Data Access Rules:
Energy Bill Disclosure in the Rental and Housing Markets

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List of Acronyms

ACEEE = American Council for an Energy-Efficient Economy
ACS = American Community Survey
AMI = Advanced Metering Infrastructure
ASA = American Statistical Association
BTU = British Thermal Unit
CEUD = Customer Energy Usage Data
CO_2 = Carbon Dioxide
DFL = Democratic-Farmer-Labor
DOE = Department of Energy
ECAD = Energy Conservation Audit Disclosure
EERE = Energy Efficiency & Renewable Energy
EIA = Energy Information Administration
EPIC = Electronic Privacy Information Center
FNMA = Federal National Mortgage Association
GOP = Grand Old Party
GHG = Greenhouse Gas
HERS = Home Energy Rating Score
IMT = Institute for Market Transformation
LEED = Leader in Energy & Environmental Design
MBTU = Million British Thermal Units
MN = Minnesota
MPUC = Minnesota Public Utilities Commission
MLS = Multiple Listing Service
NEC = Neighborhood Energy Connection
NIST = National Institute of Standards and Technology
ORNL = Oak Ridge National Laboratory
PUC = Public Utilities Commission
RECS = Residential Energy Consumption Surveys
TISH = Truth In Sale of Housing
US = United States
USPAP = Uniform Standards of Professional Appraisal Practice
URAR = Uniform Residential Appraisal Report
VCC = Voluntary Code of Conduct

Executive Summary

Building energy data disclosure is becoming seen as an increasingly viable option for cities looking to benchmark their energy use. However, disclosure policies are frequently limited to large commercial buildings; in contrast, conversations around residential buildings are usually framed through a privacy lens, with an emphasis placed on restricting energy data access, rather than facilitating it. Yet information disclosure in the residential sector has a strong precedent in the housing market, as policies such as Seller's Disclosure Laws reduce information asymmetry by informing prospective homebuyers and renters about potential deficiencies of properties. A case study of Saint Paul, Minnesota demonstrates how existing disclosure options for prospective homebuyers and renters can be broken down into four categories: data, rating, structure, and combination disclosure. Of the currently existing disclosure options, however, no policy adequately informs prospective buyers and renters as to their energy costs. To rectify this market failure, this paper recommends that the Minnesota Public Utilities Commission issue a rule requiring utilities to make annual energy use data of residential buildings available to the public.

Introduction

In an age when public data can be compiled to create information profiles on individual consumers, residential energy consumption data practices have become a major concern for customers of gas and electric public utilities. This concern has only increased with the more widespread adoption of Advanced Metering Infrastructure ("AMI"), which can record energy use data down to one-minute intervals, allowing for a precise, thorough understanding of residential energy use patterns. Some residential customers, understandably, do not want this type of "real-time" data available to the public, as it could enable an advanced understanding about a customer's household activities. As a response to these concerns, many utilities and their regulatory bodies have enacted consumer data privacy policies to prevent against the disclosure of data that may exacerbate privacy concerns.

Such policies frequently address the release of energy consumption data to third parties; that is, a person or an organization that is neither the consumer nor the utility. Third parties are interested in obtaining data for a variety of reasons, and so the possibilities of "use cases" for

energy data are diverse. Examples of third parties can include cities interested in reducing carbon emissions, contractors looking to target high-energy homes for future business, law enforcement officials looking to demonstrate drug activity, and burglars looking to assess home occupancy patterns. Clearly, while some parties might be justified in looking to obtain energy data, others may have less benign intentions. When examining consumption data policies, it is critical to understand the range of third-party use cases.

This paper addresses a third-party data privacy practice that may have gone too far in its attempt to protect consumer privacy: some energy utilities have begun refusing to disclose residential energy use information to prospective homebuyers and renters. This practice creates information asymmetry in the housing and rental markets, which has the potential to interfere with both consumer protection practices and energy conservation goals. To the first point, when consumers do not know the cost of energy in advance, they are not only unable to plan for monthly operating expenses, but also are unable to plan for the costs of needed energy efficiency improvements. Unsurprisingly, low-income consumers face much greater financial risks by not being able to plan for the costs of energy in advance of purchasing or renting. To the second point, when energy information is not disclosed in the rental and housing markets, there is no market value ascribed to low energy costs, and by extension, to building efficiency. This means that sellers and landlords do not see a market return on investing in efficiency measures, which creates a disincentive to making these investments in the first place. By the same token, it means there is no market penalty for having higher energy bills, and so prospective buyers and tenants cannot exercise market pressure upon sellers and landlords to invest in efficiency measures.

While consumer protection and building efficiency are two distinct societal goals, they are both implicated by energy information asymmetry in the housing and rental markets. This is especially important for state governments and regulatory bodies who have an interest in promoting both affordable energy for consumers while simultaneously reducing fossil fuel use and greenhouse gas ("GHG") emissions.

To provide context for the issue of consumption data practices, this paper will first provide background on how consumption data privacy became a topic of discussion on a national scale. Then, I will look specifically at Minnesota, and at how these more restrictive data practices came into being. This paper will then discuss why privacy concerns relating to AMI are different from

the privacy concerns relating to monthly billing disclosure or average annual disclosure, and examine some existing energy disclosure ordinances and policies on the national scene.

To better understand the different types of disclosure in the housing and rental markets, this paper uses Saint Paul, Minnesota as a case study to review existing disclosure policies. Existing disclosure policies can be broadly broken down into four categories: data, rating, and structure disclosure policies, with the fourth category being a combination of data, rating, and/or structure disclosure. In this case study, I have considered options available to both prospective homebuyers and renters because rental housing comprises nearly half of the entire Saint Paul housing landscape.[1] In reviewing existing options of disclosure in Saint Paul, it is clear that existing policies provide insufficient options for prospective buyers and renters interested in assessing energy costs.

To address this market deficiency, this paper proposes and evaluates the following policy alternatives:

1. The City of Saint Paul should adopt an Audit Disclosure Ordinance
2. The Minnesota Public Utilities Commission should make a rule on Docket 12-1344, or a separate docket if needed, that directs regulated utilities to make average annual energy use and cost information available to the public
3. The Minnesota Legislature should amend the Seller's Disclosure statute to specify that energy use and cost information is required at point of sale

To evaluate these proposed alternatives, this paper will examine each of these alternatives based on the following criteria: cost effectiveness, potential impact, political feasibility, and administrative feasibility. Given these criteria, I recommend that the Minnesota Public Utilities Commission make a rule requiring utility disclosure of average annual energy use and cost information.

Through this discussion, I endeavor to demonstrate that there is value to both consumers and society in requiring energy disclosure in the rental and residential real estate markets, and to demonstrate the importance of tailoring data privacy practices to different use cases.

Problem Definition

Information Asymmetry in the Rental and Housing Markets

The problem with preventing prospective homebuyers and renters from accessing utility data is that it leads to information asymmetry in the housing and rental markets. Information asymmetry arises when two parties do not have the same amount of information about a particular issue;[2] in the case of energy data disclosure, this means that the seller knows the billing history of the property, while the buyer does not. In a market where energy disclosure is not a common practice, an account holder who is selling their house only has an incentive to release the data if the house uses energy efficiently; a seller with an inefficient property is actively dis-incentivized from disclosing this data since it may dissuade buyers or drive down the price.

While landlords renting out their property experience the same disincentive for releasing data, they may face an additional barrier under restrictive privacy policies: if the property's energy bills are in a previous tenant's name, the landlord will not be able to access the data, even if they wanted to provide it to a prospective tenant.

Historically, information asymmetry in the housing market has been mitigated through mechanisms such as Seller's Disclosure Laws, which seek to enable informed consumer decision-making at the time of buying a property. Disclosure laws place the onus on the seller to be up-front in disclosing hidden costs associated with a property, rather than on the buyer to flush out hidden costs. These laws, which were adopted by a majority of states in the 1960s, replaced the previous doctrine of *caveat emptor*, or "buyer beware."[3]

Implications for Household Energy Affordability

While consumers at all income levels are affected by market information asymmetry, low-income consumers will suffer a proportionally greater consequence from having higher-than-expected energy costs as a result of uninformed decision-making. If they do not know home operating costs upfront, they shoulder a greater risk when purchasing or renting. This has larger societal equity implications, particularly in a post-mortgage-crisis environment.

When energy costs are a smaller part of home operating costs, the cost of owning a home becomes much more affordable. A 2009 study of 229 homes across five subdivisions in Gainesville, Florida, found that the average ENERGY STAR home saved $180.00 per year in

energy costs, which was capitalized to a home value increase of $4,500.00, and the ability to afford a mortgage $2,255.00 greater.[4] More recently, a study by the University of North Carolina at Chapel Hill and the Institute for Market Transformation ("IMT") found that in a sample of 71,000 ENERGY STAR and non-ENERGY STAR single-family homes, risks of mortgage default are 32% lower in efficient homes.[5] The authors of both of these studies point to the importance of energy operating costs as a component of housing affordability.

Yet housing occupied by low-income families is more likely to be inefficient, and so more likely to result in higher bills for occupants. A 2009 study by the Oak Ridge National Laboratory ("ORNL") found that while the average energy consumption per square foot for low-income households was 31 MBtus, this number was 24 MBtus for non low-income households. ORNL additionally found that while 28% of low-income households reported inadequate insulation, only 17% of non low-income households reported inadequate insulation.[6]

Yet even if building efficiency were comparable across income demographics, low-income households will still experience a higher "energy burden" (or "bill-to-income ratio") than the household with an average income and comparable bills. In other words, the lower a household's income, the greater the relative cost of energy.

It can be useful to use rough energy costs and income estimates to understand how renters and homeowners across different income groups experience the cost of energy. Assuming an average annual per-household energy cost of $1,947.00,[7] which was taken from the Energy Information Administration's ("EIA's") Residential Energy Consumption Survey ("RECS"), we can compare income data for 2,107,232 occupied housing units in Minnesota surveyed in the 2009-13 American Community Survey ("ACS"). Table 1 shows how much households living at different income levels are impacted by the same energy cost.

