customers can be made based on the judgment of the designers of the Lifeline structure.

3.1.3 Distinguishing a "usage reduction" universal Lifeline objective.

In contrast to the factors to be considered in setting an initial block given the "hardship alleviation" objective, setting the first block for the objective of promoting conservation takes different factors into account. In addition, even within a "conservation" objective, the first block is set differently if the purpose of the energy reduction is to reduce peak demand or whether the purpose is to reduce overall energy production (and thus carbon emissions or environmental footprint).

If the objective of the Lifeline rate is primarily to promote usage reduction, the first block of consumption should be set at a level considered irreducible by the utility. The purpose of the rate differential between the first and second blocks is to serve as an incentive for customers to reduce their usage so as to stay solely within the first block (and thus receive only the reduced priced electricity). If the block is set too low, the customer will not strive to reach it since the goal is unattainable. If the block is set too high, the customer will not need to strive to attain it since usage may reasonably fall within the low-income block with no effort on his or her part.[84]

In setting the first block of consumption for purposes of incentivizing conservation, it is less necessary to determine what consumption is "essential" and more necessary to determine what consumption is "discretionary." One analyst explained a methodology for making this determination as well.

> An electricity demand function is kinked, sloping steeply around the minimum required for basic needs and then rapidly leveling off as the quantity consumed moves from necessity to luxury. Ideally, a subsidy would provide just enough compensation to ensure that each household consuming in the steeply sloping (inelastic) portion of the demand curve consumes in the flat (elastic) portion where welfare losses are small. Since the exact location of the kink[85] cannot be identified, an upper and lower bound approach can be used.[86]

[84] "The choice of threshold for the second block will be one factor determining how many customers might seek to switch off the inclining block tariff. The higher the block the fewer the households that would face higher bills and have an incentive to switch." Inclining Block Rate Tariffs--NSW, at 21.
[85] A kink in the demand curve is a specific instance of non-linearity.
[86] Julian Lampietti (editor) June 2004). *Power's Promise: Electricity Reforms in Eastern Europe and Central Asia*, at 39, World Bank Working Paper No. 40, World Bank: Washington D.C.

The lower bound eliminates incentives for gaming the system, while at the same time excluding residences with very low usage.[87]

A second way to establish the initial block is to determine whether a level of consumption exists at or below which the consumption has not changed over time. The Massachusetts Department of Public Utilities (DPU), for example, established the size of a subsidized usage block at the residential average, noting that that average consumption had not changed over time. The residential average was found to be a consistent measure of what residential customers had exhibited to be an irreducible consumption amount, whether or not such usage was to be defined as being "essential" to the household's well-being.

3.1.4 Taking cost-reflectivity impacts into account

Finally, setting the level of the initial block in a universal Lifeline rate can and should take the cost-reflectivity impacts of the rate into account. This consideration of cost-reflectivity should consider customer usage patterns, both at-present and over time. Customer usage at-present indicates the extent to an initial block of consumption can be identified which would be primarily base-load. Cost-reflectivity generally acknowledges that low use customers make disproportionately low contributions to system peak and thus do not cause a utility to incur the higher production cost of meeting system peaks. An initial inquiry, therefore, should be made into what level of kWh consumption falls within the baseload portion of the company's load curve at present.

Beginning with the bill distribution curves of residential customers, it is possible to assess the extent to which, if at all, residential customers with usage falling primarily (or exclusively) in an initial block of Lifeline consumption exhibit weather sensitive load. The general assumption is that if consumption (kWh) does not increase during on-peak times, the customers are not disproportionately contributing to that peak demand. Identifying the monthly consumption amount below which customers do not exhibit substantial weather-sensitive changes in usage will help identify an appropriate level for the initial block.

Considering usage shifts can be done over time as well. In Massachusetts, state regulators established the residential *average* consumption as the limit of its reduced price usage block.[88] The residential average consumption had remained constant over time, the state regulatory commission found. Since the average had exhibited no growth, the Massachusetts commission decided, customers consuming at or below that average should not be burdened with paying the increased costs of meeting the growth which had, in fact, occurred.

[87] Power's Promise, at 39.
[88] The subsidy was provided through a rate freeze, not through a Lifeline rate.

3.2 The Number and Size of Blocks

Aside from setting the size of the initial block in a Lifeline rate, one of the most important design decisions involves setting both the number and size of the subsequent blocks as well. Again, the design decisions are closely related to the objectives sought to be accomplished by the inverted block tariff rate.

An inverted rate designed primarily to alleviate low-income hardship is generally a two-step rate, with the first block having a reduced price and the second block having an increased price. A universal Lifeline rate designed primary for "hardship alleviation" purposes does not have the same considerations counseling the adoption of multiple blocks. Instead, a two-step universal Lifeline rate must take into account the bill distributions (on both an annual and monthly basis) discussed elsewhere, in order to ensure that it makes a positive contribution to rate relief. If low-income customers frequently have consumption above the break-even point, the two-step rate will be subject to challenge as an affordability strategy.

In contrast, setting the size and number of blocks in an inverted block rate designed primarily to promote usage reduction involves different considerations. If the primary purpose of the inverted block rate is to generate usage reduction, particularly under circumstances where resources are limited and inflexible, as well as where there are substantial energy shortages,[89] a rate comprised exclusively of two blocks is probably *in*appropriate.[90] "To be successful, an energy supplier's inverted block rate should have sufficient blocks to encourage changes in consumption patterns."[91] As customers make consumption decisions, they should be able to see those decisions reflected in the price they are paying for electricity. If a company has only two blocks, no incremental information is provided through the pricing process.[92]

While a utility seeking to use its inverted block rate primarily to promote usage reduction may want to use multiple rate blocks, there is a corresponding danger in establishing "too many"

[89] Under such circumstances, it has been argued, marginal costs are no longer a consideration.

[90] A two-block rate need not stand only contrast to a rate with multiple (three or more) blocks of energy consumption. Contrast, for example, the existing inverted rate of Hydro Quebec. Hydro Quebec has two *energy* blocks in its domestic rate. The first block is set at 0.0529¢/kWh for the first 30 kWh per day, while the second block is set at 0.0703¢/kWh (33% above the first block). There is not a third *energy* block, but rather a demand charge for all residential customers taking power above a specified amount of kW. This approach should be favorably compared to the discussion elsewhere in this report which notes that one shortcoming of an inverted block rate, irrespective of how many blocks such a tariff might have, is that it assumes a connection between kWh and kW usage, but does not explicitly take a residential customer's demand (kW) into account.

[91] Inverted Block Rates in Nova Scotia, at 24.

[92] This observation is offset somewhat by observations, discussed elsewhere in this paper, about the need to have a readily discernible price signal. A rate structure that is too complex may be too complicated for the typical consumer to use in deriving a price signal on incremental consumption. Some persons involved with the design of utility rates reject the use of inverted block rate tariffs on the grounds that they are complicated and difficult to understand. Such tariffs, these opponents argue, lack "simplicity and transparency." "With a typical [inverted block tariff], it is impossible for all but the most analytical and determined users to deduce the average or marginal price that they actually pay for water. The kind of price signal that most customers rely on (the change in the total bill that results from a conscious change in water usage) becomes misleading and confusing when the resulting water use moves from one block to another. This is an important point, because customers cannot respond as expected when they cannot detect a coherent price signal." The Political Economy of Water Tariff Design, at 229.

blocks in an inverted block tariff. Establishing too many blocks creates a disconnection between customer decisions and the usage block into which the customer falls. By its very nature, residential energy consumption fluctuates over time. Consumption may increase or decrease based not only on factors involving the weather, but on factors involving how long a home is occupied during the day, how many residents are in the home, and other factors that can reasonably be expected to change from week-to-week and from month-to-month. Consumption blocks in an inverted block tariff should be sufficiently limited that households do not typically move from one block to another based solely on these normally fluctuating factors. The usage differentials between blocks in the inverted block tariff should, in other words, be sufficiently large that the move from one block to another results from a discernible customer decision to add or subtract a usage component from the home.

3.3 The Rate Differential between the Initial and Second Blocks

This paper does not seek to inquire into the various methods for establishing prices for each usage block in an inclining block tariff (universal Lifeline). The factors affecting each price are too complex and too varied to lend themselves to a discussion in the space and context of this report.

3.3.1 The break-even point

In setting the price for the *second* consumption block in an inverted block rate structure, however, it is important to determine the beak-even point for customers with consumption above the Lifeline amount. The break-even level for a consumer's bill defines that level of kWh used where "the savings accruing from the 'lifeline block'. . .are completely offset by the higher per kWh charges for consumption above the Lifeline block."[93]

> Compared to traditional rates, the average price per kWh for individual residential customers will vary according to the 'break-even' level in consumption. The average prices paid for electricity will rise for all residential customers above the break-even level.[94]

While significant attention is devoted to the rate differential between the first and second blocks of a Lifeline rate in the literature, the fundamental message to be derived from these discussions involves ensuring that the price increase from the first to the second block is substantial enough to convey the signal that consumers should carefully monitor their consumption to avoid moving into the higher, and more expensive, usage block.

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[93] Rate Design Proposals, at 103. The break-even level is "the point at which estimated electricity bills would be equivalent under the two competing structures." Evaluation of Lifeline Rates, at 335. "A household ceases to be a net subsidy recipient only when the surcharge applied to the last units consumed is large enough to exceed the subsidy received on the first units consumed." Distributional Incidence, at 13.
[94] Rate Design Proposals, at 102 – 103.

3.3.2 The advantages of a deep, narrow price reduction

The better reasoned discussion argues, however, that the break-even point should be controlled by adjusting the size of the initial block rather than by adjusting either the price or the size of the second block. This reasoning posits that a Lifeline rate with a smaller initial block and a deeper discount is a better approach than a broader, shallow discount with a higher price for the second, non-discounted block. Such a narrow deep discount offers several advantages, even if the total dollars of price reduction are identical to the consumer:

- From the perspective of the low-income consumer, it helps the customer to achieve the maximum benefit more quickly. With a broad, shallow discount, a customer has to consume more in order to exhaust his or her discount potential.[95] If the initial (low-priced) block is 500 kWh, in other words, and the consumer uses "only" 450 kWh, that consumer is leaving discount potential on the table.[96]

- From a conservation perspective, it eliminates any incentive for a low use customer to increase consumption in order to maximize receipt of the discount.[97] Setting aside the environmental consequences of this increased usage, even if a low-income customer decreases his or her average price per kWh by increasing usage within the first block, the total dollars of the customer's bill will increase, thus exacerbating rather than alleviating customer hardship.

- From a utility perspective, while the rate of inclusion of low-income customers will likely decrease somewhat by making the initial block narrower, the rate at which non-low-income customers are excluded will likely increase to an even greater extent. The

[95] "However, even when the direction of the subsidy (from rich to poor) is relatively uncontroversial, keeping the limitations of this tariff characteristic in mind is important. The maximum possible subsidy is small. . .a household must use the entire first block of water to receive the full subsidy. As a household reduces its water use, it receives a smaller subsidy." The Political Economy of Water Tariff Design, at 223.

[96] To this extent, a deep but narrow discount addresses a paradox identified by World Bank researchers within a Lifeline context. The World Bank analysis of the distributional incidence of utility subsidies through the grant of a universal lifeline (i.e., an inverted bock rate not targeted based on income or other demographic factors) identified an inherent conflict presented by Lifeline subsidies. On the one hand, the use of an inverted block rate will deliver benefits primarily to the poor only in those instances where the poor have lower consumption than do the non-poor. On the other hand, if the poor *do* have lower consumption, they are likely to receive a proportion of benefits lower than their proportion in the overall population.

> When the poor do in fact consume less than the population as a whole (and when nearly all residential customers are subsidy recipients), this factor tends to *decrease* the size of the total subsidy received by the poor recipients relative to the total subsidy received by the population as a whole. Ironically, this means that the less the poor consume relative to the non-poor, the *less likely* the subsidy is to deliver the bulk of the benefits to the poor.

Distributional Incidence, at 14.

[97] This increase in consumption would not arise because of price elasticity, it arises as a consumer may seek to exhaust the dollars of available discount by increasing the use of the low-priced kWh to the maximum allowed. Even if such consumption occurs, however, as discussed elsewhere, overall systemwide consumption will decrease due to the lower per household decrease attributable to higher prices, and the much larger population experiencing those price increases.

use of deepening the rate of the price reduction, but narrowing its scope, thus has distinct trade-offs in the process of inclusion (of low-income households) and exclusion (of non-low-income). As discussed elsewhere, the decision for the utility is how much over-inclusion of non-poor is acceptable in order to expand the reach into the poor community, when Lifeline availability is usage-based rather than demographic-based?

The key conclusion from these experiences is that a deep, but narrow, initial block must be supported by empirical considerations. If rates are relatively low with which to begin, for example, an initial block may not provide sufficient opportunity for rate relief to occur through a deep, but narrow, price reduction. Similarly, if a substantial number of low-income customers use electricity for space heating, a deep, but narrow, price reduction in the initial block may still be offset by higher prices in the tail blocks. The structure of the size and pricing of the second block relative to the first block must constantly take into account this break-even point.

