

Remaking Energy: The Critical Role of Energy Consumption Data

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This Article explores the public policy benefits associated with increased access to energy consumption data as well as the legal and institutional barriers that currently prevent such access. As state and local governments as well as electricity users attempt to improve the efficiency of their buildings, reduce greenhouse gas emissions, and realize the promises of improved demand side management of energy resources, the need for electricity and other energy-related data becomes even more pressing. But the current law that balances making energy consumption data available against any privacy or confidentiality interests in the data is underdeveloped. Thus, this Article draws on the more sophisticated legal frameworks governing health care, education, and environmental emissions data that balance the public policy needs for data evaluation with countervailing interests. A review of the law in these fields shows that the privacy and confidentiality interests in energy consumption data may be overstated and, in any event, can be adequately addressed in most instances through aggregating the data, using historic rather than current data, or through contracts and other agreements to ensure security where access to individualized data is needed.

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INTRODUCTION

The “smart grid,”¹ “smart meters,”² and the data that can be collected from these meters are new technological developments that have changed the

1. The smart grid consists of “controls, computers, automation, and new technologies and equipment” working together with the electric grid “to respond digitally to our quickly changing electric demand.” See *The Smart Grid*, SMARTGRID.GOV, https://www.smartgrid.gov/the_smart_grid/smart_grid.html [<https://perma.cc/L5LC-TA2Q>] (last visited May 29, 2016).

2. Smart meters are electronic devices that record the consumption of electric energy and relay the information to utility companies for monitoring and billing. See *The Smart Home*,

terrain of energy management. In the past, when meter readers collected customers' "energy consumption data"³ for utilities, which they then collated and mailed to customers with a bill, the difficulty in accessing and evaluating such data was understandable. But in today's big data world, smart meters record intrahourly electricity use and transmit that data to utilities wirelessly or through fiber networks, who then bill customers electronically. As a result of such technological developments, energy consumption data has become a lynchpin in the energy sector and is used regularly by electric utilities in their daily operations. Despite these advances, energy consumption data is surprisingly difficult for governments, energy efficiency service providers, and researchers to obtain and evaluate, creating a major impediment to necessary developments in energy management.

Billions of dollars of public and private investments in the "smart grid" have contributed to a new era in energy management that uses digital communication technology to detect local changes in electricity usage and communicate that information instantaneously to electric utilities and wholesale energy market actors. For example, 43 percent of U.S. homes (over fifty million) are now equipped with a smart meter,⁴ which allows for two-way communication between electricity producers and consumers. This smart meter feature can enable real-time pricing and facilitate deployment of distributed energy resources, such as solar photovoltaic (PV), energy efficiency, and demand response,⁵ while better engaging consumers in energy management and markets. The term "distributed energy resources" (DER) is often used to refer to "behind-the-meter" power generation at an end-use customer's premises for the purpose of supplying all or part of the electric load and also

SMARTGRID.GOV, https://www.smartgrid.gov/the_smart_grid/smart_home.html [https://perma.cc/8DFR-662K] (last visited May 29, 2016).

3. Energy consumption data is a record of the amount of electricity and fuel a building uses over a given period of time. Such data is sometimes referred to as customer energy usage data (CEUD) or energy usage data. *See, e.g., Best Practices for Working with Utilities to Improve Access to Energy Use Data*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON. (ACEEE) (June 2014), <http://aceee.org/sector/local-policy/toolkit/utility-data-access> [https://perma.cc/X7TA-M6PY]. Although energy consumption data can sometimes include natural gas and water use in homes and businesses, this Article focuses solely on electricity data.

4. *See* EDISON FOUND., INSTITUTE FOR ELEC. INNOVATION, UTILITY-SCALE SMART METER DEPLOYMENTS: BUILDING BLOCK OF THE EVOLVING POWER GRID (Sept. 2014), http://www.edisonfoundation.net/iei/Documents/IEI_SmartMeterUpdate_0914.pdf [https://perma.cc/XP73-6EBM].