Minnesota	Percentage of occupied housing units (2,107,232 total)	Percentage of owner-occupied housing units (1,528,272 total)	Percentage of renter-occupied housing units (578,960 total)	Energy burden based on 2009 average regional consumption data ($1947/year)
HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2013 INFLATION-ADJUSTED DOLLARS)				
Less than $5,000	2.4%	1.2%	5.70%	Greater than 38.94%
$5,000 to $9,999	3.2%	1.3%	8.2%	19.47% to 38.94%
$10,000 to $14,999	4.5%	2.4%	10.1%	12.98% to 19.47%
$15,000 to $19,999	4.7%	3.0%	9.3%	9.74% to 12.98%
$20,000 to $24,999	4.6%	3.4%	8.0%	7.78% to 9.74%
$25,000 to $34,999	9.3%	7.4%	14.2%	5.56% to 7.78%
$35,000 to $49,999	13.2%	12.3%	15.8%	3.89% to 5.56%
$50,000 to $74,999	19.1%	20.5%	15.5%	2.30% to 3.89%
$75,000 to $99,999	14.3%	17.0%	7.0%	1.95% to 2.30%
$100,000 to $149,999	14.9%	18.8%	4.5%	1.30% to 1.95%
$150,000 or more	9.8%	12.9%	1.7%	Less than 1.30%
Median household income (dollars)	59,836	73,314	30,934	
Energy burden of median household incomes based on 2009 average regional consumption data ($1947/year)	3.25%	2.66%	6.29%	

Table 1. Energy burden by household income and housing type in Minnesota 2013, using a set cost of energy.
Sources: US Census Bureau, 2009-2013 5-Year American Community Survey; US Energy Information Administration, 2009 Residential Energy Consumption Survey Data, Totals and Intensities[8]

There are two core points to be taken from this table. The first is that the same energy bill impacts renters and owners in Minnesota differently. While a household earning the median income for owner-occupied homes may only experience a household energy burden of 2.66% at the average RECS energy level, a household earning the median income for renter-occupied homes will experience a household energy burden of 6.29%. This discrepancy indicates that even when the energy cost is the same, rental populations will experience a higher energy burden than home-owning populations.

The second important point is that the energy burden figures by median area income tell a very different story from energy burdens calculated by income ranges. Looking at the energy

burden by income ranges, it is apparent that, when using the average annual RECS usage data, an estimated 15% of Minnesota households would spend more than 10% of their income on energy bills. This figure drops to 8% for owner-occupants, but jumps up to 33% for renter-occupied housing. For rental populations, a full 14% would pay more than 20% of their income towards their utility bills.

The point of this demonstration is to show how the same exact utility bill will impact different income and housing demographics differently; it is not intended to calculate actual energy burdens across the state in Minnesota. However, we can see that if two households, one low-income and one non-low-income, are considering buying or renting the same property, the low-income household is taking a larger financial risk by not knowing the full costs of operating up front. Information asymmetry about energy costs puts a greater risk burden on low-income households.

Implications for the Value of Building Energy Efficiency

Information asymmetry resulting from more restrictive data policies also has implications for household energy conservation, specifically with regard to building efficiency.

Building efficiency is frequently seen as an important component of energy conservation. The EIA estimates that in 2014, residential and commercial buildings consumed 41% of total energy consumed in the United States, or about 40 quadrillion Btus.[9] Of this, about 10 quadrillion Btus came from the estimated 113.6 million housing units in the residential sector, costing residences an estimated $230 billion dollars per year.[10] The Department of Energy's ("DOE's") Office of Energy Efficiency and Renewable Energy ("EERE") estimates that of the $2,000.00 the average American spends on energy per year, between $200.00 and $400.00, or 10-20% is likely wasted as a result of building inefficiencies.[11] If these household savings can be scaled nationally, then U.S. homeowners have the potential to collectively save between $230 and $460 million per year through efficiency measures.

While building efficiency is frequently identified as a means to achieving energy savings, it has historically been difficult to assign market value to building efficiency. Yet a growing body of work shows that if efficiency measures are properly valued in the market, this has the potential to incentivize buyers and landlords to invest in energy efficient retrofits.[12]

However, reducing information asymmetry is not just about creating monetary value for the property; it's also about de-valuing inefficient properties. For example, if tenants see that a properties has higher-than-average bills, they may not be as likely to rent at the property, which in turn puts market pressure on the landlord to make their property more appealing by investing in energy efficiency. This is particularly important, since landlords are dis-incentivized from investing in efficiency when they aren't the ones paying the energy bills, a problem known as the "split-incentive barrier."[13] Preventing prospective tenants' access to reliable and current data further exacerbates the landlord tenant split incentive barrier because it takes away the one point of leverage tenants, collectively, have: exerting market pressure on a prospective landlord to invest in efficiency measures.

In order for disclosure policies to be effective in creating market value around building efficiency, the data must be collected and disseminated in such a way that is useful for end-users.[14] However, what is considered "useful" depends on who you ask. For example, IMT points out that while appraisers find billing history to be a sufficient valuation tool, energy specialists prefer building simulation methods that provide a building rating.[15]

There are good reasons for the divergence. It is critical to note is that energy data is not necessarily indicative of building efficiency; behavior plays a large role in actual energy use. Even if a prospective homebuyer or renter can see billing information prior to purchase or signing a lease, the existing account holder's energy use might not be a fair representation of the next account holder's energy use.[16] On the other hand, there are also reasons why billing disclosure may be preferable to rating disclosure in some circumstances. First, rating disclosure does not provide direct information about residential operating costs. Second, without data, rating disclosure can only provide modeled assumptions of potential energy savings and carbon emissions reductions, rather than actual performance figures. While ratings and data disclosure are both important tools for properly valuing efficiency in the market, this paper focuses primarily on the latter.

Background: Energy Consumption Data

Energy consumption data or customer energy usage data ("CEUD")[17] has become a topic of heated debate due in part to the deployment of AMI, which involves the use of "smart meter" technology.[18] AMI is frequently cited as having the potential to revolutionize the electricity grid, producing benefits for both households and utilities through allowing two-way communication between consumers and the grid.

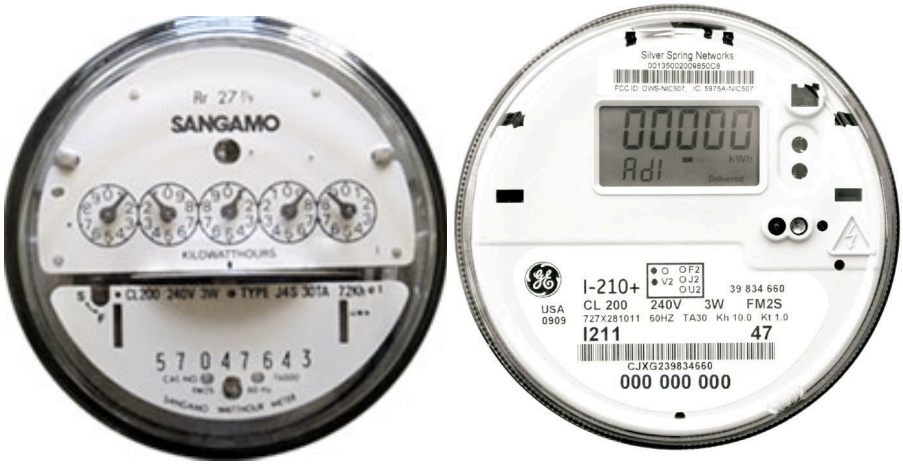


Figure 1. Analogue meter and smart meter.
Sources: Images retrieved online from Pacific Gas and Electric and Citizens Utility Board.

Enabling the AMI revolution is the ability to record highly granular data. Rather than recording data on a monthly basis, as Traditional and Automated Meters do,[19] smart meters can record data in hour-based or even minute-based increments. The greater degree of precision smart meters provide has engendered much more concern about privacy because studies have shown that data recorded at the minute-interval can be used to infer specific household activities.

In 2002, Wood and Newborough published *Dynamic energy-consumption indicators for domestic appliances: environment, behavior, and design*.[20] Their study, which sought to demonstrate how individual consumers might interact with their own smart-meter-generated energy data, included the following graph, which shows household energy use on a per-minute increment scale:

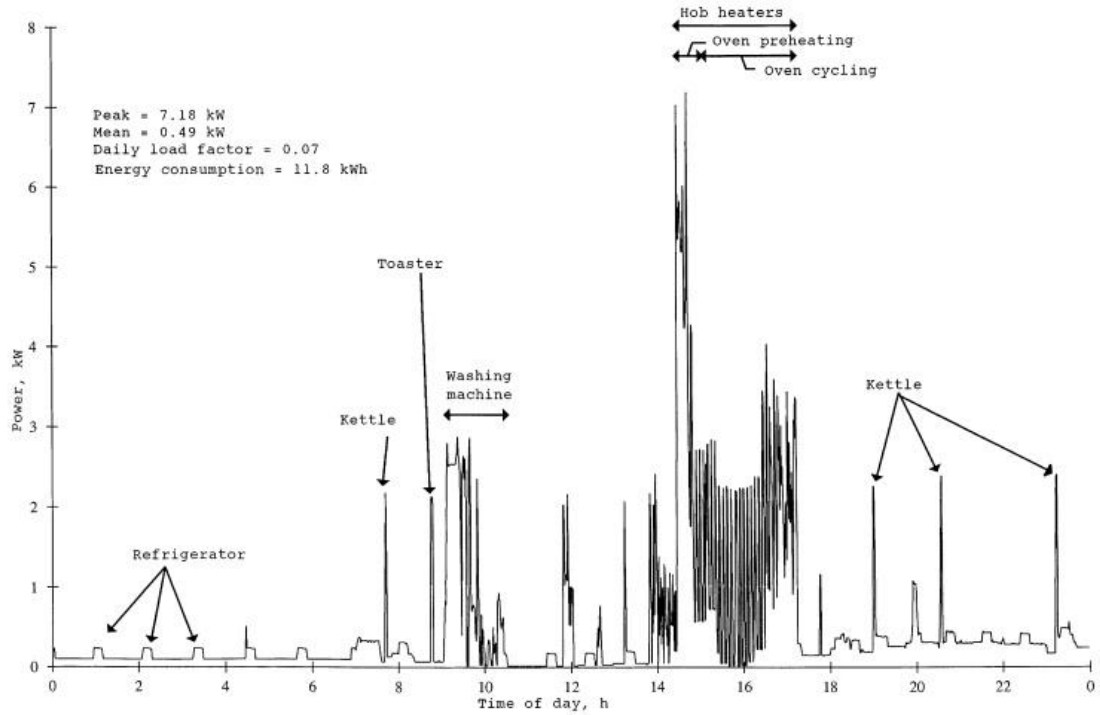


Fig. 1. Example of an electricity demand profile from an individual household recorded on a 1-min time base [7].

Figure 2. Wood and Newborough's electricity demand profile graph, based one 1-min time base.
Source: Wood and Newborough, "Dynamic Energy-Consumption Indicators for Domestic Appliances."

Since it was first published, several high-profile reports have used the graphic to demonstrate the level of household detail that can be obtained from smart meters. Among such reports were the National Institute of Standards and Technology's ("NIST's") 2010 *Guidelines for Smart Grid Cyber Security,*[21] the Congressional Research Service's 2012 *Smart Meter Data: Privacy and Cyber Security*,[22] and a 2009 report presented to the Colorado Public Utilities Commission.[23] Interestingly, in a Google Image search of "smart meter data," it comprised two of the first five images yielded.[24] The image, in short, has contributed meaningfully to the conversation of privacy concerns surrounding AMI.