3.3.3 Supporting access vs. supporting usage

A decision to provide deeper, narrower, discounts is also supported by lessons learned for the pricing of water in developing countries. At first blush, discussions about water subsidies in third world countries may seem to have little applicability to Quebec. Extensive research, particularly by the World Bank,[98] concludes that Lifeline rates [or inverted block tariffs] have little place in a developing country. This conclusion is based primarily on two observations:[99]

- The need in developing countries is for improved access to the utility infrastructure, not for subsidized consumption.[100] Rather than having metered electricity to provide heat, consumers gather wood and other fuel. Rather than having piped water, consumers use communal pumps. The need is for subsidized access rather than subsidized usage.

- Given the lack of connection to the utility infrastructure, Lifeline (or inverted block rates), made universally available based on usage levels, nonetheless overwhelmingly exclude the poor (by not improving access to the system). Since having low-priced usage provides no benefit to a customer not connected to the system with which to begin, inverted block rates overwhelmingly disproportionately deliver benefits to the higher-income households that have the system hook-ups.

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[98] This research is cited throughout this report.
[99] "Because more nonpoor than poor people use clean network energy, there will likely be leakage problems. One solution is to design a block structure that includes fixed fee for a very low minimum needs level of consumption followed by a significantly higher price for following blocks." Julian Lampietti and Anke Meyer (2003). *Coping with the Cold: Heating Strategies for Eastern Europe and Central Asia's Urban Poor*, World Bank Technical Paper No. 529 (Europe and Central Asia Environmentally and Socially Sustainable Development Series), at 24, World Bank: Washington D.C. citing, Lovell, L. et al. (2000). *Maintaining Utility Services for the Poor—Policies and Practices in Central and Eastern Europe and the Former Soviet Union,* World Bank: Washington D.C.
[100] This need can be beneficially compared to the U.S. Federal Communications Commission (FCC) Lifeline (subsidized consumption) and Link-up (subsidized access) programs.

It might first appear, and the World Bank itself concludes, that these observations do not apply to utilities serving developed countries. It would seem, however, that lessons might nonetheless be learned for purposes of program design. The issue of "access" to an electric grid such as Hydro Quebec arises not due to the lack of connection to the grid but rather from service disconnections due to nonpayment. A Lifeline rate might help address that issue.

If the objective of Lifeline is not broadly to alleviate the hardship of home energy bills, but rather to preserve *access* to the system, a Lifeline equivalent might involve offering limited service at deeply discounted prices, to persons otherwise facing the disconnection of service. While the offer of such service would not, unto itself, answer the question of how much service should be offered for the limited service, or what the depth of the discount should be, such a program would have all the elements of a narrow, but deep, Lifeline rate.[101]

In sum, considerable attention is devoted to how to determine the rate differential between the first and second blocks in a Lifeline rate structure. Making a reasonable decision on that differential is not only necessary, but reasonable. The price differential is largely what governs the "break-even point" for a Lifeline customer, that level of consumption at which the customer stops becoming a net recipient of benefits. The break-even point occurs when the increased price of usage with the second block of consumption exceeds the decreased price of usage in the first block.

The difference in price between the first and second block, however, is affected as much by the size of the initial block as it is by the price charged to either the first or second blocks. Indeed, legitimate reasons exist why *more* attention should be devoted to determining the scope of the reduced priced in the first block before determining the depth of the reduced price.

Moreover, if one defines the objective of the Lifeline as preserving access to service, rather than merely alleviating the hardships associated with high electricity prices, additional options exist to offer deep, but narrow, Lifeline rates within an inverted block rate structure.

[101] In order to maintain consistency with the inverted block rate nature of such a program, the revenue foregone would be collected from the tail block of the non-discounted service.

4 The Experience of Other Jurisdictions with Universal Lifeline and Related Rate Structures

This purpose of the section below is to provide summaries of various Lifeline/inverted block rate structures that exist throughout the developed world. The goal is to look beyond the United States and Canada to determine whether there are lessons that can be derived and applied to a deliberation of whether, and if so how, to develop a Lifeline/inverted block rate. The rates and programs are not set forth as models to emulate so much as they are set forth as generating important insights into some aspect of the design and operation of a Lifeline/inverted block rate tariff.[102] In some instances, low-income affordability programs other than Lifeline/inverted block tariffs are discussed where important insights can be drawn from their inclusion.

This discussion of the experience of other jurisdictions with universal Lifeline rates is intended to respond to several inquiries.

- The discussion will first generally describe the rate design to be reviewed. While the intent is to focus on universal Lifeline rates, in those instances where the rate design is something other than a universal Lifeline, that will be noted;

- The public policy objectives of the rate design will be identified. While the rate designs included in the discussion below were not supported by specific quantitative goals (*e.g.*, to reduce bills by $x or to reduce bills by x%), each jurisdiction articulated the ***purpose*** for implementing the rate design it did;

- The date of introducing the rate design, along with the industry events that can reasonably be associated with its introduction. While the United States universal Lifeline rates can be associated with substantial rate fly-ups in the late 1970s, for example, the rate designs in Europe and South Africa can be associated with public policy concerns over the scarcity of natural resources (*e.g.*, water, energy).

- The "market environment" is noted where relevant. While the move to a competitive market influences the rate design decisions in Europe and Australia, for example, it is the move to a privatized industry that is significant in South and Central America;

For each jurisdiction, the impact of the universal Lifeline rate design on low-income households is noted, where possible, along with the reactions of other stakeholders.[103]

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[102]The lessons from many of these programs have been incorporated into the various discussions presented earlier in this paper.

[103] Much of the discussion of impacts is contained in the discussion presented in the preceding chapters.

4.1 United States

Much of the learning about Lifeline/inverted bock rate structures in the United States was accomplished in the late 1970s and early 1980s as the U.S. engaged in a nationwide deliberation over appropriate rate designs for electric utilities. During that time, the federal government had mandated, through a statute known as the Public Utility Regulatory Policies Act of 1978 (PURPA), that each state regulatory commission "consider" designated rate design structures. While some of the research discussed below is dated to that extent,[104] the substance of much of the research remains valid today.

At the time PURPA was enacted, the United States was moving into a period of significant capacity expansion. Moreover, it had become apparent that generating plants had reached both their technological limits of getting bigger and their economic limits of producing increasing economies of scale. It was evident that the construction of additional generating stations would generate not only additional electric price increases, but *substantial* electric price increases. These issues involving base load generation construction were compounded by the fly-up in the price of oil, used as a peaking fuel, caused by geopolitical and environmental factors external to the electric industry itself.

A series of initiatives implemented by various utilities throughout the United States provides valuable insights into what lessons should be considered in deliberations over whether and/or how to pursue a Lifeline rate.[105] The move to an inverted bock rate tariff in the United States today has not been prompted so much on social equity grounds, as it has been based on environmental/energy efficiency grounds.[106] Though not explored in detail, for example, the

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[104] Indeed, the inverted block rate tariffs that have been approved in more recent years appear to be neither supported by similar empirical analysis nor empirically evaluated to assess their impacts.

[105] Much of the information about specific programs below is derived from a study performed by Cleveland State University for the U.S. Department of Energy (DOE). See, Cleveland State University (1980). *Lifeline Electric Rates and Alternative Approaches to the Problems of Low-Income Ratepayers: Ten Case Studies of Implemented Programs*, DOE/RG/1006-02, National Technical Information Service: Washington D.C. This report is the second volume of a three-part series. The first volume is titled: Cleveland State University (1980). *Lifeline Electric Rates and Alternative Approaches to the Problems of Low-Income Ratepayers: Ten Case Studies of Rejected Programs*, DOE/RG/1006-001, National Technical Information Service: Washington D.C. The third volume is: Cleveland State University (1980). *Lifeline Electric Rates and Alternative Approaches to the Problems of Low-Income Ratepayers: A Cross-Program Analysis*, DOE/RG/1006-003, National Technical Information Service: Washington D.C.

[106] Consider the New England Demand Response Initiative (NEDRI), a consortium of industry, environmental, consumer and government stakeholders. In a recent recommendation that New England regulators adopt inverted rates, NEDRI stated:

> Inverted rates are used extensively in the Western states, including Arizona, California, Idaho, and Washington. Load research there has indicated that upper-block usage in the summer is associated with air conditioning loads, and upper block demand in the winter is associated with space heating. Both have very high coincidence factors and drive the seasonal system peak demands. Therefore inverted rates, properly designed, will produce much larger percentage reductions in peak demand than in energy sales.
>
> Vermont used inverted rates as a method to distribute a limited supply of low-cost hydroelectric power to residential consumers in the past. The approach being described here is not based on differential resource costs, but rather on the inferior load factor and load shape of upper block usage in the summer months

recent *National Action Plan for Energy Efficiency* identified the utilities (both water and electricity) listed in the table below as using an inverted block rate structure.

Partial List of Utilities with Inclining Tier Residential Rates	
Utility Name	State
Florida Power and Light	Florida
Consolidated Edison	New York
Pacific Gas & Electric	California
Southern California Edison	California
Arizona Public Service Company	Arizona
Sacramento Municipal Utility District	California
Indiana Michigan Power Company	Michigan
Modesto Irrigation District	California
Turlock Irrigation District	California
Granite State Electric Company	New Hampshire
Vermont Electric Cooperative	Vermont
City of Boulder	Nevada
SOURCE: National Action Plan for Energy Efficiency, Table 5-1, at 5-6, U.S. Environmental Protection Agency: Washington D.C.	

Unfortunately, empirical analysis, either in a before-the-fact justification of the decision to use such rate structures, or in an after-the-fact evaluation of the rate structures *vis a vis* their objectives, is not available.

Having noted these contemporary examples of inverted block rate tariffs, the discussion below turns to Lifeline rates that have been used and empirically assessed in the United States.

4.1.1 Boston Edison: Massachusetts

Boston Edison Company, a moderate size electric company, established a "Lifeline" rate in 1975 through the imposition of a rate freeze on small consumption.[107] Boston Edison set its rate freeze at 384 kWh per month. The 384 kWh threshold was established when the Massachusetts Department of Public Utilities (DPU) determined that this was the average residential consumption. It was adopted in "recognition of the fact that average residential customers did not significantly contribute to peak load growth and therefore should not bear the cost of additional investments."[108] The freeze was in effect for somewhat over 2 ½ years.

> when the New England bulk power system experiences its peak demand. In this sense, an inverted rate is a surrogate for a time of use / critical peak pricing scheme, particularly applicable to systems without advanced metering in place for residential consumers.

New England Demand Response Initiative (2003). *Pricing, Metering and Default Service Reform*, NEDRI: Boston (MA).

[107] According to one assessment of the Boston Edison program, "of all the programs being considered, this probably resembles the conventional lifeline rate the least, since the residential rate structure is still a declining block and the freeze was only in effect for a relatively short period of time. The Commission agreed in principle with the rate structure proposed by the company" (which was a declining block rate). Ten Case Studies of Implemented Programs, at 11.

[108] Ten Case Studies of Implemented Programs, at 1.

The Massachusetts DPU adopted the Boston Edison rate freeze in lieu of an income-based discount. The DPU found that evidence regarding a connection between income and usage was "inconclusive." Instead, in freezing rates for all usage at or below 384 kWh, the DPU found that residential consumption "had remained relatively steady" and had thus not contributed to the growth in energy and demand causing the need for new capacity expansion. Accordingly, the DPU held that "a portion of residential usage which has not contributed to the increase in demand should not be required to bear its cost."[109]

Three years later, when the freeze expired, the DPU still maintained its Lifeline structure. When the Massachusetts commission imposed a "summer surcharge" of 1.6¢ per kWh on residential usage, it exempted the first 350 kWh from that surcharge. The DPU based its decision on a consideration that:

> (1) [an] increase in air conditioning load was the primary cause of growth in summer peak demand; (2) the residential customer with usage of 350 kWh is less likely to be using air conditioning than high users, therefore those low users are not contributing to summer peak consumption or demand.[110]

It should be acknowledged that while the Boston Edison rate freeze may have given low-income advocates a political victory, the rate freeze, itself, really provided very little economic advantage to residential customers. The benefits generated by the rate freeze for the average residential customer were later calculated to be $1.00 or less per month. "Unlike other targeted lifeline programs, this freeze did not result in a reduction of rates per se; rather, it may have provided a psychological benefit to customers whose electricity bills were staying the same when the cost of everything else rose. . .The rate freeze may have been more beneficial as a signal to those classes who caused the need for new capacity, rather than a serious attempt to aid low-income people in paying their bills."[111]

4.1.2 Florida Power and Light: Florida

Florida Power and Light implemented a "conservation rate," even though not doing so through a rate freeze such as in Massachusetts. Also done within the context of a general rate case, Florida Power and Light requested that a rate increase be placed primarily on the second block of a two block residential rate. In this fashion, the company argued that it created an "incentive for residential customers to conserve."[112] Bills increased for usage over 750 kWh per month. "The inverted rate. . .would signal the consumer to conserve resources, arrest demand growth, and postpone the need to add to the generating plant, thus keeping costs lower in the long run."[113]

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[109] Ten Case Studies of Implemented Programs, at 4 – 5.
[110] Ten Case Studies of Implemented Programs, at 5. While the Commission based its decision on the relationship between usage and cost-causation, it also took explicit note of the impact of its decision on low-income customers. "The rationale given for using the average consumption figure was this: low-income consumers had probably reduced their usage out of necessity and more affluent users probably increased their usage with items such as air conditioning. Since large users were not reducing the need for additional capacity, only average or below average residential usage was exempted from the increases." Id., at 12.
[111] Ten Case Studies of Implemented Programs, at 12, 25.
[112] Ten Case Studies of Implemented Programs, at 79.
[113] Ten Case Studies of Implemented Programs, at 81.