5. *See Demand Response*, U.S. DEPT. OF ENERGY, <http://energy.gov/oe/technology-development/smart-grid/demand-response> [http://perma.cc/CSL2-GSA4] (last visited May 12, 2016) ("Demand response provides an opportunity for consumers to play a significant role in the operation of the electric grid by reducing or shifting their electricity usage during peak periods in response to time-based rates or other forms of financial incentives. Demand response programs are being used by electric system planners and operators as resource options for balancing supply and demand."); *see also infra* note 43 and accompanying text (discussing demand response).

having the potential to provide electricity to the grid.⁶ Advances in energy management also create new business opportunities by supporting the development of new technologies and providing new ways to manage energy and save consumers money. These advances are significant because electricity generation makes up 40 percent of total U.S. energy consumption, while buildings account for 39 percent of total energy use and 68 percent of electricity use.⁷

Deploying distributed energy resources in over one hundred million buildings⁸ and billions of end-use devices will require a tremendous scale-up in both project size and investments, which has prompted significant action on the part of all levels of government and the private sector. Over one thousand cities have adopted greenhouse gas reduction goals, with a significant emphasis on increasing energy efficiency in buildings and government operations.⁹ As of 2015, a wide range of federal, state, and local funding programs totaling \$122 billion have provided tax benefits and loans for “green” construction efforts.¹⁰ Experts predict that increased investment in energy efficiency in buildings would have a significant payoff. Indeed, McKinsey estimated that investing \$520 billion in nontransportation energy efficiency by 2020 could generate energy savings worth over \$1.2 trillion, reduce end-use energy demand by 23 percent compared to current projections, and eliminate over 1.1 gigatons of

6. DER power includes solar panels, back-up power, energy storage, micro grids, and small wind turbines. But the term is also used more broadly to include energy efficiency and demand response, which do not contribute power to the customer’s premises or to the grid but instead reduce the demand for power, thus reducing the energy resources needed to meet grid demand. *See* N.Y. INDEP. SYS. OPERATOR, A REVIEW OF DISTRIBUTED ENERGY RESOURCES 1 (Sept. 2014), http://www.nyiso.com/public/webdocs/media_room/publications_presentations/Other_Reports/Other_Reports/A_Review_of_Distributed_Energy_Resources_September_2014.pdf [<https://perma.cc/KRX8-SGBB>].

7. *See Clean Energy*, U.S. EPA, <http://www.epa.gov/cleanenergy/energy-and-you> [<http://perma.cc/LUH4-AD9E>] (last visited May 29, 2016); U.S. EPA, GREEN BUILDING TECHNOLOGIES (Oct. 2006), <http://nepis.epa.gov/Adobe/PDF/P100EKZ5.pdf> [<http://perma.cc/C6RL-LBXR>].

8. TABLE HC2.1 STRUCTURAL AND GEOGRAPHIC CHARACTERISTICS OF U.S. HOMES, BY HOUSING UNIT TYPE, 2009, U.S. ENERGY INFO. ADMIN., RESIDENTIAL ENERGY CONSUMPTION SURVEY (Apr. 2013), <http://www.eia.gov/consumption/residential/data/2009/#structural> [<https://perma.cc/FNF5-9U5F>] (noting 113,600,000 total U.S. homes); TABLE B1. SUMMARY TABLE: TOTAL AND MEANS OF FLOORSPACE, NUMBER OF WORKERS, AND HOURS OF OPERATION, 2012, U.S. ENERGY INFO. ADMIN., COMMERCIAL BUILDINGS ENERGY CONSUMPTION SURVEY (Apr. 2015), <https://www.eia.gov/consumption/commercial/data/2012/#summary> [<https://perma.cc/K499-5TPH>] (noting 5,557,000 total U.S. commercial buildings).

9. *See* J.B. Wogan, *What Can Cities Really Do About Climate Change?*, GOVERNING (Dec. 2014), <http://www.governing.com/topics/transportation-infrastructure/gov-climate-change-grand-rapids-michigan.html> [<http://perma.cc/EUK2-5S22>] (“Grand Rapids, Mich., is among more than 1,000 American cities that have pledged to reduce greenhouse gas emissions . . .”).