While Wood and Newborough's graph has not been the only image cited in energy data discussions, privacy advocates frequently base their concerns around this level of data granularity. After the NIST 2010 report, anti-smart meter advocates created the following list of "Potential Privacy Impacts" based on information from the report:[25]

Privacy Concern	Discussion
1. Identity Theft	Specific combinations of Personally Identifiable Information ("PII") may be used to impersonate a utility consumer, resulting in potentially severe impacts, such as negative credit reports, fraudulent utility use, and other damaging consumer actions.
2. Determine Personal Behavior Patterns	Access to data use profiles that can reveal specific times and locations of electricity usage in specific areas of the home can also indicate the types of activities and/or appliances used. This data analysis process is a form of surveillance. The data could be (mis)used by: (1) organizations to perform "target" marketing; (2) governments to tax specific activities and uses; and (3) persons to conduct activities with malicious intent.
3. Determine Specific Appliances Used	Smart meters will provide capability to track appliance usage either through remote location software algorithms or meters that are specifically programmed to communicate with the smart appliances. Appliance manufacturers may want to acquire this information to know who, how, and why individuals used their products in certain ways. Such information could impact appliance warranties. Insurance companies may want to use this information to approve or decline claims. There is an unlimited number of other possible uses for the data as yet not imagined.
4. Perform Real-Time Surveillance	Access to near real-time energy usage data can reveal if people are in the residence, what they are doing, where they are in the residence, and so on. This not only presents a safety risk, with burglars and vandals using it to their destruction, but it could also be used to do target marketing based upon home energy use behaviors.
5. Reveal Activities Through Residual Data	Several articles have been published warning that if the data on the metering devices is not effectively or completely removed, the residual data can reveal former customer activities to the new meter user or entity. If true, not only does this present similar concerns to those listed above (in other privacy concern areas), it could also be used by activists or others who have agendas to reveal what they view as a lack of social responsibility.
6. Targeted Home Invasions (latch key children, elderly, etc.)	Malicious use of meter data for specific consumers could lead to a wide number of problems, such as physical invasions to the home because crooks could tell when certain residents were away, or whether a home is totally unoccupied or vacant.
7. Provide Accidental Invasions	Meter data could be systematically analyzed in a way to reveal unusual or unexpected appliance usage or behavior patterns later used to the detriment of residents.
8. Activity Censorship	The meter data could reveal resident activities or appliance usage that utility companies may then subsequently decide are inappropriate or should not be allowed. Without restrictions, if this information could then shared with local government, law enforcement, or public media outlets, the residents could suffer embarrassment, harassment, loss of vital appliances, or any number of other damaging actions.
9. Decisions and Actions Based Upon Inaccurate Data	With meter data being stored in potentially many locations, accessed by so many different individuals and entities, and used for a very wide variety of purposes, it is a significant risk that the PII data will become inappropriately modified. Automated Smart Grid decisions made for home energy usage could not only be detrimental for residents (e.g., restricted power, thermostats turned to dangerous levels, and so on) but decisions about Smart Grid power use and activities could be based upon inaccurate information.
10. Profiling	Profiling may occur in ways that were previously not possible, or not as easily possible. What can you tell about someone by analyzing energy consumption? For example, is the consumer having an affair? Terrorist profiles? Illegal activities, e.g., marijuana growing? Will access to do data mining for investigations put people on terrorist watch lists, etc.? Will politicians want to use data for potential activity taxation?
11. Unwanted Publicity	There could be embarrassment and other negative impacts resulting from

and Embarrassment	unauthorized disclosure and/or publication of household appliance usage, behavior patterns, or electric vehicle use.
12. Tracking Behavior Of Renters/Leasers	When an individual other than the resident owns and pays the utilities, such as in the case of a rental unit, apartment subletting, leasing, and so on, the landlord or property owner will likely have "authorized" and easy access to the smart meter data through a utility online portal website. The renter's electricity, gas, and possibly water usage patterns and behavior could be monitored in near real-time. Hypothetically, a landlord could use information obtained from smart meter data to determine whether the tenant has broken a lease provision or for other more malicious purposes. Rent decisions could be made based on past power usage history. Power usage profiling records could follow individuals to future residences and impact a wide range of decisions.
13. Behavior Tracking (possible combination with Personal Behavior Patterns)	Will there be any items within the smart meters that could act in ways similar to browser/document cookies or web bugs? If so, these items could be (mis)used in ways similar to how cookies and web bugs are currently (mis)used. Is there any possible technological connection for power usage records in the smart meter to the Internet, cell phone carriers, appliance companies, etc.?
14. Public Aggregated Searches Revealing Individual Behavior	What kind of smart grid search engines will there be? What discussions or plans have occurred around this possibility? What information would be involved? What control would consumers have to prevent their data from being included in such searches? The privacy issues would be similar to the privacy concerns that currently exist with Internet search engines, but the implications could be more wide reaching because the data would be based upon individuals' actual daily living activities, and not upon what they consciously chose to put onto the Internet.

Table 2. Potential Privacy Impacts with Discussion, as cited by Anti-Smart Meter Advocates.
Sources: Herold, "Potential Privacy Impacts for Smart Grid Information Disclosure and Misuse." Electronic Privacy Information Center, "The Smart Grid and Privacy."

These fourteen bullet points, which appear to have been initially published on the Electronic Privacy Information Center's ("EPIC's") website, then annotated by Rebecca Herold and Associates, have been redistributed among anti-smart meter advocates, and even appear in a complaint form issued to the Maine Public Utilities Commission.[26] This paper does not seek to address the legitimacy of any of these claims in regards to AMI; rather, this table is intended to demonstrate how customer-generated concerns about AMI have focused on one-minute time interval level of data granularity.

To address these types of privacy concerns, some state Public Utilities Commissions ("PUC's") have opened and ruled upon so-called "Privacy Dockets" to standardize practices. Early on, in a 1997 decision, the California PUC decided to use account aggregation as a way to render usage data anonymous in a specific Direct Access case.[27] The aggregation standard they set, frequently called the "15/15" standard, stated that aggregated data must contain at least 15 accounts, with no one account comprising more than 15% of the total aggregate energy usage. California's ruling was very narrow in scope, and the CPUC has since clarified that the 15/15 standard was

not intended as a standard for aggregated generic data access.[28] However, in 2012, the Colorado PUC implemented 15/15 standard on a statewide level, ruling that no utility should disclose individual CEUD to a third party absent the consent of the account holder.[29] Since California's early decision and Colorado's more expansive decision, many other state PUCs have begun to examine their own consumption data privacy practices.

In their recent paper "Energy Consumption Data: The Key to Improved Energy Efficiency," Klass and Wilson document how these types of PUC rulings have begun to conflict with an increased interest in local and state laws that seek to improve building energy efficiency through data transparency laws.[30] The question is one of jurisdiction: who has authority to decide data access policies, a local government or a Public Utilities Commission?

This question is important because many local transparency laws require state and local officials to obtain CEUD in order to benchmark energy use; but data acquisition has sometimes been at odds with aggregation levels such as the 15/15 standard. On one hand, aggregation levels do not necessarily line up with existing building stock; a city official who wants to benchmark a building with four meters will not be able to understand the building's energy use if the minimum aggregation level is set at fifteen accounts. Conversely, a city official who wants to benchmark a building with fourteen meters will need to obtain written consent of energy disclosure from each and every account holder.[31]

Klass and Wilson's jurisdiction question will only become more pressing as an increasing number of state and local bodies have enacted building benchmarking and transparency policies. In the last month alone both Atlanta and Portland, OR have enacted transparency policies. IMT and partner organization Building Rating have recently published the most current map of disclosure policies across the country:

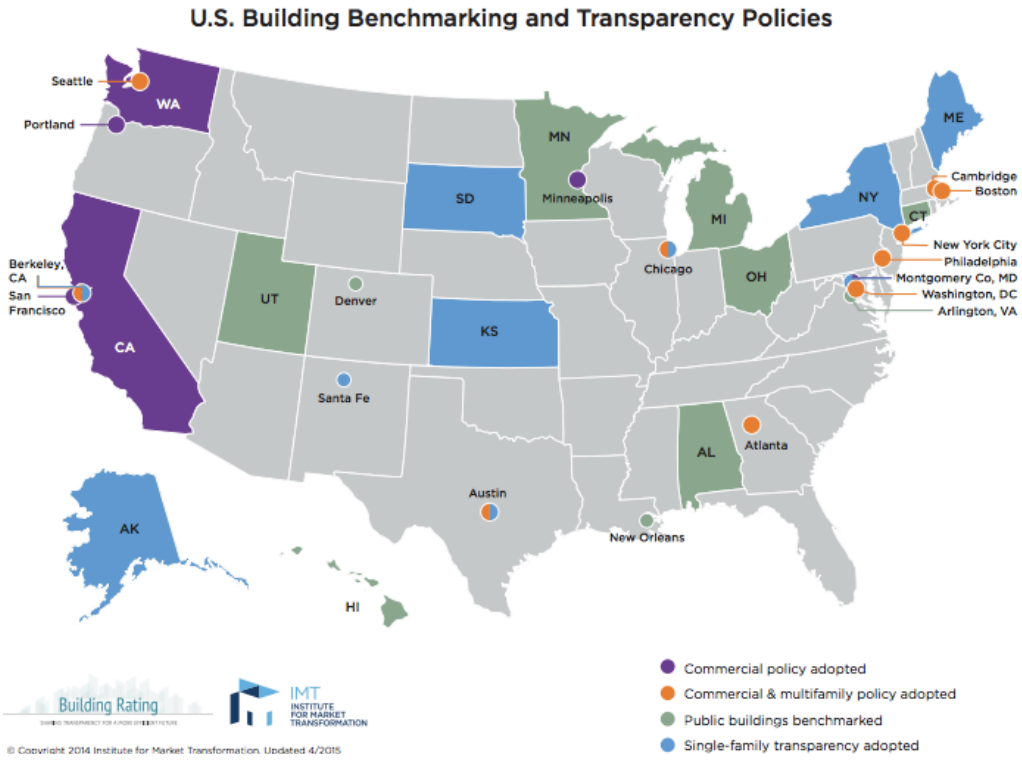


Figure 3. U.S. Building Benchmarking and Transparency Policies, Institute for Market Transformation and Building Rating.
Source: Keicher, "Map: U.S. Building Benchmarking and Transparency Policies."