Importantly, the Florida Public Service Commission (PSC) distinguished its conservation rate from any effort to assist low-income households avoid the hardships associated with unaffordable electric bills. In a subsequent discussion of a low-income Lifeline, the Florida PSC explicitly stated:

> This lifeline rate, however, should not be confused with the energy conservation rate approved by us. The two are completely different. The latter is an attempt to price electricity in a manner so as to increase the incentive to conserve electricity. . .It is important to note that that this incentive to conserve is not limited to a specific group, such as people in low-income, but is available to *everyone* (emphasis in original). . .It is not a form of welfare.[114]

Even though the conservation rate was not viewed as a mechanism through which the hardship of low-income unaffordability could be addressed,[115] the staff of the Florida PSC nonetheless evaluated the rate to determine the bill impact of the new conservation rate relative to what bills would have been without the new conservation rate structure. The staff considered the impacts relative to income status.

> Although the results were not very conclusive, they do indicate that while the inverted rate generally helps low-income customers (resulting in higher bills for high-income customers), there are cases in which it increases the burden on the poor and benefits those who are not needy. . .The [staff] study also found high income/low usage customers are considerably more prevalent than high usage/low-income customers.[116]

4.1.3 Iowa-Illinois Gas and Electric Company: Iowa

Iowa-Illinois Gas and Electric Company first proposed a "small use" rate in 1978 as part of a general rate case in which it sought to bring a new power plant into rates. The Iowa-Illinois rate "was based on the cost of serving small residential customers, and was designed to provide a rate break for small users to encourage conservation during summer months."[117] The rate was available to residential customers in single-family, individually-metered homes whose daily usage did not exceed an average of 15 kWh per day for the customer's two highest billing periods from June through September.[118] Any residential customer that did not use air

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[114] Ten Case Studies of Implemented Programs, quoting Florida PSC Order No. 7843, Docket No. 760727-EU, at 48.
[115] "Although the rate may benefit low-income persons, it has no direct relation to a person's ability to pay, either in its structure or in its effect. In fact, this was never discussed as an explicit objective of the rate." Ten Case Studies of Implemented Programs, at 100.
[116] Ten Case Studies of Implemented Programs, at 91.
[117] Ten Case Studies of Implemented Programs, at 103.
[118] Ten Case Studies of Implemented Programs, at 103. A customer must take electricity during every month of the season in order to qualify for the rate, although if a customer moved into a previously occupied home, the usage from the initial customer would be imputed to the new resident.

conditioning, Iowa-Illinois found, would, in general, meet the 450 kWh monthly usage (a daily average of 15 kWh).[119]

The Iowa-Illinois rate provided a discount of roughly 16% off of the standard residential rate.[120] Customers taking service under the conservation rate saved roughly four dollars ($4.00) a month.[121]

Iowa-Illinois justified its small use rate on a cost basis. The cost justification, in turn, was based on a customer load survey in which customers were divided into five usage levels. According to the Iowa-Illinois study:

> It was found that customers in the first strata had very even usage patterns: in the summer, they did not incur the same proportion of peak capacity costs as larger users. It was also found that large-use customers have about twice the amount of capacity-related costs per kWh as do small-use customers. The survey further demonstrated that the small-use customers generally use more energy in the winter (for space heating) than other customers, which is also beneficial to system demand since the system is summer-peaking.[122]

Ironically, consumer groups in Iowa were not supportive of the small use rate introduced by Iowa-Illinois. "There was some feeling by consumer groups in both Iowa and Illinois that the initiative of the small-use rate was an attempt by Iowa-Illinois Gas and Electric to avoid the issue of Lifeline rates which were under consideration in both states at the time."[123] One local consumer group opposed the rates, claiming that the rate difference (16%) was insignificant and that the small-use rate "was imposed as a poor substitute for lifeline."[124] Moreover, the consumer group noted, small users still paid a rate increase, even if smaller than the rate increase imposed through the standard residential tariff (9.5% vs. 24.3%).

4.1.4 Northern States Power Company: Minnesota

The Minnesota state Public Service Commission (PSC) ordered a "conservation rate break" in 1978 to be implemented by Northern States Power Company.[125] The Conservation Rate Break provided a waiver of the $2.50 fixed monthly customer charge for any residential customer with monthly usage of 300 kWh or less.[126]

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[119] Ten Case Studies of Implemented Programs, at 112.
[120] The discount provided a monthly customer charge of $2.05 rather than the standard customer charge of $2.40 per month. Moreover, the conservation kWh charge was set at a flat rate of 4.10¢ per kWh. In contrast, the standard residential rate was 4.92¢ for all summer consumption; winter consumption was priced at 4.92¢ per kWh for the first 500 kWh and 3.80¢ per kWh for all usage over 500 kWh.
[121] Ten Case Studies of Implemented Programs, at 120.
[122] Ten Case Studies of Implemented Programs, at 109.
[123] Ten Case Studies of Implemented Programs, at 109.
[124] Ten Case Studies of Implemented Programs, at 113.
[125] Ten Case Studies of Implemented Programs, at 249.
[126] Half of the monthly customer charge ($1.25) was waived for customers with usage from 301 kWh to 400 kWh each month.

Unlike the Iowa-Illinois rate, the Minnesota PSC did not seek to rigorously justify its Conservation Rate Break on empirical grounds. In responding to objections that the Conservation Rate Break was not cost-based, the PSC rejected the argument that it was violating the principle that each class of customers should pay "their own full cost of service." This "theory" of cost-based ratemaking, the PSC said, was "based on an unstated set of assumptions, none of which was true in the real world."[127] According to the PSC:

> It assumes, falsely, that "costs" can be defined, measured and allocated "correctly," or at least in a way which reasonable persons can agree upon as "correct."
>
> It assumes, falsely, that the costs measured and allocated are the marginal costs, where as the costs in evidence here, and typically used in rate regulation, are embedded or historic costs as to which the economic theory of efficiency maximization is inapplicable.
>
> It assumes, again falsely, that "all other things are equal," in an ideal world where resources are equally distributed. It therefore does not deal with the harsh moral and political realities of a world in which some people will be unable to afford the essential services of life and others have such a superfluity of resources that no pricing signal can affect the profligacy of their use of those services.[128]

Without citing any cost or empirical study, the Minnesota PSC then decided that the customer charge waiver would be an "obvious reward for conservation [that] should attract considerable attention to the actual amounts of electricity being consumed by each customer."[129]

The Conservation Rate Break attracted the participation of more than one-third of Northern States Power's residential customers. According to a subsequent evaluation, the Conservation Rate Break "practically administer[ed] itself. If a customer maintains electricity consumption below 400 kWh per month, his bill is automatically credited with the appropriate amount."[130] Moreover, even though not limited, by design, to any particular demographic group, the subsequent evaluation found that:

> 42% of the beneficiaries are over 61 years of age and 52% have an annual income of less than $10,000. Although this program is not targeted, and is designed primarily to promote conservation, a substantial number of beneficiaries of this rate break are members of two of the groups that are usually considered to be in need of assistance –the low income and the elderly.

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[127] Ten Case Studies of Implemented Programs, at 250.
[128] Ten Case Studies of Implemented Programs, at 250, quoting Minnesota PSC Amended Order, Docket No. E-002/GR-77-61, at 34.
[129] Ten Case Studies of Implemented Programs, at 254.
[130] Ten Case Studies of Implemented Programs, at 259.

As in other states, a subsequent evaluation of the Minnesota Conservation Rate Break concluded that "the actual benefits provided by this program are, by many standards, not significant."[131] Nonetheless, it quoted "one senior citizen" speaking in favor of the program who asserted "even two or three dollars is important to a person who is giving up meals to pay utility bills."[132]

4.1.5 Los Angeles Lifeline: California

The City of Los Angeles adopted a Targeted Lifeline rate effective in November 1975. It extended the rate to all customers meeting two criteria: (1) the head of household was age 62 or older; and (2) the household's annual income was $7,500 or less. Within a year of enactment, the City reported that 90,000 of the estimated 110,000 eligible households were taking service on the Lifeline rate.[133] The Los Angeles Lifeline was not a universal Lifeline rate. "The eligibility was limited to lower-income senior citizens in order to concentrate the benefits on those felt to be most needy. A broader criterion of eligibility –for instance, all low-income users—would have been considerably more costly and would have given benefits to a considerable number of customers at higher income levels."[134]

A subsequent Rand Corporation review of this Los Angeles Lifeline rate found validation of the assertion that low-income and low-use were positively associated. Noting that "the correlation is not perfect, of course," the evaluation found nonetheless that "broadly speaking, there is a positive correlation between income and monthly consumption."[135] The evaluation reported:

> Over 70% of households with annual income below $7,500 per year consume less than 200 kWh per month. This compares with a systemwide average of almost 400 kWh/month in [Los Angeles]. Only 17% of households with income above $15,000 consume less than 200 kWh per month. . .[136]

The Rand Corporation study of the Los Angeles Lifeline rate found further that low-income households had lower price elasticities:

> These smaller (closer to 0) elasticities mean that households with modest appliance holdings and households headed by low-income senior citizens will demonstrate less adjustment, proportionately, to changes in price than other customers. If a price rise occurs, households will reduce their usage very little, and instead will have that much less money left over for consuming other goods. Conversely, a price fall will lead [to] relatively little increased electricity use and will amount to extra dollars available for other uses.[137]

[131] Ten Case Studies of Implemented Programs, at 259.
[132] Ten Case Studies of Implemented Programs, at 259.
[133] An additional unspecified number were thought to be either master-metered or renters paying for service as a bundled part of rent.
[134] Jan Paul Acton (1980). *Electricity Prices and the Poor: What are the Effects and What Can We Do?*, at 15, Rand Corporation: Santa Monica (CA).
[135] Electricity Prices and the Poor, at 7.
[136] Electricity Prices and the Poor, at 7.
[137] Electricity Prices and the Poor, at 10.

One impact of the Los Angeles Lifeline Rate was the promotion of a conservation impact overall on the Los Angeles electric system, even though conservation was not the primary objective of the rate. This result arose because of the combined impact of two factors: (1) the higher price responsiveness of higher use, higher income customers; and (2) the greater number of higher use, higher income customers.

> The Los Angeles plan was financed by raising the bills of all other residential, commercial and industrial customers by 1.8 percent. Because higher volume residential users (with their greater appliance holdings, etc.) are estimated to be more price responsive, we have an interesting conclusion from the Los Angeles experience. . .Sullivan estimates that 33,000 of the Lifeline households each increased their use by 6.5 kWh per month (after adjusting for weather), due to the 50 percent discount on their first 180 kilowatt hours of use each month, while the remaining Lifeline customers and some 900,000 nonlifeline customers reduced their use about 3 kilowatt hours on average in response to their 1.8 percent higher bills. In net, it appears that residential use in Los Angeles actually went down as a result of the Lifeline rate because of the greater price responsiveness of higher volume users and their large number.[138]

While the usage of Lifeline participants increased by 214,500 kWh, in other words, the usage of all other customers *decreased* by nearly 2.9 million kWh.

4.1.6 California's State Lifeline Rate

Electricity companies in the State of California have operated under inverted block rates for nearly a decade. In 2001, the California Public Utility Commission introduced an inverted block structure consisting of five blocks.

> Blocks consist of a so-called "base" rate (determined by consumers' electricity needs) to which successively larger percentages of the block rate are added as time goes by (first from 101 to 130%, then from 131 to 200%, then from 201 to 300%, and finally, over 300%). The per unit price of energy offered by the Southern California Edison Company varies from 13.009 cents per kWh (the minimum block rate) to 25.993 cents per kWh (the maximum block rate)."[139]

California did not design its Lifeline rate to target the reduced rate toward low-income customers.[140] The California experience thus allowed analysts to empirically assess the arguments that combining income status and low use status failed to appropriately deliver

[138] Electricity Prices and the Poor, at 13.

[139] "Determining the threshold at which the per unit price of energy begins to rise is the key to inverted rates." Temurjan Nasirov, et al. (August 2007). *The Outlook for the Development of Renewable Energy in Uzbekistan*, at 53, United Nations Development Program: Tashkent, Uzbekistan.

[140] Indeed, California has enacted a separate discount program (California Alternative Rates for Energy: CARE) for low-income customers.

benefits exclusively to low-income customers. One evaluation of the pre-2001 rates, for example, examined 1985 and 1986 residential monthly billing data for customers in the PG&E service territory. The evaluation compared the patterns of usage for low-income and non-low-income customers relative to the baseline tier provided by the "baseline" rate. It found that "for basic baseline service, 46 to 48% of low-income households consume solely within the baseline tier. Basic baseline service also provides a price discount for 24 to 27% of the non-low-income households (which represented a much greater number of households than those in poverty)."[141]

4.2 Australia

In 2003, Energy Australia introduced an inclining block rate tariff for its retail customers.[142] The primary reason for introducing this rate structure, along with the subsequent consideration of inclining block rates for other New South Wales electric distribution companies, was grounded in the "rapid growth in summer peak demand relative to overall energy consumption."[143] In turn, this growth in peak demand was attributed to a dramatic increase in air conditioning, particularly in the residential sector. That growth gave rise to cost and capacity procurement issues.