10. Thomas Frank, “Green” Growth Fuels an Entire Industry, USA TODAY (Nov. 14, 2012), <http://www.usatoday.com/story/news/nation/2012/10/25/green-building-big-business-lead-certification/1655367> [<http://perma.cc/2KT5-TEYT>].

greenhouse gas emissions annually.¹¹ Energy efficiency will also play a major role in state efforts to develop plans to meet the requirements of President Obama's Clean Power Plan Rule, released in 2015, which, if upheld by the courts, will require states and utilities to make significant cuts in carbon emissions from the electric power sector.¹²

Thus, improving the management of electricity use in buildings can dramatically reduce overall U.S. energy use, decrease energy costs, lessen the need to build more power plants, increase energy security, curtail greenhouse gas emissions, and capture significant environmental protection benefits. Yet, in spite of the extensive investments in the smart grid, technological opportunities provided by the smart meter, and the potential role of energy efficiency in meeting any new carbon limits in the electric power sector, the smart grid is not yet living up to its promised potential.¹³ A major roadblock to taking full advantage of the smart grid is a lack of readily available energy consumption data.

The deficiency of available energy consumption data stands in stark contrast to other critical energy information that is widely available to the public. The U.S. Environmental Protection Agency (EPA), the Energy Information Administration (EIA), and the Federal Energy Regulatory Commission (FERC or Commission) collect and make available to the public a wide range of emissions and electricity generation data at the boiler or plant level on an hourly basis.¹⁴ By contrast, while utilities control the data of their own customers, detailed nationwide or even statewide data sets on energy use are not generally available at the level needed to support investment or management decisions. The data gap is striking in light of the technologies used in today's regional electric grid operations that allow grid operators to communicate real-time (i.e., in five- to fifteen-minute intervals) synchronized data and sell wholesale power in real-time regional electricity markets.

11. MCKINSEY & CO., UNLOCKING ENERGY EFFICIENCY IN THE U.S. ECONOMY iii (July 2009).

12. See *Fact Sheet: Clean Power Plan Overview*, U.S. EPA (Apr. 11, 2016), <https://www.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-overview> [https://perma.cc/Z5U3-SDRB] (discussing the importance of energy efficiency in state plans to comply with Clean Power Plan limits on carbon emissions from the electric power sector); *Fact Sheet: President Obama to Announce Historic Carbon Pollution Standards for Power Plants*, WHITE HOUSE (Aug. 3, 2015), <https://www.whitehouse.gov/the-press-office/2015/08/03/fact-sheet-president-obama-announce-historic-carbon-pollution-standards> [http://perma.cc/3R3K-BYVW] ("EPA's analysis shows that energy efficiency is expected to play a major role in meeting the state targets as a cost-effective and widely-available carbon reduction tool, saving enough energy to power 30 million homes and putting money back in ratepayers' pockets.").

13. See Chris Mooney, *Why 50 Million Smart Meters Still Haven't Fixed America's Energy Habits*, WASH. POST (Jan. 29, 2015), <http://www.washingtonpost.com/news/energy-environment/wp/2015/01/29/americans-are-this-close-to-finally-understanding-their-electricity-bills> [http://perma.cc/W5EA-YBQS].

14. See *Survey-Level Detailed Data Files*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/electricity/data/detail-data.html> (last visited May 12, 2016).

This lack of data creates important information asymmetries between utilities and other public and private sector actors involved in energy management and thus represents a serious market failure. More specifically, the inability of municipalities, energy efficiency providers, and customers to easily obtain energy consumption data in a standardized format excludes them from participating in energy markets, evaluating different rate pricing schemes, and understanding the value of energy investments. This limits numerous opportunities to shape private investment decisions and evaluate billions of dollars in public expenditures. For instance, in 2013, utilities spent over \$7.7 billion on energy efficiency programs (\$6.3 billion on electricity efficiency programs and \$1.4 billion on natural gas efficiency programs), saving an estimated 24.3 million megawatt-hours (MWh) of electricity.¹⁵ These investments are projected to nearly double to \$15 billion per year by 2025.¹⁶ But inconsistent metrics resulting from the lack of energy consumption data often stymie efforts to assess which programs are most effective.