IMT and Building Rating identify four types of disclosure policies around the country: Commercial, Commercial and Multifamily, Public Buildings, and Single-Family. Contrast to this, the American Council for an Energy-Efficient Economy ("ACEEE") identifies four types of transparency laws: Asset Ratings, Utility Bills, Energy Efficiency Features, and Benchmarking.[xxxii]

Notably, while many policies address commercial, multi-family, and public buildings, fewer deal with the disclosure of single-family transparency policies. However, single-family transparency policies, along with single-meter transparency policies, are the most applicable when talking about disclosure in the housing and rental markets. To complicate matters even further, single-family disclosure policies range in the scope of implementation. ACEEE provides the following examples of types of ordinances:

Location and Policy	Policy goals	Disclosure Requirement (strategy for meeting goal)
Austin, TX Energy Conservation and Disclosure Ordinance (ECAD)	A. Increase number of green jobs in the city; B. Spur participation in energy efficiency retrofit programs.	A. Require energy audits of all homes listed for sale; B. Provide information in audit materials to connect homeowners with existing programs.
Santa Fe, NM HERS Rating Requirement	A. Ensure energy code compliance for new homes; B. Increase stringency of the energy code.	A. Require a Home Energy Rating System (HERS) rating to be posted in all new homes; B. Require a specific HERS rating for all new residential construction.
Chicago, IL Residential Energy Use Disclosure	A. Provide information about energy use and costs to homeowners at the time of purchasing or renting a home B. Encourage retrofits of homes to increase efficiency.	A. Disclose one year of energy use data at the time of sale or rental for residential single family buildings and individual units. Enable easier compliance by linking energy use data with the local MLS home listing service. B. The City of Chicago has an existing program in place to supplement energy disclosure information, called Retrofit Chicago, which provides incentives for residential retrofits.

Table 3: ACEEE's Examples of Exiting Disclosure Policy Goals and Requirements.
Source: American Council for an Energy-Efficient Economy, "Residential Energy Use Disclosure: A Guide for PolicyMakers."

Simply, even those these policies all deal with disclosure in the housing and rental markets, they disclose different types of information. While Austin's policy releases building energy audit information, Santa Fe's releases building rating, and Chicago's releases building data.

In order to enact these types of policies, a critical question has been the jurisdictional relationship of the utility, local government, and governing PUC. The question of conflicting jurisdictions came to a head in Minnesota when, in February of 2013, the City of Minneapolis adopted a benchmarking ordinance requiring commercial buildings over 50,000 square feet and city-owned buildings over 25,000 square feet to annually benchmark and report to the City their energy usage.[32] By this time, Xcel Energy, already having implemented 15/15 in Colorado, was interested in implementing the same standard in Minnesota.

The Minnesota Public Utilities Commission

In March of 2012, Xcel Energy ("Xcel") filed a Customer Data Privacy Tariff with the MPUC in Docket 12-188, which would allow Xcel to adopt the "15/15" rule in Minnesota.[33] Many groups, including the City of Minneapolis, commented on the filing, stating that the 15/15 rule was unusable for the purposes of benchmarking. The filing and subsequent comments resulted in questions from the MPUC regarding wider utility data privacy questions: What were the common practices amongst utilities? What is an adequate level of aggregation for protecting customer privacy while still ensuring that benchmarking groups can effectively meet their state-mandated goals?

To analyze these questions, MPUC opened a new docket, 12-1344, and established a CEUD Work Group in June of 2013.[34] Facilitated by a judge from the Office of Administrative Hearings, the CEUD Work Group was made up of participants and observers representing utilities, cities, state agencies, nonprofits, and trade groups. Of the participating utilities (Xcel, CenterPoint, Dakota Electric Association, and Minnesota Power), none reported currently using AMI.[35] The Work Group met over the course of nine months to discuss the tradeoffs between data access and privacy, and in the end produced a report detailing recommendations for the MPUC.

Much of the Work Group's report dealt with the question of jurisdiction: does the MPUC have the authority to regulate consumption data practices? In the end, the Work Group decided that the MPUC does have the authority because, as Xcel put it "If we charge, it's a rate. If we provide data without charge, it's a service. Both rates and services are covered by the PUC's broad authority."[36]

Much of the Work Group's report described various use cases of how data might be sought and used by third parties. Almost unanimously,[37] the Work Group decided that any use cases involving individual account-level data should not be considered eligible for release to third parties absent consent. This included two use cases that involved the release of individual CEUD in the housing market.

Early on during the meetings of the Work Group, all participating utilities reported that, upon request, they will give out average annual usage data, along with high month/low month figures to prospective homebuyers, renters, and affiliated real estate agents. However, this changed during the course of the Work Group's meetings. The final report states:

> The only reported caveat to this general practice [of not disclosing individual account-level data] relates to utilities' historic practices involving realtors. For decades, some utilities have provided information about a specific property's average annual utility usage and costs to realtors upon request, without proof of consent from a current or former owner or building occupant. Participants explained that this practice grew out of the recognition that this information is useful to facilitate sales and lease transactions. Given the level of current public interest in privacy issues, Xcel Energy recently changed its practice and now requires requesting realtors to obtain specific consent from utility customers, thus handling these requests in the same manner as those from all other non-customer-of-record requestors. Both CenterPoint Energy and Dakota Electric Association reported that they continue to provide realtors, upon request, with a property's average energy usage over the past 12-month period without seeking or obtaining customer consent.[38]

Xcel has since confirmed that it continues to require customer consent in order to disclose any CEUD, including instances involving prospective buyers and renters.[39] Additionally, since the time of the CEUD Work Group Report, CenterPoint has also changed its policy to limit disclosure only to cases where consent is given.[40]

A critical thing to note, however, is that these utility policy changes have not been enacted to intentionally harm customers; to the contrary, Xcel Energy has expressed interest in providing the best customer service possible in this regard, with an appropriate balance between data access and data privacy.[41] However, without direction from the MPUC, the utilities are putting themselves at risk by providing any data, even average annual data, to requestors. In order to eliminate this liability, utilities must have explicit direction from the MPUC.

Since the MN dockets were first opened, a few new changes have occurred on the national scene. In 2014, California made an official statewide ruling to include different types of data disclosure standards for different customer classes and use cases.[42] More recently, Colorado has enacted a rule that would allow an aggregation standard of 4/50, for whole buildings only.[43] In January, the US DOE released a Voluntary Code of Conduct ("VCC"), meant to serve as a guide for state regulators deciding upon energy data privacy rules.[44] Last month, the American Statistical Association's ("ASA") Privacy and Confidentiality Committee and Energy Subcommittee released "Recommendations for State Public Utility Commissions to Assess the Sensitivity of Tabular Data Revealing Identifiable Energy Consumption Information." As part of their recommendations, they state that the "15/15" rule is too restrictive and recommends that

"sensitivity rules" should vary depending on the customer class, the utility's distribution and population counts throughout their entire service territory for that class, and the specific needs of the local government requesting the information.[45] Given these decisions and releases, there appears to be a trend toward tailoring different data access policies to different use cases.

As of yet, the MPUC has not made a rule about either docket 12-188, or docket 12-1344. The Executive Secretary of the MPUC recently decided to reconvene the Work Group for an additional two meetings, dates to be determined, to gather input on the DOE's VCC.[46]

Data Use Case: Housing and Rental Market Disclosure

As illustrated by the recent precedents in California, Colorado, and by the DOE and ASA, it important to establish different types of privacy policies for different use cases when looking at Minnesota. It is therefore also important to fully specify the type of data, how it might be inappropriately used, and whether cited privacy concerns are warranted. Through this discussion, it becomes clear that existing efforts to define this type of use case have fallen short.

The CEUD Work Group identifies three different use cases that specifically relate to the housing and rental markets.[47] The table below describes some of the characteristics identified about each:

	Use Case #1	Use Case #2	Use Case #3
Use Case Type/Category	Individual CEUD	Individual CEUD	Energy Benchmarking Multi-tenant/Multi-family/Commercial Building with Separate Tenant Meters
Requestor (who wants the data)	Real Estate Agents	Homeowner or potential homeowner	Real Estate Agents to facilitate sale or rental transaction
Describe the Data (kWh, Therms, Participants, etc)	Kwh; therms; cost	Kwh; therms; cost	Kwh; therms; cost
Data Interval and Frequency (interval, monthly, annual, etc	Average annual monthly data	Average annual monthly data	Monthly & average annual data each year
Granularity (describe the categories/subtotals/data breakdowns)	Individual building and/or meter	Individual building and/or meter	Individual building; may include multiple meters
Purpose (Why is the Data Wanted/Needed?)	By real estate agents/homebuyers to calculate annual energy budget	Individual benchmarking-previous data may be needed to measure progress	By real estate agents/buyers to calculate annual energy budget
How will the Data Be Used?	For potential owners to calculate annual budgets; to calculate cost-benefit analysis for energy improvements pre-sale	To calculate cost-benefit analysis for energy improvements; to measure energy efficiency improvements from previous owner	For potential owners to calculate annual operations budgets; to calculate cost-benefit analysis for energy improvements pre-sale; to measure energy efficiency improvements from previous owner

Table 4. Use Cases relating to the rental and housing markets, as identified in the Minnesota Public Utilities Commission's Customer Energy Usage Data Work Group Report.
Source: CEUD Work Group Report, 2014, Appendix H.

In examining these use three cases, it is clear that Use Cases #1 and #2 are the most applicable to the current discussion. Use Case #1 identifies ways in which prospective homeowners may wish to assess operating costs and the costs of potential improvements; Use Case #2 identifies ways in which existing and prospective homeowners may wish to understand energy use and costs, and estimate the cost effectiveness of past improvements. However, Use Case #3 is inadequate at presenting the type of data that might be requested by a prospective renter because it inappropriately groups buyers of multi-family properties with renters of multi-family properties. It then fails to provide information relevant to a prospective renter who might want the data. While buyers of multi-family properties are an important use case, this paper does not concern that group. However, Use Case #2 raises an important point relevant to prospective tenants of multi-family buildings with separate meters: "previous data may be needed." Prospective tenants are often faced with this dilemma in separately metered buildings, as the landlord does not have access to the previous tenant's account. Ultimately, however, while Use Cases #1 and #2 fairly represent how prospective homebuyers may want access to data, no meaningful information has been identified about disclosing information to prospective renters.[48]

There is another important difference between Use Cases #1 and #2, as opposed to Use Case #3. While the first two only describe the release of "average annual monthly data," Use Case #3 describes the release of both average annual data and "monthly" data. This distinction between "monthly" data and "average annual" data is an important one to differentiate, as time interval of data is a crucial component to understanding consumption data sensitivity. The following discussion will attempt to show how monthly and average annual data provide different amounts of information regarding resident behavior, but that both types provide significantly less information than minute-based data.