> In the absence of any price or non-price demand management measures, servicing this growing peak demand will require greater network capacity, which might be drawn upon for a limited amount of time through the year. For example, Energy Australia currently provided 10 per cent of its network capacity to meet its peak demand that is utilized less than 1 per cent of the year.[144]

The New South Wales regulatory commission (Independent Pricing and Regulatory Tribunal: IPART) considered inverted block rates as one pricing mechanism to help address this growth in summer peak demand. "Price and nonprice demand management initiatives are strongly supported by the Tribunal."[145] Noting that to date, "there has been little discussion of the properties of inclining block tariffs, aside from [their] likely impact on customer bills, assuming current levels of consumption," the staff of the IPART developed an assessment of the issues that it believed needed to be considered.

The Staff consideration of inverted block rates was done within the context of the introduction of full retail competition into the Australian electricity market. However, despite this move to

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141 Lifeline Rates in California, at 127. The evaluation found further that "the low-income capture rate is 54% in the summer and 73% in the winter. Similarly, 42% of the non-low-income households consume in the first tier during the summer and 64% in the winter." Id., at 127 – 128.

142 In New South Wales, the "Distribution Network Service Providers" (DNSPs) do not have a direct relationship with retail customers. Instead, the DNSP charges retailers for electricity based upon tariffs specific to each customer class. The retailer then passes on those network costs, along with other appropriate charges, to the retail customer. If a DNSP has an inclining block rate structure, therefore, the retail electricity provider may, but need not pass on those charge through a retail inclining block tariff.

143 IPART (2003). *Review of Gas and Electricity Regulated Retail Tariffs: Issue Paper*, Discussion Paper DP-70, Independent Pricing and Regulatory Tribunal: Sydney (AU).

144 Inclining Block Rate Tariffs--NSW, at 2.

145 Inclining Block Rate Tariffs--NSW, at 2.

competition, rates for small users remain regulated by the Regulatory Tribunal. A "small user" is one using less than 160 mWh per year (equivalent to an annual bill of about $20,000).

The IPART discussion was predicated on the observations, reported by two of the major electric utilities serving New South Wales, that the existing rate schedule did not accurately reflect the costs that residential air conditioning load imposed on the system. Inverted block rates were proposed to redress this failure. In seeking to redress these price-reflectivity problems with non-inverted block rates, the IPART discussion found, "the size of the first block is a critical factor influencing how the inclining block tariff might impact on customers."[146]

- Energy Australia proposed a higher block charge starting at 7,000 kWh of annual consumption, with a 25 percent differential between the first and second blocks.

- Integral Energy proposed a higher block charge starting at 5,000 kWh of annual consumption, with a roughly 40 percent different between the first and second block.

- The Victorian utilities of CitiPower, TXU and United Energy have inverted block rate structures with their higher rates starting at 4,080 kWh annually.[147]

Each of these utilities, all of which bill on a quarterly basis, proposed simply to divide the annual consumption blocks into quarters as the means of applying their proposed inclining block rates.

In both the Energy Australia and Integral Energy proposals, the price in the first block would be <u>*lower*</u> than the equivalent flat energy rate. If customers remain within the first consumption block, in other words, those customers would face a bill that is less than they would have experienced under the existing flat rate.[148] Energy Australia, in a presentation to the Australian Pricing Issues Consultation Group (PICG), estimated that all residential customers with consumption less than roughly 8,000 kWh annually –roughly 83 percent of its customer base--would experience lower bills. In contrast, Integral Energy estimated that the break-even point for its inclining block rate would be roughly 7,500 kWh annually, with customers at exactly this consumption level facing a price increase of 0.3 percent.[149]

In contrast to the favorable consideration of inclining block rates presented to IPART (in New South Wales), this ratemaking concept did not receive a similar reception in Melbourne. In 2005, the Minister for Energy Industries and Resources established a "Committee of Inquiry into Financial Hardships of Energy Consumers." Made up of a broad range of stakeholders, the Committee was charged with assessing "the impact on consumer hardship of the policies and practices of all energy retailers, Government departments and agencies, and financial counsellors and welfare agencies." In addition, the Committee was charged with recommending "a broad

[146] Inclining Block Rate Tariffs--NSW, at 11.
[147] United Energy customers face a "more complicated" structure than do other Australian customers. United Energy customers may face <u>*either*</u> "a single rate tariff with a summer demand incentive charge <u>*or*</u> a winter economy block tariff with a second block commencing at 4,080 kWh a year and a lower second block charge in winter." Inclining Block Rate Tariffs--NSW, at 14 (emphasis added).
[148] Inclining Block Rate Tariffs--NSW, at 12.
[149] This takes into account the lower charges for consumption below 5,000 kWh annually and higher rates for all other consumption.

allocation of responsibility for mitigating against energy hardship between retailers, Government and consumers."

One recommendation submitted to the Committee was a proposal "to reduce the standing charge and the price of initial consumption, with higher rates for additional levels of consumption."[150] The Final Report of the Committee, however, found:

> There are some significant problems with this proposal:
>
> - It is doubtful it would help the customers in greatest need. To maintain the current total retailer revenues, the overall cost of electricity would fall for households that are smaller than average (single person households and holiday homes); would be about the same for two-person households, and would rise for larger households. From the analysis presented by PIAC and other submissions,[151] many households in financial hardship are either single parents with children or low-income households with children – groups that would see increases in electricity costs under this proposal.
> - It creates new cross-subsidies in electricity prices, moving away from current efforts to have transparent, cost-reflective prices;
> - A corollary of the latter point is that, in a competitive market, the new prices would encourage retailers to target particular customer groups (especially, larger, well-off households) more than they do at present, with consequences for the effectiveness of competition, and on incumbent retailers' finances.[152]

The increasing block tariff proposal was thus rejected in Melbourne.

4.3 Europe

Seeking to discern lessons for Hydro Quebec from the use of inverted block rates in Europe presents an array of issues that must be considered. On the one hand, there is a distinct difference between the use of utility subsidies in the developing countries of eastern Europe and their use in developed countries. In addition, there is a difference between the use of utility subsidies in the southern European countries and the remainder of Europe. Finally, some European countries use inverted block rate structures for pricing electricity while others use such tariffs for water pricing. Within this context, a sampling of European uses is presented below. The sampling demonstrates actual experience in the application of the principles discussed in the previous sections of this report.

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[150] Committee of Inquiry into the Financial Hardship of Energy Consumers (September 2005). *Committee of Inquiry into the Financial Hardship of Energy Consumers: Main Report*, at 84, Melbourne (AU). The proposal was advanced by the Victorian Council of Social Services, the Social Research Institute, and the Financial and Consumer Rights Counsel.
[151] This material was not further expanded upon, other than this reference.
[152] Committee of Inquiry, at 84. PIAC is the Public Interest Advocacy Center.

4.3.1 Electricity

European electric companies operate within a competitive system. While the European Community prescribes certain standards, including Public Service Obligations (PSOs) for European electric retailers to meet, these companies operate within a broad public policy of allowing the market to determine pricing levels and structures. One intent, as well, is for European electric providers to operate on a pan-European basis.

Despite this public policy, electric competition has not developed in Europe, particularly for residential customers. Nonetheless, the regulatory policy of European policymakers is to defer to the market for the pricing of residential electricity.

4.3.1.1 Hungary

Hungary adopted an inverted block rate tariff for electric service in 1997. The Hungarian rate consisted of three blocks. The first priced a minimal amount of electricity (0 – 50 kWh/month/household), with the second reaching from 50 kWh up to 300 kWh. The third block was for all consumption exceeding 300 kWh per household per month.[153] One of the major inquiries in Hungary was whether to adopt a two-block, or a three-block, inclining block tariff.

The primary concern in Hungary was not environmental, but rather to deliver rate relief to lower-income households. The first block was priced 17% below the second block, with the third block priced 16% above the second. Through this three-block structure, Hungary provided rate relief benefits to lower-income households at a reasonable cost. A subsequent World Bank evaluation of the Hungarian pricing scheme found that through the three-block structure, "poor households received 19.9% of the subsidy distributed (after netting out the impact of the negative subsidy. . .), producing a targeting ratio that is slightly better than random selection (16.7%).[154] The "negative subsidy" referenced is the above-cost pricing in the higher consumption blocks.

Adding the third block to Hungary's inverted block tariff only modestly increased the targeting of rate relief to lower-income households, but did so at considerable cost savings to the program. Without the substantially increased price in the third block in Hungary, a two-block tariff in Hungary "would have produced a targeting ratio of 16.1%, while spending 35% more in the process (with most of the extra spending going to the non-poor)."

Hungary's move to a three-block tariff, however, did not come without some cost in other aspects of the operation of the inverted block rate. One benefit that is produced by a two-block tariff, for example, is its high predictability.

> The predictability of the benefit decreases somewhat with the introduction of the third ("penalized") block, since actual electricity consumption fluctuates and even

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[153] Lazlo Lovel, et al. (September 2000). *Maintaining Utility Services for the Poor: Policies and Practices in Central and Eastern Europe and the Former Soviet Union*, at 14, World Bank: Washington D.C.
[154] Maintaining Utility Services for the Poor, at 14.

> low income families may get "penalized" occasionally. Even when the price discount is relatively high, the price distortion caused by a two-block lifeline tariff can be fairly low if the first block is kept sufficiently small so most consumers (including the poor) consume more than the first block (ensuring that the last unit of consumption is priced correctly). . .So, the impressive targeting performance of this tariff comes with a price tag—reduced coverage . . .[155]

4.3.1.2 Portugal

Portugal offers a limited Lifeline tariff to its "badly-off" customers.[156] The Portuguese Social Tariff is based on legislation relating to "consumer's rights embracing the protection of the more deprived," according to the Deputy Director-General of the Portuguese Energy Directorate. According to the Deputy Director:

> One of those principles is the "Equal treatment and opportunities" principle. It must be recognized that such a rule can not be understood as a principle of neutrality: on the contrary, it requires that people with very low income must receive appropriate positive discrimination. Otherwise, the aim of equality would be biased, or even, would be meaningless.[157]

The Social Tariff encompasses "a price-related policy pursued specifically to support the access to electricity by the more deprived households."

Despite the broad language, the actual benefit provided through the Portuguese Social Tariff is quite small. The maximum annual consumption allowed under the tariff is about 20% of the average consumption per household.[158] "The Social Tariff can thus be understood as fulfilling a response to the right of electricity supply for its more specific use, that is to say, lighting. But it does not respond to more energy consuming heating and cooking needs, satisfied by fuels."[159]

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[155] Maintaining Utility Services for the Poor, at 15. In addition, a subsequent evaluation argued, without empirical analysis, that, assuming that the third block is low-enough so that most non-poor households consume above the second block (and thus make a negative subsidy payment), there is a "price distortion." With electricity priced above cost, the analysis argued, consumers will move to conservation measures that are not merited by the true price of the electricity. Even this "price distortion" can be mitigated, however. Price distortion is thought to be inefficient when consumers respond to the marginal, rather than to the average, price signal inhering in an electricity rate. If price differences between blocks are small, it is less likely that consumers will respond to the price of the marginal unit of consumption. In contrast, however, "with a large. . .price jump between the first and second blocks and an effort to increase consumer awareness, it is likely that most households will recognize that they face the higher tariff for every additional kWh."

[156] Bento de Morais Sarmento, "Right of access to energy for badly-off consumers in the Portuguese distribution system," in Belgian Federal Ministry for Economic Affairs, *Right of Access to Energy, Environmental Protection and Opening of Electricity and Gas Markets*, proceedings of an Energy Conference, at 39, September 27 – 28, 2001, Brussels (Belgium).

[157] Right of access for badly-off consumers, at 39. This "equal treatment and opportunities" principle can be beneficially compared to the equal treatment requirement of Section 15 of Canada's Charter of Rights and Freedoms.

[158] Right of access for badly-off consumers, at 40.

[159] Right of access for badly-off consumers, at 40. According to Sarmento, the low usage threshold is justified, in part, by the overall low average consumption of electricity in Portugal. While the average residential consumption

In Portugal, the electricity bill is comprised of two components: (1) a fixed power charge; and (2) an energy consumption charge. The Social Tariff discounts only the fixed power charge. For a contracted power of 1.15 kVa, the social tariff is 0.40 Euros per month, while the standard residential tariff is 1.62 Euros per month. The Portuguese Social Tariff reaches about 0.1% of the overall population. These customers represent 0.01% of the total mWh of residential consumption, and about 0.001% of the total energy bill.

Despite its limited nature, the Portuguese Social Tariff illustrates the flexibility of structuring a Lifeline rate. Rather than applying to the entire energy bill, a Lifeline rate might be applied to a discrete portion of the bill. While in Portugal, the tariff was limited to the fixed power charge, other jurisdictions might apply a Lifeline tariff to the generation (rather than distribution) component of a bill.

4.3.1.3 Belgium

In contrast to the limited benefits identified for Portugal, Belgium (and in particular, the Flemish region of Belgium) provides more generous benefits. Before addressing the structure of the subsidy, it is important to note, however, that unlike the low consumption (and thus low bills) in Portugal, electricity prices in Belgium are among the highest in Europe. Only in Denmark, Germany, Italy and the Netherlands do residential customers pay more for electricity.[160] Part of these electricity costs are the costs which the Belgian distribution companies incur in fulfillment of their public service obligations.[161] The public service obligations include certain "social measures."