Likewise, federal, state, and local governments encourage energy efficiency through a wide variety of different policies including direct programs, tax incentives, building standards, and appliance efficiency standards. But without energy consumption data, governments must rely on modeled data and behavioral estimates to evaluate the success of these energy efficiency investments, which makes evaluation of smaller efforts and complex upgrades or comparisons between programs difficult. Moreover, municipalities and third-party consultants could use energy consumption data to hone targeted energy efficiency programs. For instance, they could use energy consumption data to identify heavy energy users, crossreference that data with households that have not applied for a new furnace permit in twenty years, and target those residents for furnace replacement programs. Third-party consultants such as Oracle's Opower have worked with utilities to create behavior modification programs to reduce energy consumption.¹⁷

More granular energy consumption data could reduce transaction costs for evaluating and deploying distributed energy resource technologies like solar PV and electric vehicles. New technologies such as the Nest Thermostat can link with utilities like Austin Energy, a municipal utility, to provide demand response services by controlling air conditioning units remotely to manage demand on hot summer days.¹⁸ Electric cars, smart appliances, and third-party

15. AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., THE 2014 STATE ENERGY EFFICIENCY SCORECARD vi (Oct. 2014), <http://aceee.org/sites/default/files/publications/researchreports/u1408.pdf> [<https://perma.cc/8ZTC-48L2>].

16. *Id.* at 19.

17. See OPOWER, <http://opower.com> [<https://perma.cc/5FG8-BJXN>] (last visited May 12, 2016).

18. See Peter Fairley, *The Lowly Thermostat, Now Minter of Megawatts*, MIT TECH. REV. (May 20, 2014), <http://www.technologyreview.com/news/527366/the-lowly-thermostat-now-minter-of-megawatts> [<http://perma.cc/EX2X-QWHE>].

energy management applications could all use energy consumption data and two-way communication to save consumers and the energy system money. These data could also help utilities better plan for the costs of distribution network upgrades.

Energy consumption data could give industrial and residential electricity users more detailed information on how they use energy, allowing for both real-time management and better long-term planning. These data could facilitate modeling and allow consumers to evaluate the financial impacts of different rate structure programs, such as dynamic pricing, time of use pricing, or a flat rate structure. In 2013, over sixty million residential customers had access to variable pricing programs, but only four million were enrolled in time-varying rate programs.¹⁹ One reason customers have often been reluctant to switch to dynamic pricing programs is that they do not know what the costs would be before doing so. Energy consumption data can help customers evaluate the costs of different pricing programs and incentivize them to shift their energy consumption behavior to support new energy resources.²⁰ Hourly energy consumption data, for instance, could help homeowners size rooftop solar PV systems and better target energy retrofits. These data could also assist homebuyers, renters, real estate investors, and lending institutions in making more informed investment and financing decisions.

Energy consumers could also be more active in demand response and other energy management programs, thus playing a more central role in energy markets and grid system reliability. While many large industrial customers are on interruptible contracts and may have their power curtailed during emergency situations, and some residential customers are on programs that cycle their air conditioning when demand gets too high, energy consumption data could open up new possibilities to create responsive load. This is already prevalent in some electricity markets, such as the PJM Regional Transmission Organization in the Northeast, where third-party demand response aggregators like EnerNOC manage the demand of industrial and commercial customers within regional grid operations and electricity markets.²¹ In December 2014, EnerNOC reported that its management of peak electricity load had saved its customers over \$1 billion since it began operations in 2001.²² Accordingly, expanding the use of energy management with energy consumption data and smart grid

19. See *Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861 Detailed Data Files*, U.S. ENERGY INFO. ADMIN. (Oct. 21, 2015), <http://www.eia.gov/electricity/data/eia861/index.html> [<http://perma.cc/8BLL-D7Q4>]; see also *infra* note 38 (describing different types of variable pricing programs).

20. See *Rate Design for the Distribution Edge*, ROCKY MOUNTAIN INST. (Aug. 2014), http://www.rmi.org/elab_rate_design [<http://perma.cc/8TKJ-5D43>].

21. See ENERNOC, <http://www.enernoc.com> [<http://perma.cc/XYZ2-EKB9>] (last visited May 12, 2016).

22. See *EnerNOC Surpasses \$1 Billion in Enterprise Customer Savings*, ENERNOC (Dec. 10, 2014), <http://investor.enernoc.com/releasedetail.cfm?releaseid=887065> [<https://perma.cc/EY6B-QH6R>].

technologies could increase participation in energy markets and enhance distribution network reliability.