IMT proposes a Utility Data Sensitivity Matrix,[49] which can be helpful in visualizing the sensitivity of different types of data:

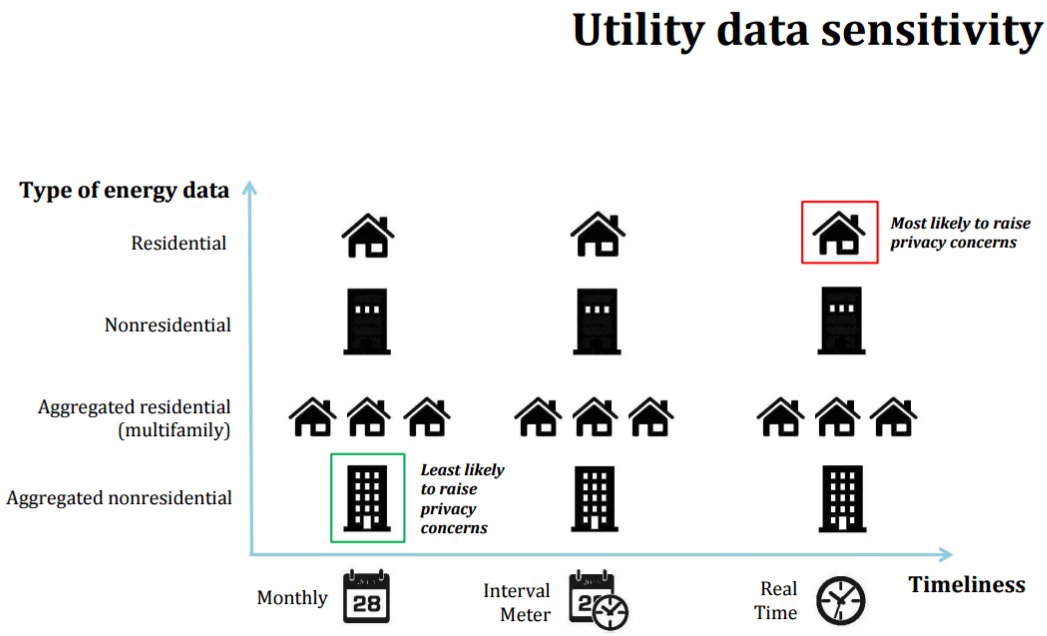


Figure 4. Institute for Market Transformation's Data Sensitivity Matrix.
Source: Burr, Keicher, and Majersik, "Utility Data Sensitivity Matrix."

As the number of aggregated meters decreases, data becomes more sensitive in terms of privacy. Thus, the most sensitive data is considered to be Residential, Real-Time data, as shown in the Wood and Newborough graph. The least sensitive data is considered to be Aggregated, Not-Residential data.

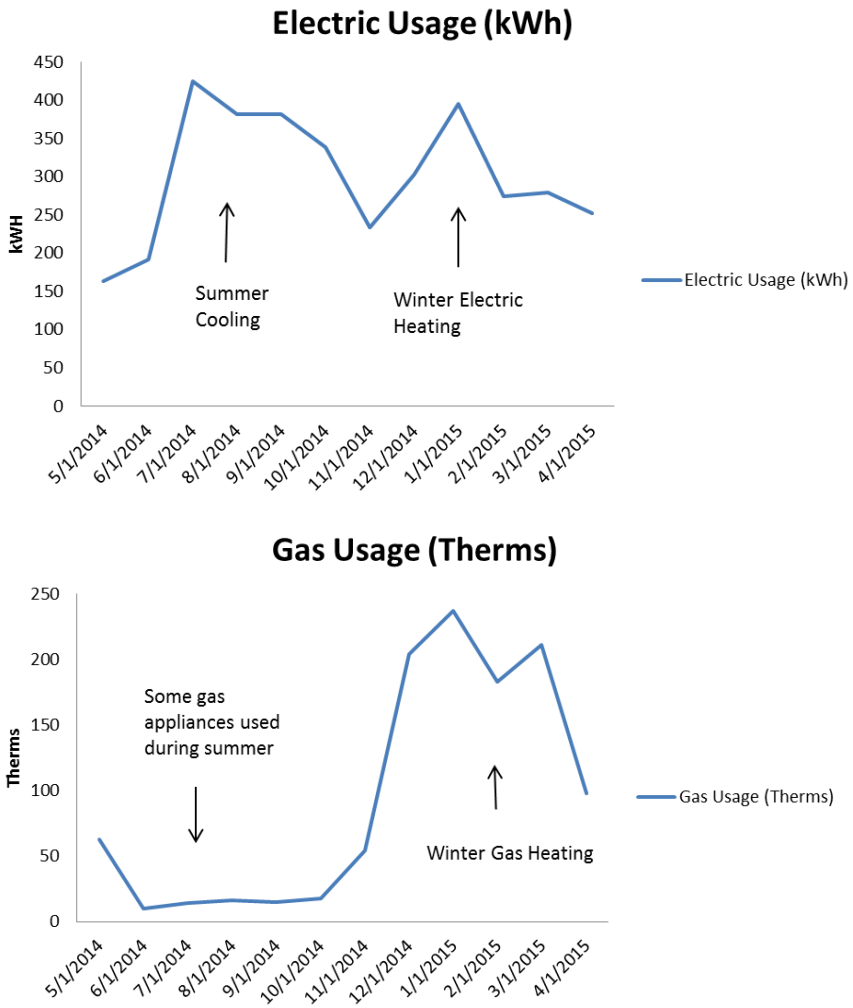
If we consider the data interval proposed in Use Case #3, monthly data, this discussion focuses on the upper left-hand house in IMT's Matrix, a single-metered Monthly Residential disclosure. In terms of the current discussion on data privacy, this data can be considered "semi-sensitive." On one hand, it is the most sensitive, least aggregated class of customer. On the other hand, it is the least sensitive type of data in terms of timeliness.

To demonstrate what this data looks like, the following table shows an example of one year's worth of monthly billing and usage data, along with read dates, billing days, average monthly temperature, and additional fees:

Last Read Date	Billing Days	Average Temp	Electric Usage (kWh)	Electric Charges	Gas Usage (Therms)	Gas Charges	Total Fees	Gas and Electric Total
4/14/2015	29	42 ° F	252	$36.39	98	$79.46	$2.79	$118.64
3/16/2015	32	22 ° F	279	$38.99	211	$172.89	$2.98	$214.86
2/12/2015	29	25 ° F	274	$39.37	183	$149.89	$3.01	$192.27
1/14/2015	34	19 ° F	395	$52.70	237	$202.52	$4.02	$259.24
12/11/2014	31	21 ° F	302	$42.39	204	$176.78	$3.23	$222.40
11/10/2014	29	48 ° F	233	$34.68	54	$50.20	$13.61	$98.49
10/12/2014	31	57 ° F	338	$48.69	18	$22.15	$17.87	$88.71
9/11/2014	30	71 ° F	382	$56.45	15	$19.90	$18.44	$94.79
8/12/2014	29	74 ° F	382	$56.94	16	$20.10	$18.59	$95.63
7/14/2014	32	72 ° F	425	$62.77	14	$19.06	$19.20	$101.03
6/12/2014	30	65 ° F	192	$31.65	10	$16.26	$13.76	$61.67
5/13/2014	29	49 ° F	163	$27.47	63	$54.72	$9.25	$91.44
Past Year Monthly Averages	30	47 ° F	301	$44.04	94	$81.99	$10.56	$136.60
Past Year Monthly Totals	365	n/a	3617	$528.49	1123	$983.93	$126.75	$1,639.17

Table 5. Example of monthly customer energy usage data, based on personal data generated from Xcel Energy's website.
Source: Personal data generated from Xcel website, "Xcel Energy: Home: My Account: My Usage: Download Energy Usage Report."

For purposes of comparison, we can graph this data and overlay Wood and Newborough's strategy of identifying behavior patterns through energy use.[50]



Figures 5 and 6: Graphs generated from CEUD data, with Wood and Newborough behavior overlays. Source: Generated from personal data.

The month-increment graph exposes different types of household activities from those exposed by the minute-increment graph. Someone analyzing this data would not be able to see when appliances have been operating throughout the course of the day. Rather, they would be able to infer heating and cooling versus baseload energy use, whether the property heats with electricity, and whether the property has gas appliances used during the summer. Additionally, although not shown in these graphs, monthly data could also be used to infer whether the property had been vacant for more than one month, used seasonally, or had some kind of appliance that had a very large electric draw throughout the year. Examples of appliances producing such draws are pools, hot tubs, medical equipment, and large amounts of lighting or electronics. However,

while the presence of a large electric draw could be detected, the source of the draw could not be definitively identified through monthly data alone.[51]

If we instead consider the data proposed for release in Use Cases #1 and #2, average annual data, in IMT's data sensitivity matrix, our discussion falls to the left of the upper left hand house, identified by the green circle. Simply, this data is even less sensitive than monthly data.