The Belgian "social obligations" involve a mixture of a universal Lifeline rate and a targeted Lifeline rate. On the one hand, the supply of electricity in Flanders incorporates a social obligation to provide *every* household with a prescribed amount of free electricity. This free amount is set at 100 kWh per household increased by 100 kWh per family member. On the other hand, the supply of electricity involves a further obligation to provided a targeted "social tariff," under which senior citizens and disabled customers receive the first 500 kWh they utilize each year for free.[162]

Clearly, however, this "free" electricity is not truly "free." As with any Lifeline rate, the revenue foregone by reducing costs in the initial consumption block must be paid by subsequent usage in higher blocks. In particular, the universal component of the Flemish Lifeline results in substantial dollar amounts being paid by higher users. According to one assessment of the

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in Portugal was 3,721 kWh per year in 1997, the average European Union residential consumption was 6,436 kWh per year. Id.

[160] Karolien Verhaegen, Leonardo Meeus and Ronnie Belmans (2005). *The Influence of Public Service Obligations on Distribution Network Tariffs*, Katholieke Universiteit Leuven: Kasteelpark Arenberg, Heverlee (Belgium) (presented to the Power and Energy Systems 2005 Conference, Marina del Rey, USA).

[161] The government "obligates" Flemish distribution utilities to budget for three different types of public service obligations: "social measures; measures to stimulate the rational use of energy, and to stimulate green energy." Influence of Public Service Obligations, at 2.

[162] Influence of Public Service Obligations, at 2.

Flemish social tariff, the cost of providing the 100 kWh each year free to all customers is the "most expensive" of the public service obligations, making up 9.45% of the total distribution budget.[163]

A similar water Lifeline system has been established in Flanders, where the free water allowance is granted per person rather than per household.[164] Flanders grants 15 cubic meters of water free per person per year.[165]

4.3.2 Water

Aside from the use of pricing to promote electric policy, the use of inverted block tariffs is becoming increasingly popular in many parts of Europe to pursue public policy with respect to water as well. In particular, not only are increasing block tariffs accepted for water pricing in Europe, "in the southern countries, an increasing block schedule (IB schedule) is the most widely used tariff structure" for water.[166]

According to one review of European water rates, the increasing block tariffs are used for social purposes rather than environmental or conservation purposes. The use of such schedules "outlines the fact that in the southern countries, social concerns are more important as far as water pricing is concerned than in the other countries as IB schedules are said to address equity problems arising from the allocation of a price of water."[167]

The use of inverted block rates is not exclusively to address "social concerns," however. The "demand management tariff systems" in Barcelona (Spain) are considered to be "one of the few outstanding examples" of the use of water tariffs to promote conservation. The Barcelona tariff was described as follows:

> In 1983, the system was changed from a minimum-charge without blocks or fixed charge into one with a fixed charge and two blocks. Encouraged by a drought in 1998, a third block was introduced with a much higher price for high consumption, giving big users an incentive to reduce their consumption. For equity reasons, the fixed charge is calculated according to characteristics of the house and the limits of the second block are adjusted to the household size.[168]

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[163] Influence of Public Service Obligations, at 3. The authors did not seek to quantify this statement, nor did they provide any empirical analysis of where the break-even point occurred.
[164] Peter Van Humbeeck (1999). *Water Pricing in Flanders: The 1997 Reform in the Domestic Water Supply Sector: Background and First Assessment*, in European Commission (1999). *Pricing Water: Economics, Environment and Society*, European Commission: Brussels (Belgium).
[165] Maria Salvetti (2005). *Incentive, Sustainable and Fair Pricing: A Trilogy Out of Reach?*, at 8, paper presented to the 45th Congress of the European Regional Science Association (Amsterdam). The "free" electricity and water approach should be compared, also with the Free Water Program adopted in South Africa.
[166] Eva Roth (2001). *Water Pricing in the EU: A Review*, at 7, European Environmental Bureau: Brussels (Belgium). The "southern countries" are defined to include Greece, Italy, Spain and Portugal.
[167] Water Pricing in the EU, at 7.
[168] Water Pricing in the EU, at 7, *citing*, OECD (1999). *The Price of Water: Trends in OECD Countries*, Organization for Economic Cooperation and Development (OECD): Paris (France).

The outcome of the Barcelona inverted block rate was to reduce household water consumption per capita by nine percent (9%) between 1991 and 1996.

4.4 The United Kingdom's "Social Tariffs"

The United Kingdom has implemented a national strategy setting forth goals for the elimination of fuel poverty throughout Great Britain and the three devolved administrations.[169] The goal is two-fold: (1) to eliminate fuel poverty in vulnerable households[170] by 2010; and (2) to eliminate fuel poverty in all other households by 2016. In the United Kingdom, "fuel poverty" is defined to include all households who must spent 10% or more of their income on home heating.

4.4.1 Overview of UK programs

The United Kingdom's Department for Environment, Food and Rural Affairs (DEFRA), the agency charged with administering the National Fuel Poverty Strategy, reported in its most recent annual progress report on the implementation of the Fuel Poverty Strategy that over three million households had been removed from fuel poverty in the United Kingdom since 1996.[171] Nevertheless, the 2005 estimates (the most recent available) indicate that over 2.5 million households remain in fuel poverty, of which 2.0 million are vulnerable households.

Not surprisingly, the efforts that resulted in this dramatic reduction in the number of households in fuel poverty have multiple components:

- The Warm Front program provides government funding for energy efficiency investments and benefit entitlement checks, the latter which seek to ensure that households eligible for public assistance actually apply for and receive those benefits.

- The Energy Efficiency Commitment (EEC) involves gas and electric suppliers meeting mandated targets for energy efficiency investments, with suppliers required by law to focus at least 50% of the energy savings on a priority group of low-income consumers.[172]

- The Office of Gas and Electric Markets (Ofgem), the national utility regulatory body, initiated its Social Action Strategy in 2005 and updates that Strategy annually.[173]

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[169] The three devolved administrations include Scotland, Wales and Northern Ireland.
[170] A "vulnerable household" is defined to include households with children, the elderly, sick, and disabled.
[171] Department for Environment, Food and Rural Affairs (DEFRA) and Department for Business Enterprise and Regulatory Reform (BERR). (2007). *The UK Fuel Poverty Strategy: 5th Annual Progress Report*, at 1, DEFRA: London (England).
[172] The population of low-income households and the population of households in fuel poverty overlap, but are not identical.
[173] Ofgem, however, in its Social Action Strategy, makes a key distinction in its role regarding addressing fuel poverty. Ofgem does not undertake actions "to help" fuel poverty households, but rather undertakes actions "that help" those customers. Richard Green (July 2000). *Regulators and the Poor: Lessons from the United Kingdom*, at 16, World Bank Institute on Governance, Regulation and Finance: Washington D.C. ("The regulators' most visible

Multiple reasons exist for the continuing existence of substantial fuel poverty in the United Kingdom. Recent increases in fuel prices[174] resulted in an increase of 1.0 million households in fuel poverty from 2004 to 2006. For every one percent increase in price, the British government estimates that 40,000 more households fall into fuel poverty.[175] Perhaps even more significantly, the 2007 annual progress report on the implementation of the Fuel Poverty Strategy acknowledged that:

> A further key reason for households remaining in fuel poverty by 2010 is that the majority of these households have extremely low incomes, such that energy efficiency measures alone are not always enough to take them out of fuel poverty.[176]

Energywatch recently concluded that the British government's "target to eradicate fuel poverty in vulnerable households by 2010 has been left looking unattainable."[177]

4.4.2 The UK's "Social Tariffs"

The offer of "social tariffs is one important component of the energy industry's response to fuel poverty in the United Kingdom. A "social tariff" is priced to respond to the inability to pay of certain British gas and electric customers. While these tariffs are closer in design to utility programs designed to deliver affordability assistance, and do not represent inverted block tariffs, or Lifeline rates in the traditional sense, they offer certain lessons that might be useful to Hydro Quebec. For example:[178]

- British Gas offers its "Essentials" tariff, under which roughly 300,000 customers pay prices equivalent to the British Gas monthly direct debit rates, the lowest standard electric and gas tariff available from British Gas, regardless of what payment method the customers in fact use.

- EDF Energy offers eligible customers a 15% discount on their fuel bills, and access to a benefit entitlement check

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actions typically concern the average level of prices, and keeping average prices down is an important help to poorer customers.")

[174] According to energywatch, the government-funded consumer advocate, between 2003 and 2006, natural gas prices in the UK increased 94%, while electric prices increased 60%. Richard Bates (May 2007). *A Social Responsibility? The energywatch consultation on the nature of social tariffs in the energy market*, at 3, energywatch: London (England).

[175] William Baker (April 2006). *Social tariffs—A solution to fuel poverty?*, at 13, Center for Sustainable Energy: Bristol (England).

[176] Fifth Annual Progress Report, at 38.

[177] A Social Responsibility, at 3.

[178] See also, Cornwell Energy (January 2008). *Proportionality of social tariffs and rebates: Paper for Energywatch*, Cornwell Energy: North Walsham (England) (describing the full range of social tariffs in the six major energy companies serving the United Kingdom).

- Powergen provides roughly 365,000 customers a fixed bill for their electricity and natural gas for one year at a time, based on the number of people in the home and the number of bedrooms in the house. These fixed bills are independent of consumption.

- Scottish and Southern Energy targets a 20% rate discount to customers living in fuel poverty.

- Scottish Power has implemented a Social Tariff under which targeted customers will receive a fixed rebate of £100. The rebate will bring the average bill of these customers in line with the bills accruing from the company's direct debit tariff. [179]

Despite these seeming efforts to address fuel poverty through tariffed rates, the efforts by natural gas and electric utilities to address fuel poverty through Social Tariffs has come under significant criticism in 2007 and 2008. The "social tariffs" offered by British utilities, for example, were often found to be not even the lowest tariff offered to residential customers. For example, some "social tariffs" provide discounts off of the price charged to prepayment meter customers; these discounted rates, however, still exceeded the rates charged for direct debit customers.

The offer of social tariffs that were priced higher than other some other residential rates generates substantial passions in the UK. Unison, the labor union of utility employees, for example, was quoted as saying that social tariffs "are not worthy of that name, if they are more expensive than products that the same energy company offers to all customers."[180] One other party, National Energy Action (NEA), said that it was "axiomatic that social tariffs should represent the lowest level of charges offered by the supplier."

4.4.3 Refusal to consider inverted block rates in lieu of "Social Tariffs"

"Rising block tariffs"[181] have been proposed in Great Britain as one alternative to social tariffs. The National Consumer Council (NCC), for example, recommended that such tariffs would "join up policies for sustainability with fuel poverty policy."[182] "This rising block model would also recognize and reward the low usage and carbon footprint of many low-income consumers, while at the same time providing a real incentive and desire to install energy efficiency measures in order to avoid the more expensive second and third tier blocks."[183]

Other advocates for households in fuel poverty recommend such tariffs because all households would benefit and there would be no need to apply any means test.[184] Similarly, the Center for Sustainable Energy and the National Right to Fuel Campaign recommend rising block tariffs in

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[179] Fifth Annual Progress Report, at 39 - 42.
[180] A Social Responsibility?, at 29.
[181] In this report, "rising block tariffs" are referred to as inverted block rates or "Lifeline" tariffs.
[182] Social Tariffs—A Solution?, at 35.
[183] Cassandra Higgs (January 2007). *A Social Responsibility? NCC's response to an energywatch consultation on the nature of social tariffs in the energy market*, National Consumer Council: London (England).
[184] Social Tariffs--A Solution?, at 35.

Great Britain as a "universal solution" that does "not stigmatize low-income consumers and [does] avoid the need to apply costly means tests."[185]

British regulators, however, have resisted such tariffs. In response to a House of Lords inquiry recommending that the Government explore Lifeline tariffs, the Government dismissed such tariffs as being "against the Government policy of not intervening in energy markets and because of their potential complexity."[186]

4.5 South Africa's "Free Basic Water Service"

As with Central and South America, the use of a form of inclining block rates in South Africa has explicit social overtones to it. Noting that the increasing block tariff structure "has been used as a measure to support fair access to water," one evaluation of the South Africa "Free Basic Water Service" program reports:

> A minimum supply of water is part of the basic needs, and access to water is a main source to conflict in many areas. However, more important is the situation where water supply is an important political issue, linked to the problems of extreme income inequality in many developing countries. A system where the willingness to pay decides on the distribution of goods will not work in an acceptable way if large parts of the population have too small money to buy basic goods.[187]

South Africa's Free Basic Water Service program is offered within a context of the recognition of water, in particular, as a scarce resource in that country. The country's rainfall is just over half of the world average. The scarcity of water is compounded by a booming economy, calling for increased water consumption, along with a rapidly increasing population. Given these factors, "the available water resources are insufficient to meet projected demands at current usage and price levels within the next 30 years."[188] In language that resounds with the same themes of energy efficiency advocates in the United States and Canada, one author observes:

> South Africa is moving from supply side management to demand side management and water pricing is playing a key role in managing the water resource in an equitable, efficient and environmentally sustainable manner. . .As it is put in the 1997 White Paper:[189] "There is a limit to the development of new dams and water transfers that we can afford or sustain. Our present use of water is often wasteful and inefficient and we do not get the benefits we should from our investments in our water. Water conservation may be a better investment than

[185] A Social Responsibility?, at 21.
[186] Social Tariffs—A Solution?, at 36, citing, UK Government (2005). *Government Response to the House of Lords Science and Technology Committee Report on Energy Efficiency*, at 21.
[187] Mikko Moilanen and Carl-Erik Schulz (2002). "Water Pricing Reform, Economic Welfare and Inequality," 5 *South African Journal of Economic and Management Sciences NS* 354 (2002).
[188] Water Pricing Reform, at 3.
[189] This reference is to the National White Paper on water policy in South Africa. Department of Water Affairs and Forestry (DWAF) (2001). *White Paper on a National Water Policy for South Africa*, DWAF: Pretoria (SA).