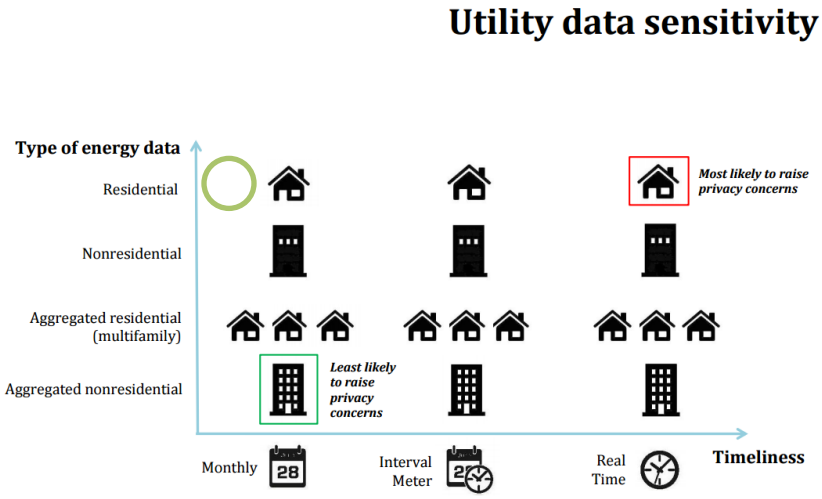


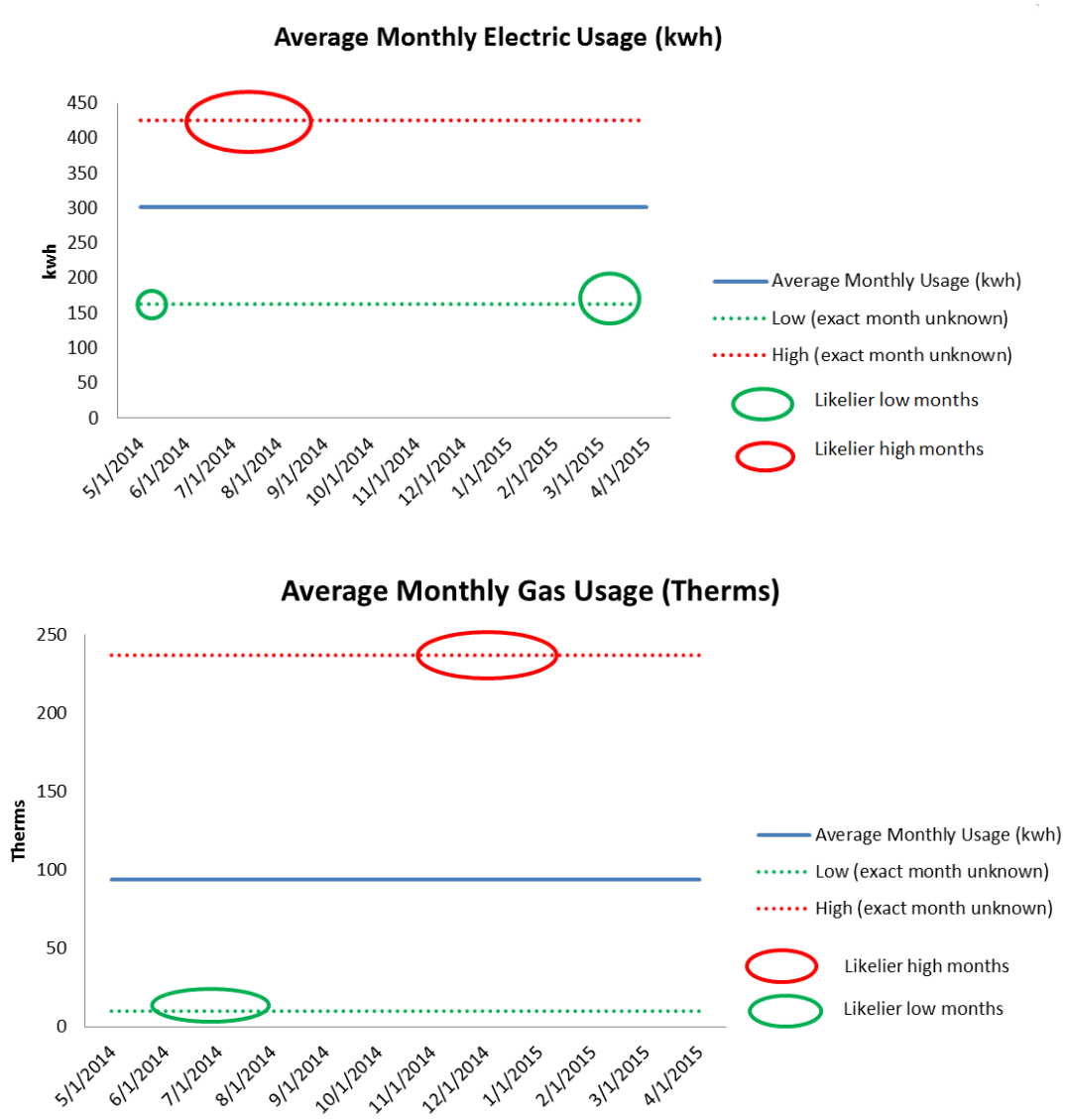
Figure 7: IMT's Utility Data Sensitivity Matrix with Green Circle identifying sensitivity placement of average annual data.
Source: Burr, Keicher, and Majersik, "Utility Data Sensitivity Matrix," altered.

Using the same data as in the monthly example, this is an example of how average annual information might be presented:

1	Meter: Gas	Therms	Cost	Number of Days in Billing Period	Heating
	High:	237	202.52	34	Yes
	Low:	10	16.26	30	
	Monthly Average:	94	81.99	30	
1	Meter: Electric	Kilowatt Hours	Cost	Number of Days in Billing Period	Heating
	High:	425	62.77	32	No
	Low:	163	27.47	29	
	Monthly Average	301	44.04	30	

Table 6. Example of average annual customer energy use data, based on personal data generated from Xcel Energy's website.
Source: Generated from personal data from Xcel Energy's website, modeled after lookup tool through Madison Gas and Electric, "Madison Gas and Electric: Average Energy Use and Cost for Residential Addresses."

When average annual data is graphed and behavioral patterns are overlayed, we can come up with the following graphs:



Figures 8 and 9: Graphed average annual CEUD with Wood and Newborough behavior overlay.
Source: Generated from personal CEUD data from Xcel Energy Website.

With average annual data, along with high month and low months, it is possible to see overall home energy use and cost throughout the year, and to guess which months may be higher- or lower-use based on residential gas and electricity use patterns.[52]

With this in mind, the previously identified privacy concerns are no longer as relevant:

Privacy Concern	Discussion in regards to disclosure in housing/rental markets
1. Identity Theft	Seller/landlord has already released their name to buyer/tenant, although previous tenant may be unknown by name; generally, not relevant
2. Determine Personal Behavior Patterns	Possible to see that property had been used seasonally in past and infer that seller or previous tenant may occupy their next property seasonally
3. Determine Specific Appliances Used	Possible to infer that property was heated with electric heat or had some energy-intensive appliance, such as a pool or hot tub; the existence of these types of appliances, with the exception of space heaters, would be disclosed to buyer/renter anyway
4. Perform Real-Time Surveillance	Not relevant
5. Reveal Activities Through Residual Data	Not relevant
6. Targeted Home Invasions (latch key children, elderly, etc.)	Not relevant; data would be from previous account holder, and so would not apply to future account holder
7. Provide Accidental Invasions	Not relevant
8. Activity Censorship	Not relevant
9. Decisions and Actions Based Upon Inaccurate Data	Not relevant
10. Profiling	Possible to profile a seller as a seasonal home user. Also, if person using data had access to meaningful comparable data, seller could be identified as a higher or lower than average energy user.
11. Unwanted Publicity and Embarrassment	Possible to profile a seller as a seasonal home user. Also, if person using data had access to meaningful comparable data, seller could be identified as a higher or lower than average energy user.
12. Tracking Behavior Of Renters/Leasers	Landlords may be able to see if property was used seasonally or had higher or lower than average bills
13. Behavior Tracking (possible combination with Personal Behavior Patterns)	Not relevant
14. Public Aggregated Searches Revealing Individual Behavior	Not relevant

Table 7: Potential Privacy Impacts cited by Anti-Smart Meter Advocates, as applied to either monthly or average annual consumption data.
Source: Altered table from Herold, "Potential Privacy Impacts for Smart Grid Information Disclosure and Misuse." Electronic Privacy Information Center, "The Smart Grid and Privacy."

These demonstrations show that the longer the data interval, the less information about behavior patterns can be determined. While it can be useful to demonstrate how different time intervals of data reveal different types of usage patterns, at the end of the day, this data comes from households that will no longer reside at the property producing the data. Even if someone were planning on using CEUD to assess resident behavior patterns, information obtained would cease to be relevant as a new household moves into the property.

However, the more important point of this discussion is that while the release of this information does not pose a significant privacy threat to existing (soon-to-be-previous) account holders, it does provide prospective account holders with a significant benefit in being able to plan for their operating and investment costs. Local governments around the country have recognized this benefit, as various cities have enacted ordinances that require data or rating disclosure in the housing and rental markets.

Case Study: Existing Disclosure Options in Saint Paul, MN

In order to survey the existing types of disclosure options within a local area, this paper uses Saint Paul, Minnesota as a case study. Saint Paul is provided with both natural gas and electricity by Xcel Energy.

I propose a modified alternative to ACEEE's previously identified disclosure types of Asset Ratings, Utility Bills, Energy Efficiency Features, and Benchmarking. Instead, I suggest Data, Rating, Structure, and Combination Disclosures. These new categories are more applicable to disclosure in the housing and rental markets: Data Disclosure is more comprehensive than Utility Bills, as it specifies both energy use and costs, whereas Utility Bills can be interpreted to mean just costs; Rating corresponds well to Asset Rating; Structure can include Energy Efficiency Features, but involves a more comprehensive disclosure about the physical structure of the property; Combination, such as an Energy Audit, involves a combination of Data, Rating, and/or Structure Disclosure. To demonstrate how this model can be used to assess effectiveness at reducing energy information asymmetry in the housing and rental markets, these disclosure types will be applied in the following case study of existing disclosure options in Saint Paul, Minnesota.

Table 8 lists existing options by Type of Disclosure (Data, Rating, Structure, Combination), Disclosure Option, and Administering Body. Each option will then be described and evaluated based on its effectiveness at reducing information asymmetry in the housing and rental markets.

Type of Disclosure	Disclosure Option	Administering Body
Data	Consent Forms	Xcel Energy
	Renter's Single-Meter Disclosure	Landlord
Rating	Green Building	NorthStar MLS
	HERS Index	NorthStar MLS
Structure	Truth-in-Sale-of-Housing ("TISH")	City of Saint Paul
	Seller's Disclosure	Seller
	Appraisal	Appraiser
	Home Inspection	Home Inspector
	Rental Inspection	City of Saint Paul
Combination	Direct Request	Buyer
	Energy Audit	Neighborhood Energy Connection (Xcel Energy), Independent Contractors

Table 8: Existing Disclosure Options in the Saint Paul Housing and Rental Market
Source: Generated from survey of Saint Paul disclosure landscape.

Data Disclosure

Consent Forms

Xcel will release consumption data to a third party if the existing account holder agrees through a written consent form. Requestors must provide their name and contact information, along with their reason for requesting the data. Requestors have the option to see data for the past month, most recent 12 months, most recent 24 months, or most recent 36 months.[53]

A landlord who actually wants to provide information to a prospective tenant will often encounter difficulties releasing data because the previous tenant's information is not the landlord's to give. In such cases landlords do not have information about their own property, which is a problem in itself. To mitigate this, it is possible for a landlord to request that a new tenant sign a consent form when signing the lease. Doing so ensures that the landlord will have

future access to account information, and also means that the landlord can release this data to future tenants if they choose to do so.