> new dams. We will have to adopt such new approaches to water management if our aspirations for growth and development of our society in the 21st century are not to be held back as a result of limited water resources."[190]

In response to this need for pricing reform, within the framework for an aggressively socially conscious pricing scheme, in 2001, South Africa adopted an Increasing Block Tariff, known as the Free Basic Water Service program. This program articulated a policy to provide 6,000 liters of safe water per month per household.[191] The "primary intended recipients" of the free basic water service are "poor" households. According to the South Africa government's Implementation Strategy, "although there is a broader policy commitment to the extension of free basic services to all households, the primary target of the policy is poor households for whom free basic services represent a significant poverty alleviation measure."[192] The definition of "low-income" status was left to local governments, who also have primary responsibility for administering the program.

The actual delivery mechanism for the free basic water service is also left to the discretion of local governments in South Africa. Two basic forms of service delivery are recommended by the national government: (1) a rising block tariff, with the first block set from 0 – 6 kilo-liters (kl) with a zero tariff;[193] and (2) a "targeted credit" under which a consumer that is selected for poverty relief receive a credit on their water bill sufficient to cover the charge for 6kl of water per month free.[194] A third delivery mechanism, under which poverty level consumers receiving a "restricted flow" service is generally made available only in rural areas of South Africa.

South Africa's rising block tariff is a universal Lifeline rate. According to South Africa's Implementation Strategy, implementation of the Free Basic Water Service through a rising block tariff involves no income targeting, unlike the other two delivery forms of the Free Basic Water Service.

The increasing block tariffs are primarily financed through internal subsidies between large users and small users. According to the Implementation Strategy, in order to effectively finance the rising block tariff form of the Free Basic Water Service program, a local government requires 30% of its residential customers purchasing more than 20kl per month.[195] In general, "the ratio

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[190] Water Pricing Reform, at 3.

[191] Department of Water Affairs and Forestry (DWAF) (August 2002). *Free Basic Water Implementation Strategy*, Version 2, at 7, DWAF: Pretoria. The program was supported by a declaration that: "As part of government's strategy to alleviate poverty in South Africa, a policy for the provision of a free basic level of services has been introduced. In the words of President Mbeki, 'the provision of free basic amounts of electricity and water to our people will alleviate the plight of the poorest among us.'" Implementation Strategy, Version 2, at 3. The Implementation Strategy observed: "There are well recognized public health, equity and gender reasons for ensuring that households have access to a basic level of water supply that is affordable to even the poorest households." Implementation Strategy, Version 2, at 7.

[192] Implementation Strategy, Version 2, at 7.

[193] Most urban areas in South Africa use this rising block tariff approach. Ada Jansen og and Carl-Erik Schulz (2006). *Water Demand and the Urban Poor: A Study of the Factors Influencing Water Consumption among Households in Cape Town, South Africa*, Working Paper Series in Economics and Management No. 02/06, Department of Economics and Management, University of Tromso: Norway.

[194] Implementation Strategy, Version 2, at 31.

[195] Implementation Strategy, Version 2, at 32.

between wealthy and poor customers; the distribution of consumption in the supply area (i.e., the ratio of large to small consumers); and the ratio between industrial and residential customers are likely to be central to the viability of local level cross-subsidies."[196]

To the extent that cross-subsidies are inadequate to pay for the Free Basic Water Service program at a particular local level, the local government has recourse to restricted national funding to make up the difference. If finances dictate, however, the local program delivery will be restricted exclusively to low-income customers (as defined by the local government).

4.6 South and Central America

Electricity and water pricing in South and Central America does not occur within the competitive framework now facing much of the rest of the world's utility industries. Rather than involving the unfettered move to competition found in much of Europe and Australia, the "restructuring" of the electric and water utility industries in South and Central America involves the privatization of the utilities. Within this context, there is significant public concern about the impact of such privatization on consumer protections and the pricing of service to residential customers.

As a broad proposition, the pricing of utility service by state-operated utilities generated revenues that covered but a fraction of the cost of providing service. The privatization of these utility companies, whether electric or water, thus resulted in substantial across-the-board price increases as the price of service was required more and more to bear the full cost of service. Not surprisingly, therefore, the use of inverted block rate structures for electricity and water pricing in South and Central America is primarily focused on alleviating the economic hardships of low-income consumers. One United Nations seminar on the regulation of electric and water utilities identified the use of increasing block tariffs in Brazil and Panama, for example, as a means toward income redistribution.[197]

4.6.1 Argentina

While not a universal Lifeline rate, Argentina's water rate is directed toward the social problems of the unaffordability of basic water service. The Argentina water affordability rate was created in 2001. Referred to as the "Social Tariff," the purpose of the rate was not environmentally based, but rather was designed explicitly to "subsidize demand and bring an end to disconnections."[198]

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[196] Implementation Strategy, Version 2, at 34. The national government warns local government officials responsible for planning and implementing the program that "local authorities should ensure that they gather adequate information on these factors to enable proper local financial planning." Id.

[197] Terrence Lee (March 2007). *Seminar on the Regulation of Public Utilities—Water and Electricity*, at 61, United Nations Natural Resources and Infrastructure Division: Santiago (Chile) (seminar hosted by the Economic Commission on Latin America and the Caribbean (ECLAC), October 18 – 19, 2005, ECLAC: Santiago (Chile).

[198] Regulation of Public Utilities--Water and Electric Public Utilities, at 62.

> The objective of the programme was to reduce the bills of poor users. The system was to be focalized, explicit, and transparent, with minimum errors of inclusion or exclusion, and to have low costs of administration and control. . .A major factor in the design of the programme was the impossibility of measuring consumption. The programme was based on an estimated capacity of payment inferred from international experience. A maximum of 4% family income was established as a limit.
>
> The specific benefits of the program, which was to last a year but could be renewed, included: a reduction in the water bill, the lifting of disconnection processes, suspension of claims for debt repayment, a reprogramming of debt payments according to the capacity of the debtor to pay, the amount of the benefit was specified in the bill as the social tariff discount, and the benefit was granted in fixed amounts at a time so as to facilitate the transfers among municipalities and to avoid any conflicts over the distribution of funds.[199]

The cost of the Social Tariff was estimated to reach $4 million (U.S.$), with subsidies reaching an equivalent of 1.1% of the total income from residential billings (or 0.7% of total billings). The program was extended after the expiration of its first year of operation,[200] with four percent (4%) of all water users receiving benefits. The average benefit or discount was equivalent to 43% of the bimonthly bill. The program resulted in reducing the water bill to 2.7% of average monthly income (a bill of 14 pesos compared to an average monthly income of 260 pesos). The program reduced the number of users with debts from 70% to 18%.[201]

4.6.2 Colombia

Colombia has a system of water subsidies which, while not strictly a universal Lifeline (or inverted block rate),[202] has sufficiently comparable characteristics to offer interesting lessons. Colombia's water subsidies combine a process of providing affordability assistance using both cross-subsidies between customers and general tax revenues.[203]

In Colombia, households in each municipality are classified into six socio-economic categories. Households in the lowest two categories are provided a water subsidy for up to 40% to 50% of the *average* service cost. Subsidies are capped based on individual characteristics, however. No subsidy is allowed to exceed the value of "basic consumption."[204] Households in the level 3

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[199] Regulation of Public Utilities--Water and Electric Public Utilities, at 62.

[200] By December 2006, the program had a participation rate of roughly 114,000 customers. Emanuele Lobina and David Hall (September 2007). *Water Privatization and Restructuring in Latin America*, at 17, Public Services International Research Unit, University of Greenwich: London (England).

[201] Regulation of Electric and Water Utilities, at 63.

[202] In the same sense, a rate freeze on initial blocks, as well as a waiver of a fixed customer charge, are not a strict Lifeline or inverted block tariff rate, although they are considered as alternative forms of such rates in this report.

[203] Andres Gomez-Lobo and Dane Contreras (2000). *Subsidy policies for the utility industries: a comparison of the Chilean and Colombian water subsidy schemes*, at 43, Department of Economics, University of Chile: Santiago (Chile).

[204] Comparison of Chilean and Colombian water subsidy schemes, at 43.

classification may receive a subsidy of up to 15% of the average service cost, although the law provides that the decision on whether to actually grant these subsidies lies within the discretion of the nation's regulatory commission.

The Colombia water affordability initiative has attributes of a targeted Lifeline rate, as well as attributes of a universal Lifeline rate, in its program structure. The water affordability rate is similar to a Lifeline rate in that it provides reduced prices on a basic level of consumption. While tied to bills and not usage (and thus differs from a traditional Lifeline to that extent), the reduced price is based on a determination of average service cost. Moreover, the limitation of the subsidy so that it does not exceed the value of basic consumption exhibits Lifeline characteristics.

The Colombia program further has attributes of a *universal* Lifeline rate, even though it is not such a universal rate in the traditional sense. Colombia does not adhere to the proposition that inverted rates can only operate in a two-step manner (with low-use consumption priced "below cost" and all other use priced "above cost" to recover the resulting revenue shortfall). Instead, Colombia uses a six-block rate structure for its water rates. While the Tier 1 and Tier 2 (lowest income) rates are priced below cost, the Tier 5 and Tier 6 rates are surcharged to make up the revenue shortfall. Tier 3 and Tier 4 are neither eligible to receive the discount nor subject to the surcharge. While the six blocks in the Colombia water rate structure are based on demographic factors, not usage factors, the principles between the Colombia program and a universal Lifeline rate remain similar.[205]

A first look might lead to the conclusion that the Colombia program is a means-tested price reduction (and thus a targeted Lifeline rather than a universal Lifeline). A closer look, however, reveals that the program has mixed "universal" and "targeted" program attributes. One of the key aspects of this Colombia water subsidy scheme is the classification of residential customers. The classification occurs for dwelling units, not customers. Pursuant to a methodology promulgated by the National Planning Department (NDP), the process of classification is performed by local government.

> The basic stratification unit is a geographic area with homogenous characteristics according to criteria set by DNP. All dwellings within this unit are classified in one socio-economic group, although particular dwellings that have different characteristics within the unit can be individually classified in another group.[206]

While there is an element of "targeting" that occurs within the Colombian water rate, the targeting is on a geographic basis rather than on a means-tested basis.[207] Within any given geographic area, however, the price reduction on the "average" service cost is universally available. Customers do not apply for the price reduction. Nor must they establish eligibility for

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[205] Despite this observation, the Colombia water rate structure is neither an inclining block rate nor a volume-differentiated tariff. Rather, it is a type of a targeted Lifeline rate.
[206] Comparison of Chilean and Colombia water subsidy schemes, at 48. Individuals may appeal their classification through a prescribed regulatory process.
[207] It is correct, however, to observe that the definition of the geographic areas targeted for the price reductions are based on socio-economic grounds.

the price reduction. The price reduction is universally available in the prescribed geographic areas.

Colombia's water subsidies are funded through a two-part revenue stream. The first source of funding arises from a surcharge that is placed on residential households classified in Level 5 or Level 6 as well as on commercial and industrial customers.[208] By law, the surcharge is capped at a maximum of 20% of the water and sewer bill. Under the Colombian law, while each of the local water companies is charged with sustaining its own water subsidy program, if the surcharge on higher income residential customers (combined with commercial/industrial customers) generates revenue in excess of the subsidy provided within that company, the "net surplus" can be transferred to fund water subsidies in other jurisdictions.[209] As a general rule, however:

> It is important to note that the surcharges are in general used to fund subsidies for clients of the same service provider. In other words, the cross subsidies are internal to each water company. If the client base of a particular provider is poorer than that of another company, the ability to finance subsidies will be different.[210]

If, in contrast to generating a net surplus, the surcharges imposed on higher income residential customers (as well as commercial/industrial customers) is ***insufficient*** to offset the cost of the subsidy program to the first three levels, the difference is funded from either the national or provincial governments. A fund is established at each governmental level, called the "solidarity and income distribution fund," which is supported by a variety of general tax revenues and earmarked funding sources for these purposes.

4.7 Importance of these jurisdictions

The jurisdictions whose rates are discussed in this section present important lessons, both in the structure and rationale for a universal Lifeline rate. In some instances, the lessons lie in what *was* done (or what was decided), while in other cases, the importance lies with what was *not* done or was not decided.

One overarching observation is evident. As a general rule, the jurisdictions discussed above did not set out *quantitative* objectives for their respective Lifeline rates. With the exception of the Iowa-Illinois rate, for example, dollars of projected bill savings per account are not set forth in a prescriptive manner (*i.e.*, this is what we *seek* to generate in bill savings for customers wholly within the Lifeline rate). In contrast, Iowa-Illinois projected a 16% savings arising from its low-use rate.[211] Similarly, the estimated (or sought-after) rate of low-income inclusion (*e.g.*, the

[208] Households in Level 4 neither receive a subsidy nor are subject to the surcharge.
[209] Comparison of Chilean and Colombian water subsidy schemes, at 44.
[210] Comparison of Chilean and Colombian water subsidy schemes, at 45.
[211] Remember, of course, that consumer groups objected to this low-use rate. The 16% savings did not represent a bill reduction, but rather the avoidance of a bill increase. The Iowa consumers groups opposing the low-use rate noted that the 16% savings simply meant that rates to low-use customers would increase by 9% rather than by the 25% increase charged to all other customers.

percent of total low-income accounts with monthly consumption wholly within the Lifeline block) is not set forth for any given jurisdiction.

While the lack of such quantitative objectives, along with the lack of any evaluation of the operation of the rates relative to such objectives, does not permit an external review of the effectiveness of the respective rates in achieving desired ends, at worst, such absence seems to counsel that the lack of such quantitative goals and objectives is not fatal to the design and implementation of an inverted block tariff/universal Lifeline rate.

Other lessons are more specific to the individual jurisdictions.

The Boston Edison rate is important in that it documents a specific, objectively determinable, decision-rule for making the determination of whether to place the limits of the initial block of usage to be subject to the reduced Lifeline price. In setting the Lifeline rate (in the Boston Edison instance, the rate freeze) equal to the average residential consumption, Massachusetts regulators not only identified a clear line, but a clear rationale for establishing the line where it did.

The Northern States Power and Iowa-Illinois Gas and Electric rates are important in that they document alternatives to the use of an initial block of energy consumption as the delivery mechanism for the price reduction. Both of these utilities instead delivered their price reduction through a reduced customer charge.[212]

The Iowa-Illinois rate is important in that it documents a way in which to condition a universal Lifeline rate on factors that generate benefits to the company while still maintaining the "universal" nature of the Lifeline. The Iowa-Illinois rate demonstrates that "targeting" does not *have* to involve means-testing. Providing the Lifeline price reduction on a going-forward basis depending on whether customers met prescribed usage objectives during high-cost, peak-demand months demonstrates not only a specific mechanism for "targeting" a universal Lifeline rate, but even more importantly, demonstrates that placing such conditions on the availability of the Lifeline block can work from both a policy and administrative perspective.

The Florida Power and Light rate documents that a universal Lifeline can not only advance the interests of low-income customers ("the inverted rate generally helps low-income customers") even though facially structured as a conservation rate, but provides empirical evidence that the failure in targeting tends to be one of over-inclusion rather than over-exclusion (high income/low-usage customers are considerably more prevalent than high usage/low-income customers).

Not all lessons, however, are positive lessons. Both the Boston Edison and Northern States Power Lifeline rates demonstrate that care must be taken to ensure that overall bill reductions generated by the inverted block tariff/universal Lifeline is meaningful. With both of these rates,

[212] Iowa-Illinois provided additional per kWh price reductions as well.

subsequent analysis found that, in the words of the Minnesota evaluation, "the actual benefits provided by this program are, by many standards, not significant."[213]

The Northern States Power and Florida Power and Light rates are important, also, in that they document that, even while the rates were not targeted based on specified demographics, the rates tend to help vulnerable populations. As the Florida Power and Light evaluation found, "although this program is not targeted. . .a substantial number of beneficiaries of this rate break are members of two of the groups that are usually considered to be in need of assistance –the low-income and the elderly."

The Los Angeles Lifeline rate was included in this report even though it is a targeted Lifeline (targeted to low-income senior citizens) and not a "universal" Lifeline rate. Nonetheless, the Los Angeles Lifeline rate provides two important insights into the structure and implementation of a universal Lifeline. First, a subsequent evaluation of the rate found that while the correlation between income and consumption "was not perfect, of course. . .broadly speaking there is a positive correlation between income and monthly consumption." Just as importantly, the Los Angeles evaluation presented a good analytic framework for assessing the distributional effectiveness of the Lifeline. Noting that that over 70% of customers with income less than $7,500 consume less than 200 kWh per year, while only 17% of customers with income above $15,000 do, the evaluation further found "a systemwide average of almost 400 kWh a month." It concluded that the Lifeline appropriately targeted benefits by reducing prices in an initial block of consumption.

The Los Angeles Lifeline rate is important, also, in that it documented how a Lifeline rate, including a universal Lifeline rate, not only "may" result in an overall systemwide reduction in energy consumption, but is *likely* to do so because of the "greater price responsiveness of higher volume users and their larger number."

The California state Lifeline rate introduces an entirely new way to view a universal Lifeline rate. Like the Boston Edison rate 25 years earlier, California establishes a model for using a multiplier of the "average" residential consumption to set the "baseline" for an inverted block tariff/universal Lifeline. Rather than seeking to tie the increasing blocks to specific kWh limitations, however, the California rate uses increasing multipliers of this "baseline" usage. In addition to this structural innovation, the California experience further documents that, even while not targeted specifically to such households, the rate disproportionately reaches low-income households who "consume solely within the baseline tier."

The Australian deliberations over inverted block tariffs introduce a level of analytic sophistication with the issue of cost-reflectivity that does not exist in other jurisdictions. The deliberations of the Independent Pricing and Regulatory Tribunal (IPART) of New South Wales provide important quantitative documentation that using a universal Lifeline can improve, rather than impede, the cost-reflectivity of rates. Moreover, the favorable view of a universal

[213] In contrast, however, it might be noted that a program such as the Northern States Power or Iowa-Illinois program would, today, generate considerably higher benefits. Fixed monthly customer charges have dramatically increased since these programs were begun, and a waiver of such fixed charges would be meaningful in virtually any jurisdiction.

Lifeline/inverted block tariff by regulators and utilities alike in New South Wales demonstrates that the use of such tariffs is not inconsistent with the competitive retail market environment that prevails in the electric industry in Australia.

Hungary's three-block inverted block tariff documents the value of using a three-block tariff (rather than a two-block tariff) in implementing a universal Lifeline. An after-the-fact evaluation of Hungary's move to a three-block tariff found that the addition of the third block produced a better targeting ratio for low-income customers, while spending 35% less money. Adding the third block, the Hungary evaluation further found, improve the predictability of the benefit to low users, since it decreased the extent to which the normal fluctuation of residential consumption pushed customers into the higher priced block (thus losing net benefits).[214]

The Portuguese universal Lifeline rate offers a model that applies a universal Lifeline price reduction through an inverted block tariff that is applicable to a price other than the full retail bill. While the Portuguese rate provides little in real financial benefit to that country's consumers, the notion that the reduced price can be applied to a discrete portion of the price structure (*e.g.*, the generation portion, the distribution portion) rather than the full retail bill has been used in this part of the world.

The Flemish universal Lifeline rate introduces two important concepts. First, the Flemish rate demonstrates an inverted block tariff where the price of the initial block can be set equal to zero. With both electricity (100 kWh per household plus 100 kWh per family member) and water (the first 15 cubic meters), these Belgium residents receive a level of basic utility service "free" each year. This same approach, of course, is used in the South Africa "Free Basic Water Service" program. In South Africa, the essential water service can be provided through three prescribed mechanisms, the most popular of which (at least in the urbanized portions of the country) involves using an inclining block rate with the first block of consumption priced at zero.

The Flemish rate was important, also, in that it demonstrates a hybrid universal Lifeline/targeted Lifeline rate. While the universal Lifeline aspects of the rate provide a prescribed level of free service to ***all*** households, a higher level of service was provided to households meeting certain characteristics demonstrating their vulnerability. The Flemish rate documents that the choice between a universal Lifeline rate and a targeted Lifeline rate need not be an all-or-nothing decision. While the research for this report began with the notion that "targeted Lifeline" rates and "universal Lifeline" rates were mutually exclusive, the Flemish rate corrected that misunderstanding.

The blending of what distinguishes between a "universal Lifeline" rate and a "targeted Lifeline" rate continues with the presentation of the Colombia system of water subsidies. The Colombia water program is clearly a Lifeline rate, providing reduced prices for a basic level of consumption. The fact that the price reductions are tied to bills and not to usage does not change the Lifeline character of the rate. The Colombia water subsidy shares characteristics with Massachusetts and California in that the reduced price is tied to a determination of the *average* service cost. The blending of "universal" and "targeted" Lifeline characteristics occurs because,

[214] The "net benefit" is the dollars in reduced price from the initial block reduced by the dollars of increased price in subsequent blocks.

while targeted, the Colombia program is targeted on a geographic basis. Within each prescribed geographic area, the Lifeline rate is universally available, with every customer entitled to the reduced Lifeline price.

The final discussion of "social tariffs" in the United Kingdom offers important cautions, even though the UK tariffs do not involve Lifeline rates (either targeted or universal). Indeed, the British government has specifically rejected a move to inverted block rates, saying that they would be contrary to "the Government policy of not intervening in energy markets." The UK utilities offering "social tariffs" generated substantial controversy when it became public that these tariffs, ostensibly made available to address the problem of "fuel poverty" by low-income consumers, were not even necessarily the *lowest* residential tariffs offered by the utilities. While seemingly primarily a political issue, this British experience counsels that companies offering a universal Lifeline rate in furtherance of an objective of "hardship alleviation" must take care to ensure that such a rate improves the affordability of energy usage rather than degrades that affordability.

In short, the presentation of various models of inverted block tariffs/universal Lifeline rates above documents and demonstrates a range of design options and expected outcomes achieved (and achievable) through the use of such rates.

5 Findings and Conclusions

An inverted block tariff is a legitimate mechanism through which to deliver rate affordability assistance to low-income customers. Sometimes referred to as a "universal" Lifeline rate –a universal Lifeline stands in contrast to a targeted Lifeline in that its availability is not means-tested or otherwise limited to customers with prescribed demographic characteristics—an inverted block tariff generally applies reduced prices to an initial block of consumption for all customers. The resulting revenue shortfall is then made-up by applying increased prices to the tail blocks of monthly energy consumption.

A universal Lifeline rate can incorporate various modifications around this basic norm. United States regulators in Minnesota and Florida, for example, applied the reduced rate to the fixed monthly customer charge rather than to the initial block of consumption. In Belgium, for both water and electricity, as well as in South Africa (water), the price for the Lifeline block of service was set at zero, meaning that a prescribed block of "essential service" was made available for free to all consumers. In the United States (Massachusetts) and Colombia, the block of reduced price service was set at the residential average, while in California, the "baseline" service was set at a fraction of the residential average.

5.1 Targeting rate relief to the poor

Traditionally, much dispute has focused on whether a universal Lifeline rate adequately "targets" Lifeline assistance toward low-income households. This targeting occurs if low-use can appropriately be used as a surrogate for the low-income status of the customer. While the research finds that the relationship between low-income and low-use "is not perfect" –there will be some high-income, low-use customers while at the same time there will also be some low-income, high use customers—the relationship is sufficiently strong to support an inverted block tariff/universal Lifeline rate as a means of delivering rate relief to the poor.

Specific mechanism have been developed to measure the targeting efficacy of a universal Lifeline rate structure. A process developed by the World Bank, for example, considers both the ability of a universal Lifeline rate to target beneficiaries (*i.e.*, not to *exclude* the poor nor to *include* the nonpoor to a disproportionate amount) and to target the dollars of price reductions (*i.e.*, do the poor receive a proportionate share of the total dollars of price reduction provided through a universal Lifeline).

This is not to say that there should be a lack of concern for the potential adverse impacts on certain categories of low-income, high-use customers. In particular, customers using electricity for space heating and/or water heating may need special considerations. Nonetheless, the data appears to support the conclusion that there are more high-income, low-users than there are low-income, high-users.

5.2 Regulatory justification

The question of whether a universal Lifeline adequately "targets" benefits is not presented if the regulatory justification for the rate is not to deliver rate relief to low-income customers. Even where the *motivation* for a universal Lifeline might be to deliver rate relief to the poor, for example, the regulatory justification for the rate might lie in its impacts on the incentivizing of energy usage reduction.

Historically, some objection has been raised in opposition to Lifeline rates --irrespective of whether they are targeted Lifeline rates or universal Lifeline rates—on the grounds that such rates constitute unlawful "price discrimination." These objections were founded on the observation that the reduced rates that Lifeline provided on the initial blocks of usage were priced "below cost," while the increased rates for higher consumption were priced "above cost." Such circumstances, the objection argued, resulted in a subsidy flowing to the small user (who is presumably low-income).

This argument that the Lifeline rate must incorporate a non-cost-based subsidy to the low-income small user was extended to support the further conclusion that a universal Lifeline rate would also impede the development of a competitive electric industry. Such a rate would impede competition for the small users in that competitive service providers would not be able to match, let alone beat, the artificially low, subsidized rate.[215] Such a rate would impede competition for the larger users in that the service providers not bearing the same "social obligation" to provide the reduced price Lifeline would be able to underprice those utilities that included a small user subsidy in the rates charged to those large users.

Current research supports the conclusion that these cost-based objections to a universal Lifeline rate no longer have a sound foundation. Indeed, under the electric utility industry's current cost structure, rates that do not include a universal Lifeline (inverted block tariff) structure are likely to include a *reverse* subsidy flowing *from* low-income, small users *to* higher-income, higher-use customers. As one of Australia's electric regulatory staff (the New South Wales Independent Price and Regulatory Tribunal: IPART) found:

> The current single flat rate energy charge structure for residential and small business customers means that customers contribute to the cost of providing capacity in proportion to their energy consumption. Larger customers pay a larger share of costs by virtue of their higher consumption. Underlying this charge structure is an implicit assumption that if a customer consumes say 20 percent of total energy then they utilize 20 per cent of system capacity. If this were the case, then the single rate structure would likely be cost-reflective. . .The current charge structure is therefore likely to lead to cross-subsidies across different kinds of residential and small business customers. Customers that impose demands on system capacity that are disproportionately less than indicated by their energy

[215] This discussion of the impacts on competition assumes, solely for the purpose of analysis, that competition for the small user exists. This assumption does not hold true for most jurisdictions.

consumption will tend to cross subsidize those with disproportionately greater demand for capacity.