Renter's Single-Meter Disclosure

According to Section 504B.215 of the Minnesota Statutes, landlords who rent a "single-metered residential building" must disclose energy information costs to prospective tenants.[54] A "single metered residential building" is described as "a multiunit rental building with one or more separate residential living units where the utility service measured through a single meter provides service to an individual unit and to all or parts of common areas or other units." With limited exceptions, the landlord of a single-metered residential building must be the account holder for that meter, and must provide prospective tenants with monthly billing information for the past year. The following statutory excerpt shows the disclosure provisions:

> 504B.215 BILLING; LOSS OF SERVICES.
>
> Subd. 2a. **Conditions of separate utility billing to tenant in single-meter buildings.**
>
> (a) A landlord of a single-metered residential building who bills for utility charges separate from the rent:
>
> (1) must provide prospective tenants notice of the total utility cost for the building for each month of the most recent calendar year;
>
> (2) must predetermine and put in writing for all leases an equitable method of apportionment and the frequency of billing by the landlord;
>
> (3) must include in the lease a provision that, upon a tenant's request, the landlord must provide a copy of the actual utility bill for the building along with each apportioned utility bill. Upon a tenant's request, a landlord must also provide past copies of actual utility bills for any period of the tenancy for which the tenant received an apportioned utility bill. Past copies of utility bills must be provided for the preceding two years or from the time the current landlord acquired the building, whichever is most recent; and

(4) may, if the landlord and tenant agree, provide tenants with a lease term of one year or more the option to pay those bills under an annualized budget plan providing for level monthly payments based on a good faith estimate of the annual bill.

Rating Disclosure

Rating Filters on NorthStar MLS[55]

The only rating disclosure mechanism currently available to prospective homebuyers is through the NorthStar Multiple Listing Service ("MLS"). The NorthStar MLS is the largest MLS in the state of Minnesota, as four of its members are REALTOR Associations that comprise 80% of the REALTORS in the state.[56]

One year ago, the NorthStar MLS added two rating search filters into their home search options: a checkbox for "Green Certification" and an option for reporting Home Energy Rating System ("HERS") Index. The Green Certification checkbox indicates that a home has received any type of third-party green building certification.[57] Of the estimated 20,000 properties currently listed on the NorthStar MLS, about 70 of these have a HERS rating. It is unknown how many are labeled as having a Green Certification.

A seller who receives a Green Certification or a HERS rating and wants to report it can ask their real estate agent to list it on the NorthStar MLS. However, this disclosure is not mandatory, and if a seller receives an inefficient HERS score, they are not required to disclose it. Only members may use the NorthStar MLS database, however, so individual homebuyers mostly cannot search the database. Still, individual homebuyers can search real estate listings through brokerage websites, which draw upon the MLS. When a new search filter is added, it generally does not get passed along to brokerage websites until it has been around at least a year. This is done to make sure there aren't any unforeseen consequences from the new information's introduction into the market.

The Green Certification button and the HERS rating disclosures have not yet been approved for disclosure beyond the MLS, and so do not appear on brokerage websites and cannot

be searched by individuals. They are likely to become available on brokerage websites in the summer of 2015.

Structure Disclosure

Truth in Sale of Housing[58]

The basic purpose of most Truth in Sale of Housing ("TISH") laws is to provide a homebuyer with an unbiased visual inspection that shows a "snapshot" of a house at a particular time. In Saint Paul, TISH reports are required with each property sale,[59] and so are available to the general public through the City's website.[60] The Saint Paul TISH report also provides a supplemental section for home insulation assessment. TISH inspectors may report the presence, type, and depth of insulation found in the attic, foundation, knee walls, and rim joists of the home. Homebuyers looking for energy information about the property may look to this supplemental section of the TISH report to understand insulation levels.

Seller's Disclosure

The seller's disclosure law of Minnesota operates on a statewide level and is a form of guaranteed disclosure to consumers in the housing market. Seller's Disclosures are required at every point of sale. The Disclosure is a form, filled out by the Seller, which tries to capture both the historical and existing conditions of the property; it does not require energy information to be listed on the form. The statute states:

> **513.55 GENERAL DISCLOSURE REQUIREMENTS.[61]**
>
> Subdivision 1.**Contents.**
>
> (a) Before signing an agreement to sell or transfer residential real property, the seller shall make a written disclosure to the prospective buyer. The disclosure must include all material facts of which the seller is aware that could adversely and significantly affect:
>
> (1) an ordinary buyer's use and enjoyment of the property; or
>
> (2) any intended use of the property of which the seller is aware.
>
> (b) The disclosure must be made in good faith and based upon the best of the seller's knowledge at the time of the disclosure.

> Subd. 2.**Disclosure to licensee.**
>
> A seller may provide the written disclosure required under sections 513.52 to 513.60 to a real estate licensee representing or assisting the prospective buyer. The written disclosure provided to the real estate licensee representing or assisting the prospective buyer is considered to have been provided to the prospective buyer. If the written disclosure is provided to the real estate licensee representing or assisting the prospective buyer, the real estate licensee shall provide a copy to the prospective buyer.

Appraisals

Appraisals are a form of structure disclosure that are available to homebuyers in Minnesota, but are intended to inform the lender about the property's value, rather than educate the homebuyer about the structure. While appraisals are not a required by law to purchase a house, they are typically required by lender to obtain a mortgage loan. Minnesota appraisers are required to adhere to certain standards of practice and conduct,[62] although there is no standard stating that they must include energy-related information in their evaluation.

However, it is common for lenders to require appraisers to use standard documents such as the Uniform Residential Appraisal Report ("URAR," Form 1004) or the Individual Condominium Unit Appraisal Report (Form 1073), both of which are distributed by the Federal National Mortgage Association ("FNMA" or "Fannie Mae").[63] The URAR contains many checkboxes that could be used to infer information about the property's energy use—such as heating fuel type, age of property, presence of a pool, etc.—as well as a specific line item for valuing "energy efficient items."[64]

Home Inspections

Prospective Saint Paul homebuyers have the option to request a home inspection prior to sale. Home inspectors in Minnesota are not required to be certified and there is no uniform home inspection process; as such, a home inspection may or may not provide a prospective buyer with energy-related information.

Rental Inspections

Prospective Saint Paul renters can find property-specific structural information related to health and safety through City Rental Inspection results. Owners of Saint Paul rental properties are required to register their properties with the City and have periodic Fire Inspections through the Department of Safety and Inspections. Inspection results are available in-person or through the City's online property lookup tool. Information about energy costs is limited to minimal shell-related structural considerations, such the presence of doors and windows.

Combination Disclosure

Direct Disclosure

Direct disclosure entails the buyer or renter asking the seller or landlord directly about utility bills, rating, or structural information. The successful transfer of information relies upon the information existing in a useful format; the owner being willing to disclosure the information; the owner having access to the information, and; the owner being able to effectively transmit the information to the buyer or renter.

Energy Audits

A prospective buyer in Saint Paul may request an energy audit from a seller. In Saint Paul, audits requested by prospective homebuyers will usually be provided through Xcel Energy and administered by a local nonprofit, The Neighborhood Energy Connection ("NEC").[65] If the seller consents to an energy audit, the auditor will provide the buyer with consumption data, an Energy Fit Homes rating score,[66] and energy-related structural information about the property.

Discussion of Existing Options

To evaluate each option's effectiveness at reducing energy information asymmetry in the housing and rental markets, this paper first identified elements that would make up a strong energy disclosure policy. The policy that will be the most effective at reducing energy information asymmetry in the rental and housing markets will:

1. Provide consumers with adequate information about energy cost and use;
2. Provide consumers with access to the same types of information for comparable properties;
3. Be mandatory, and;
4. Be available for both prospective homebuyers and renters.

Therefore, to evaluate the effectiveness of existing disclosure policies at reducing energy information asymmetry, the paper asks the following of each option:

1. To what degree does the existing disclosure option provide prospective buyers and renters with information about energy cost and use at the property? (3=high, 2=med, 1=low, 0=none)?
2. To what degree does the existing disclosure option allow prospective buyers and renters to compare the disclosed information with other similar properties?
3. To what degree is the disclosure option mandatory?
4. To what degree does the disclosure option exist in both the housing and rental markets?

A perfectly effective disclosure option, therefore, will receive a score of 12, while a completely ineffective option will receive a score of zero.

Type of Disclosure	Disclosure Option	Disclosure Provides Consumer with Energy Cost and Use Information	Disclosure Allows Consumer to Easily Compare Information with other properties	Mandatory	Exists in Housing and Rental Markets	Effectiveness Scores
Data	Utility Disclosure (consent form required)	3	1	0	2	6
	Renter's Single-	3	2	3	0	8

	Meter Disclosure					
Rating	Green Building	2	2	0	0	4
	HERS Index	2	2	0	0	4
Structure	Truth-in-Sale-of-Housing (TISH)	1	3	3	0	7
	Seller's Disclosure	1	1	3	0	5
	Appraisal	1	1	3	0	5
	Home Inspection	1	0	0	0	1
	Rental Inspection	0	2	3	0	5
Combination	Direct Request	3	1	0	2	6
	Energy Audit	3	0	0	0	4

Table 9: Effectiveness Assessment of Existing Disclosure Options in the Saint Paul Housing and Rental Market
Source: Generated from survey of Saint Paul disclosure landscape.

Based on the selected criteria for reducing information asymmetry, the Renter's Single-Meter Disclosure ranks the highest, while Home Inspections ranks the lowest. Interestingly, the group that the Renter's Statute is intended to serve—renters who pay energy costs that are "rolled-in" to their rent—is less likely to have an incentive to conserve energy because they aren't the ones paying the bills. While this disclosure option does provide a high degree of consumer protection for a group that might otherwise be completely unprotected from price gauging by landlords, there is little information about whether it actually has helped prospective renters exert market pressure on landlords to invest in efficiency measures.

One notable trend is that while data and combination disclosures options provide high levels of information on energy cost and use to the consumer, rating disclosure provides medium levels, and structure disclosure provides low levels. Rating disclosure, while a good measurement of building efficiency, does not provide a customer with a picture of energy cost and use; just because a home uses energy efficiently does not mean that it has low energy bills and use relative to other properties on the market.[67] While certain structure disclosures do consider factors such as level of attic insulation, the relationship between the physical attributes and energy use is difficult to assess without data and other forms of testing; for example, a home may be well-insulated, but

improperly air sealed, which would reveal itself during a blower door test but not a naked eye inspection.

Ultimately, no single existing policy in Saint Paul is completely effective at reducing information asymmetry in the housing and rental markets; in fact, most existing disclosure options are less than fifty percent effective based on the above criteria.

Policy Alternatives

To address this market deficiency, this paper proposes the following alternatives for evaluation:

1. The City of Saint Paul should adopt an Audit Disclosure Ordinance;
2. The Minnesota Public Utilities Commission should make a rule on Docket 12-1344, or a separate docket if needed, that directs regulated utilities to make available average annual building energy use and cost information to the public, and;
3. The Minnesota Legislature should amend the Seller's Disclosure statute to specify that energy use and information is required at point of sale.

To evaluate these proposed alternatives, this section will examine each of these alternatives based on the following criteria: cost effectiveness, potential impact, political feasibility, and administrative feasibility. In determining cost-effectiveness, the same effectiveness criteria will be used as presented in the Saint Paul case study. Assessments are discussed in the sections below, with summary tables listed after the proposed alternatives.