One Australia electric service supplier serving New South Wales reported that this reverse subsidy could be as high as one-third of total sales to the residential and small business customer classes. As can thus be seen, a universal Lifeline rate can, under today's industry cost structures, be viewed as a mechanism to remedy an existing subsidy, not as a mechanism creating a new subsidy.

Care must be taken, of course, in applying the lessons of the impact of demand growth and utility cost structures. These lessons can neither be determined as a matter of policy nor applied as a matter of principle. Their application to the circumstance facing any particular utility must occur in light of the circumstances facing that utility. This consideration will likely require a marginal cost study as one basis for decisionmaking.

5.3 Increasing use of universal Lifeline rate structures

Persons living around the globe today increasingly take electric and/or water service under an inverted block tariff/universal Lifeline rate. In the United States, inverted block tariffs are viewed more as a tool in promoting resource conservation through energy usage reduction than as a mechanism to promote social justice. Utilities primarily (though not exclusively) in the American West (*e.g.*, California, Arizona, Idaho, Washington) use inverted block tariff/universal Lifeline rates. There is *not*, however, significant empirical work from these jurisdictions which examines the impacts of these rate structures, or the efficacy of these rates, in targeting rate relief to low-income and/or low-use customers in particular.

Universal Lifeline rates are not a recent structure on the regulatory landscape of the United States, however. Between 1975 and 1980, multiple forms of universal Lifeline rate structures were approved by U.S. commissions. Massachusetts regulators utilized a price freeze on usage at or below the residential average as a means of acknowledging the lack of contribution that such small users made to the capacity expansion underlying a rate case. Minnesota and Florida regulators approved a "conservation price break" to promote reduced consumption. Iowa regulators approved a utility proposal to create a reduced rate for customers maintaining low consumption, found not likely to contribute to peak demand, during the summer months.

Multiple European countries also use inverted block tariffs. One researcher reports that inverted block tariffs are the "most widely used tariff structure" for water in the "southern countries" of Europe. This use is explicitly based on social concerns rather than environmental concerns. "[I]n the southern countries," the researcher notes, "social concerns are more important as far as water pricing is concerned than in the other countries as [inverted block] schedules are said to address equity problems arising from the allocation of the price of water."

So, too, does Belgium (or the Flanders region of Belgium) use a universal Lifeline. This Lifeline applies to both electricity and water service. In the electric industry, Flanders imposes the obligation to provide *every* household with a prescribed amount of free electricity. This free amount is set at 100 kWh per household per year increased by 100 kWh per family member. The region mandates 15 cubic meters of water free per person per year.[216]

South Africa's Free Basic Water Service program is similar to this Flemish approach. South Africa mandates that the first 6,000 liters (6 kilo-liters) of water be provided free to all customers each year. While three alternative mechanisms exist through which to meet this "Free Basic Water Service" imperative, most South African urban areas use an inverted block tariff, setting the price of the first block equal to zero.

Finally, some South and Central American countries use inverted block tariff rates for purposes of delivering rate relief to low-income customers. The Colombia system of water subsidies is most akin to a universal Lifeline. Rather than tying its reduced price to usage, however, Colombia ties its reduced price to bills. Customers receiving the subsidy receive a discount of from 40% to 50% of the average service cost. Colombia established a hybrid universal/targeted Lifeline rate. While the rate is geographically targeted, within the prescribed areas, all customers take service under the reduced price program. Geographic areas are defined by reference to a series of demographic and housing characteristics prescribed by the National Planning Department.

Despite this large, and growing, use of inverted block tariffs/universal Lifeline rates throughout the world today, not all jurisdictions have approved such rate structures. The British government, for example, has refused to consider such rates. A request by the House of Lords to consider a universal Lifeline rate structure was rejected by the Government, because such tariffs went "against the Government policy of not intervening in energy markets and because of their potential complexity." Each of the six utilities serving Great Britain, along with the three devolved administrations of the United Kingdom, has various "social tariffs" designed to address the plight of UK residents living in "fuel poverty."

So, too, did policymakers in Melbourne (Australia) reject the use of inverted block tariffs. These policymakers found that it was "doubtful [such tariffs] would help the customers in greatest need." Moreover, such tariffs would "create[…] new cross-subsidies in electricity prices, moving away from current efforts to have transparent, cost-reflective prices." Finally, the Melbourne policymakers found that "a corollary of the latter point is that, in a competitive market, the new prices would encourage retailers to target particular customer groups (especially, larger, well-off households) more than they do at present, with consequences for the effectiveness of competition. . ." Arguments and data akin to what was presented in New South Wales were not presented in Melbourne.

[216] The Flemish also provide a targeted electric Lifeline, allowing senior citizens and the disabled to obtain their first 500 kWh of consumption free each year.

5.4 Consistency with environmental considerations

The implementation of a universal Lifeline rate structure is entirely consistent with the environmental public purposes of resource conservation and energy usage reduction. While a universal Lifeline will reduce prices to a certain segment of low-use customers for a utility, it will provide an offsetting increase in prices to other higher-use customers. Even if there may be some increase in consumption attributable to the reduced price in the initial block, the usage reductions in the tail blocks will more than offset any usage change.

The conservation impacts of an inverted block rate can be seen from the experience of the Barcelona (Spain) inverted water block rate. Barcelona initially implemented an inverted block rate with a fixed charge and two blocks to replace its minimum charge without blocks. A third block was later introduced to give big users an added incentive to reduce their consumption. The outcome of the Barcelona inverted block rate was to reduce household water consumption per capita by nine percent (9%) between 1991 and 1996.

References

Acton, Jon Paul (1980). *Electricty Prices and he Poor: What are the Effects and What Can We Do?*, Rand Corporation: Santa Monica (CA).

Bates, Richard (May 2007). *A Social Responsibility? The energywatch consultation on the nature of social tariffs in the energy market*, energywatch: London (England).

Belgian Federal Ministry for Economic Affairs, Energy Department (September 2001). *Right of Access to Energy, Environmental Protection and Opening of Electricity and Gas Markets*, proceedings of an Energy Conference, September 27 – 28, 2001, Brussels (Belgium).

Blocker, T.Jean (1985). "Reforming Electricity Rates: Benefits to Low-Income Households," 4 *Population Research and Policy Review* 67 (1985).

Boland, John and Dale Whittington (2000). "The Political Economy of Water Tariff Design in Developing Countries: Increasing Block Tariffs versus Uniform Price with Rebate, *in* Dinar, Ariel (2000). *The Political Economy of Water Pricing Reforms*, Oxford University Press: New York (NY).

Cleveland State University (1980). *Lifeline Electric Rates and Alternative Approaches to the Problems of Low-Income Ratepayers: Ten Case Studies of Implemented Programs*, DOE/RG/1006-02, National Technical Information Service: Washington D.C

Cleveland State University (1980). *Lifeline Electric Rates and Alternative Approaches to the Problems of Low-Income Ratepayers: Ten Case Studies of Rejected Programs*, DOE/RG/1006-001, National Technical Information Service: Washington D.C.

Cleveland State University (1980). *Lifeline Electric Rates and Alternative Approaches to the Problems of Low-Income Ratepayers: A Cross-Program Analysis*, DOE/RG/1006-003, National Technical Information Service: Washington D.C.

Colton, Roger (2007). *Best Practices: Low-Income Rate Affordability Programs: Articulating and Applying Rating Criteria*, Hydro Quebec: Montreal (Quebec).

Committee of Inquiry into the Financial Hardship of Energy Consumers (September 2005). *Committee of Inquiry into the Financial Hardship of Energy Consumers: Main Report*, Melbourne (AU).

Committee for Melbourne (2004). *Utility Death Spiral Study: Final Report*, Committee for Melbourne: Melbourne (AU).

U.S. Department of Energy and U.S. Environmental Protection Agency (July 2006). *National Action Plan for Energy Efficiency* (Chapter 5, Rate Design), Environmental Protection Agency: Washington D.C.

Department of Water Affairs and Forestry (DWAF) (August 2002). *Free Basic Water Implementation Strategy*, Version 2, DWAF: Pretoria.

Department of Water Affairs and Forestry (1997). *National Water Policy for South Africa—White Paper*, Department of Water Affairs and Forestry: Peoria.

Department of Water Affairs and Forestry (2001). *Free Basic Water Provision: Key Issues for Local Authorities*, Department of Water Affairs and Forestry: Peoria.

Dillman, E., E.Rosa, and J. D Dillman (1983). "Lifestyle and home energy conservation in the United States: the poor accept lifestyle cutbacks while the wealthy invest in conservation," *Journal of Economic Psychology* 3:299-315.

Dinar, Ariel (2000). *The Political Economy of Water Pricing Reforms*, Oxford University Press: New York (NY).

European Fuel Poverty and Energy Efficiency (2007). *Detailed Report on the different actors involved in Fuel Poverty issues*, European Fuel Poverty and Energy Efficiency Project: Brussels (Belgium).

European Fuel Poverty and Energy Efficiency (2007). *Detailed Report on the different types of existing mechanisms to tackle Fuel Poverty*, European Fuel Poverty and Energy Efficiency Project: Brussels (Belgium).

European Fuel Poverty and Energy Efficiency (2007). *Diagnosis of the causes and consequences of fuel poverty in Belgium, France, Italy, Spain and United Kingdom*, European Fuel Poverty and Energy Efficiency Project: Brussels (Belgium).

Federal Energy Administration, Office of Energy Conservation and the Environment (February 1977). *Electric Utility Rate Design Proposals*, FEA: Washington D.C.

Green, Richard (July 2000). *Regulators and the Poor: Lessons from the United Kingdom*, World Bank Institute on Governance, Regulation and Finance: Washington D.C.

Hennessy, Michael. "The Evaluation of Lifeline Electricity Rates: Methods and Myths," 8 *Evaluation Review* 327 (1984).

Hennessy, Michael and Dennis Keane, "Lifeline Rates in California: Pricing Electricity to Attain Social Goals," 13 *Evaluation Review* 123 (1989).

Hughes, Larry (2004). *The Inverted Block Rate: An Alternative to Flat Billing*, Energy Research Group, Department of Electrical and Computer Engineering, Dalhousie University: Halifax (Nova Scotia).

Independent Pricing and Regulatory Tribunal of New South Wales (IPART) (June 2003). *Inclining Block Tariffs for Electricity Network Services: Secretariat Discussion Paper*, Discussion Paper DP64.

Lampietti, Julian (2004). *Power's promise: electricity reforms in Eastern Europe and Central Asia*, World Bank: Washington D.C.

Lampietti, Julian and Anke Meyer (2003). *Coping with the Cold: Heating Strategies for Eastern Europe and Central Asia's Urban Poor*, World Bank Technical Paper No. 529 (Europe and Central Asia Environmentally and Socially Sustainable Development Series), at 24, World Bank: Washington D.C.

Lee, Terrence. (March 2007). *Seminar on the Regulation of Public Utilities— Water and Electricity*, United Nations Natural Resources and Infrastructure Division: Santiago (Chile) (seminar hosted by the Economic Commission on Latin America and the Caribbean (ECLAC), October 18 – 19, 2005, Santiago, Chile).

Lobina, Emanuele and David Hall (September 2007). *Water Privatization and Restructuring in Latin America*, Public Services International Research Unit, University of Greenwich: London (England).

Lovel, Laszlo, et al. (September 2000. *Maintaining Utility Services for the Poor: Policies and Practices in Central and Eastern Europe and the Former Soviet Union*, World Bank: Washington D.C.

Parmesano, Heather and Catherine Martin, "The Evolution in U.S. Electric Utility Rate Design," 1983 *Annual Review of Energy* 45 (1983).

Persons, Georgia (1995). *The Making of Energy and Telecommunications Policy*, Praeger Publishers: Westport (CT).

Roth, Eva (2001). *Water Pricing in the EU: A Review*, European Environmental Bureau: Brussels (Belgium).

Saghir, Jamal (May 2005). *Energy and Poverty: Myths, Links, and Policy Issues, Energy Working Notes*, Working Paper No. 4, Energy and Mining Sector Board, World Bank: Washington D.C.

Sarikas, Robert and Henry Herz (1976). *Electric Rate Concepts and Structures: A Report to theBonneville Power Administration*, National Technical Information System: Washington D.C.

Sarmento, Bento de Morais (2001). "Right of access to energy for badly-off consumers in the Portuguese distribution system," in Belgian Federal Ministry for Economic Affairs, *Right of Access to Energy, Environmental Protection and Opening of Electricity and Gas Markets*, proceedings of an Energy Conference, September 27 – 28, 2001, Brussels (Belgium).

Scott, Frank (1981). "Estimating Recipient Benefit and Waste from Lifeline Rates," 57 *Land Economics* 536 (1981).

Smets, Henri (April 2007). *Implementing the Right to Water in France*, Environmental Law Research Centre/Swiss National Science Foundation: Geneva (SW).

Sullivan, Timothy (1979). *The Los Angeles Senior Citizen Lifeline Electricity Rate*, Rand Corporation: Santa Monica (CA).

Taylor, Lester (Spring 1975). "The Demand for Electricity: A Survey," *The Bell Journal of Economics*, Vol. 6, No. 1, at 74 – 110.