Policy Alternative 1: Audit Disclosure Ordinance

The City of Saint Paul should adopt an Audit Disclosure Ordinance, similar to Austin Energy's Energy Conservation Audit and Disclosure ("ECAD") Ordinance. The ECAD Ordinance was enacted in 2008, implemented in 2009, and amended in 2011. It requires that all sellers of residential properties served by Austin Energy, a municipal electric utility, within the Austin city limits, receive an energy audit before sale of the home. In addition, all multi-family properties must receive an energy audit every ten years and provide existing and prospective tenants with audit results. Energy audits in Austin release data, rating, and structure information.

Based on these established effectiveness criteria, an audit disclosure ordinance in Saint Paul modeled after Austin's ECAD Ordinance would be very effective at disclosing energy cost and use information to prospective participants, particularly if audits continued to provide

information about data, rating, and structure. Likewise, it would be effective at allowing prospective homebuyers and renters to compare energy cost and use information across their respective markets. While this type of policy would reach both prospective buyers and prospective renters of multi-family units, it does not reach one group that may be a substantial one in Saint Paul: renters of non-multi-family units.

This type of program is likely to be very expensive; Xcel currently provides audits at a cost of $100.00 for a single-family home, a rate much lower than the real market value of an audit, which ranges from $250.00 to $375.00.[68] The costs are just for the audits themselves, and do not account for the administrative costs that would be incurred at the city, MLS, and NEC levels.

To assess potential impact, some very rough estimates can be made by looking to the energy, cost, and emissions savings experienced by Austin in their first year of the ordinance.

	Austin (first year of program)[69]	Saint Paul (predicted)[70]
Population (2010)	810,759	285,068
Energy Savings (kwh/year)[71]	7,788,000	2,738,310
Cost Savings ($/year)	723,650	254,440
Emissions Savings (tons CO_2/year)	4897	1722

Table 10: First Year Austin Energy ECAD Ordinance Impacts and predicted Impacts of Audit Disclosure Ordinance in Saint Paul
Source: Austin information from Austin Energy, Saint Paul population from ACS, Saint Paul Savings information generated.

These calculations are too simplistic to be a meaningful estimation of actual savings potential in Saint Paul. The chart nevertheless demonstrates an important point about the potential impact of an Audit Disclosure Ordinance: potential savings would be very easy to measure. This means that audit disclosures, in addition to being beneficial for consumer protection and placing market value on efficiency, could potentially enable the City to more effectively benchmark its own progress toward meeting energy goals.

The political feasibility of the Audit Disclosure Ordinance alternative is low. First, the City already requires TISH reports; some might think that an additional disclosure requirement would be redundant or wasteful. Second, Saint Paul has a precedent of being less strict with

disclosures: the Saint Paul TISH, as opposed to many other TISH ordinances around the state, is "disclosure-only," meaning that neither the seller nor the buyer must fix found deficiencies before the sale closes. The disclosure requirement is much more lax than TISH requirements in other cities. For example, Saint Louis Park's TISH requires that all deficiencies be addressed and the property be brought up to code.[72] Finally, low-income communities or their advocates would likely not favor this type of policy, as it would burden sellers with additional costs.

Administrative feasibility is also low. Part of what makes Austin's program easier to administrate is the fact that Austin Energy is a municipal utility, so the city and the utility can more directly work together to make sure audits get done. Saint Paul, on the other hand, might not legally be able to assign the task to the utility. Instead, it might need to bid out the program through a request for proposals, or even open up to any number of qualifying individuals. It is additionally unclear whether information would be made available through the city, through an MLS or other housing market mechanism, or through the administering agency.

Policy Alternative 2: MPUC Rule

The MPUC should make a rule on Docket 12-1344 that directs regulated utilities to release average annual building energy use and cost information, along with high/low figures. This policy alternative essentially allows Xcel to return to their previously established practice with official MPUC sanctioning.

In evaluating the effectiveness of this proposed alternative at reducing information asymmetry, this alternative ranks highly in terms of disclosing energy cost and use information to consumers. It is less effective in allowing consumers to easily compare information between properties, as consumers would need to call Xcel each time they wanted to find out a property's information. While this alternative would be "mandatory" in the sense that it would require Xcel to release this information upon request, there would be nothing mandatory in place to ensure that buyers and renters will end up with the information. In other words, it still places the onus on the renter or buyer to find the information, making the policy less effective. It would be available to customers in both the rental and housing markets, although not applicable to those in the rental market who are interested in renting from a Single-Metered property. Of course, the Renter's Single-Meter Statute protects the latter class of renters.

An MPUC ruling would be a very low cost alternative for utilities since such disclosures were common practice until recently. In fact, this alternative may even save money, in the form of administrative costs, for utilities like Xcel and CenterPoint since fewer people would need to submit a Consent Form, and could instead simply call the utility's customer service line.

The potential impact of returning to prior policy is unknown at this point. An MPUC ruling would certainly increase consumer protection for those who need to calculate operating costs. It is unlikely, however, to generate market value for efficiency. That said, this alternative might open the door to future advances in reducing information asymmetry. If Xcel is directed to release this information upon request, it may allow the company to later implement a web-based property lookup tool, similar to those employed by Gainesville Green or Madison Gas and Electric.[73] A property lookup tool would allow consumers to more effectively compare market information, which would likely have the intended effect of placing market value on low bills and de-valuing high bills.

The political feasibility of an MPUC ruling is moderate. Given that all utilities reporting in the CEUD Work Group reported having participated in this disclosure practice until recently, it may be that the MPUC would decide this is not a use case that warrants Consent Forms. Additionally, if the type of data to be released was average annual data, rather than monthly data, it would likely to assuage existing privacy concerns. The utilities will not likely argue against such a policy; their interest lies in providing good customer service while protecting themselves from liability.

The administrative feasibility of this alternative is high, as all utilities either recently practiced or continue to practice this form of data release.

Policy Alternative 3: Seller's Disclosure Amendment

The Minnesota Legislature should amend the Seller's Disclosure Statute to specify that energy use and cost information is required at point of sale.

The Seller's Disclosure Statute appears to support the statement that if a buyer wanted access to consumption data, they should be able to obtain it by arguing that their energy bills will affect their "use or enjoyment of the property." This implies that by listing a house on the market, a seller has essentially said that they will disclose any information about the property that the

buyer may want, which may include energy cost and use information. This has interesting implications for Xcel's policy to only disclose data when the account holder consents; if the seller has given implied consent to "use or enjoyment" disclosure, it is possible that Xcel could disclose data for houses on the market, without creating liability for themselves.

However, assuming that Xcel does not want to take that liability risk, and so will not be interested in reverting back to its old disclosure policies, the policy alternative is to amend the Seller's Disclosure itself. This would need to be done by the Minnesota Legislature.

Subjecting this policy to the "effectiveness" test yields mixed results. A statutory amendment would rank highly in terms of providing energy cost and use information to prospective buyers. If the seller's disclosure were available to homebuyers early in the home-buying process, it would be effective at allowing prospective buyers to compare information across the market. If it were not released until later, it would be less effective. While the policy would require mandatory disclosure to prospective buyers, it would only exist in the housing market and would not apply to the rental market.

The cost of implementing such a policy would likely be low. There could be some administrative costs in updating and distributing Seller's Disclosure forms throughout the state, but these are updated periodically, anyway.

The potential impact of the policy is moderate. While the policy would serve to increase the amount of consumer protection in the rental and housing markets, it is not clear whether it would increase market pressure on seller's to upgrade their property with energy efficient measures.

Political feasibility is low in the current legislative environment. A bill amending the seller's disclosure statute to release energy data might be approved in the DFL-controlled Minnesota Senate, but would likely not be approved in the GOP-controlled Minnesota House. Specifically, policies regarding data release must make it through the Civil Law and Data Practices Committee, which has demonstrated an interest in more restrictive data privacy practices. For example, earlier this legislative session, a bill to amend the Renter's Single-Meter Statute to increase disclosure to prospective tenants did not receive a hearing in the Committee.[74]

However, an amendment to the statute would likely be very feasible from an administrative perspective. Xcel's recent efforts to make it easier for customers to obtain their own energy data – such as adopting the Green Button program and revamping their website –

would make it very easy for sellers to access their data and provide a copy in the Seller's Disclosure.[75]

Policy Alternatives Summary Tables

The above information can be summarized in two tables: an Effectiveness Assessment table that evaluates the policy alternatives on the same Saint Paul disclosure options scale, and a Policy Alternatives Evaluation, which looks at the proposed alternatives based upon the criteria described above.

Type of Disclosure	Disclosure Option	Disclosure Provides Consumer with Energy Cost and Use Information	Disclosure Allows Consumer to easily compare property information with other properties	Mandatory	Exists in Housing and Rental Markets	Effectiveness Score
Combination	Audit Disclosure Ordinance	3	2	3	2	10
Data	Utilities release average annual information	3	2	1	3	9
Data	Amend Seller's Disclosure	3	2	3	0	8

Table 11. Effectiveness Assessments of Proposed Policy Alternatives
Source: Survey of existing options in Saint Paul.

Policy Alternative	Cost-Effectiveness	Potential Impact	Political Feasibility	Administrative Feasibility
Audit Disclosure Ordinance	Med	High	Low	Low
Release of Annual Average Data upon request	Med	Low/High	Med	High
Amend Seller's Disclosure	Med	Med	Low	High

Table 12: Policy Alternatives evaluation based on selected criteria.
Source: Survey of existing options in Saint Paul.

Policy Recommendation

Based on evaluations of the proposed alternatives, the recommendation of this paper is that the MPUC should make a rule directing utilities to disclose average annual data along with high and low month figures. This alternative has no monetary cost to the utilities, but provides prospective homebuyers and tenants with a planning tool they had until recently. While it is only moderately effective at reducing information asymmetry in the rental and housing markets, it has the potential to have a large impact on creating market value around efficiency, if paired with a website lookup tool.

Conclusion

Discussions surrounding data privacy tend to assume that a greater amount of privacy is always better for consumers. Yet in the case of customer energy use disclosure in the housing and rental markets, we can see that this is not always the case.

One major contributor to this discourse is an assumed a level of home surveillance that is not relevant to the type of data being disclosed in this use case. Instead, the type of data proposed for disclosing information in the housing and rental markets is beneficial to consumers because it not only helps them understand how the structure of the property performs in terms of energy use, but it also helps them prepare for operating costs. Recent practices have interfered with both consumer protection practices and efforts to advance building efficiency through market mechanisms.

Energy data practices in the residential market will only continue to become more important as distributed generation, such as rooftop solar, becomes more widespread. In order for meaningful impacts to be made at both the household and societal level, it is critical that our data practices appropriately balance concerns of privacy and access in different circumstances.

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