Third parties such as solar providers or energy efficiency service providers could use energy consumption data to develop new energy management products—for example, solar PV installations that are tailored to match consumer load or to target opportunities within a geographic area and thereby lower the transaction costs associated with their services. Utilities and energy service providers could also use energy consumption data to create new products to help consumers manage the environmental implications of their energy use. For instance, the Tennessee Valley Authority (TVA)²³ is working with large industrial customers to help them manage their greenhouse gas emissions. Greenhouse gas accounting standards measure the direct and indirect emissions associated with energy used during electricity production.²⁴ By providing the estimated carbon intensity of their electricity use for all 8,760 hours of the year, TVA is able to help its industrial customers more accurately report and manage emissions associated with electricity use.²⁵

Thus, for consumers, policy makers, and third-party businesses, access to energy consumption data could help benchmark energy use, accelerate developments in energy management, and create a comparable context for best practice energy management. But there are presently only limited means for consumers, energy service companies, or local or state governments to obtain comprehensive energy consumption data. While governments have made efforts to require utilities and other power providers to make energy consumption data publicly available, utilities and some consumer groups have raised privacy and other concerns.

Part I explores the landscape of energy consumption data, focusing on the difficulty in obtaining such information and its potential uses if gathered on a

23. Established by Congress in 1933, TVA is a U.S. government corporation and the nation's largest public power provider. *See Our History*, TENN. VALLEY AUTH., <http://www.tva.com/abouttva/history.htm> [<http://perma.cc/MQJ4-T3Y5>] (last visited May 12, 2016); *see also* ABRAMS ENVTL. LAW CLINIC, UNIV. OF CHI., *FREEING ENERGY DATA: A GUIDE FOR REGULATORS TO REDUCE ONE BARRIER TO RESIDENTIAL ENERGY* 8–13 (June 2016) (discussing types of energy efficiency service providers and the services they can provide with more energy consumption data).

24. *See FAQ*, GREENHOUSE GAS PROTOCOL, <http://www.ghgprotocol.org/calculation-tools/faq> [<http://perma.cc/S4L3-9PTD>] (last visited May 12, 2016) (explaining direct and indirect greenhouse gas emissions and measurement protocols); *Scope 2 Guidance*, GREENHOUSE GAS PROTOCOL, http://www.ghgprotocol.org/scope_2_guidance [<http://perma.cc/9HFR-X8Z2>] (last visited May 12, 2016) (describing 2015 standards for how corporations should measure emissions from purchased or acquired electricity, steam, heat, and cooling (called “scope 2 emissions”)).

25. *See Carbon Dioxide*, TENN. VALLEY AUTH., <https://www.tva.com/Environment/Environmental-Stewardship/Air-Quality/Carbon-Dioxide> [<http://perma.cc/73U4-Q4V5>] (last visited May 12, 2016) (discussing TVA programs available to industry customers); MARY SOTOS, GREENHOUSE GAS PROTOCOL, *SCOPE 2 GUIDANCE CASE STUDIES* 4 (Jan. 2014), http://www.wri.org/sites/default/files/Scope_2_Guidance_case_studies.pdf [<http://perma.cc/Z85D-HV5B>] (describing program that offers TVA customers supplier-specific CO₂ emission figures and encourages those customers to plan their electricity use around lower carbon-emitting hours).

large scale. Part II summarizes developing state and local policies governing energy consumption data, including how lawmakers have attempted to address some of the privacy and other concerns associated with data disclosure. Part III explains why many of the data disclosure concerns that surface in other fields such as health care, education, and chemical and environmental emissions may be less applicable in the energy consumption data context. Part IV proposes an approach to collecting and disclosing energy consumption data.

I.

ENERGY CONSUMPTION DATA TODAY AND CURRENT BARRIERS TO USE

Today, utilities collect, manage, and hold customer energy consumption data. Aside from quadrennial federal energy consumption surveys, which sample only a small fraction of industrial, commercial, and residential buildings, there is no publicly available and comprehensive dataset on U.S. energy use.²⁶ This Section covers past and current practices in energy consumption data collection and management, identifies current barriers to using such data, and then discusses how these data could transform the management of the electric system.

Historically, utilities have generated electricity at large centralized power stations and transported it over high voltage transmission lines to substations where the voltage is stepped down for low voltage distribution networks that ultimately deliver power to electricity customers. Investments in and coordinated planning of the low-voltage distribution networks have lagged behind that in other areas of the energy system.²⁷ But this is changing with investments in creating a smarter grid, supported by advances in information and communication technology and by enhanced capabilities of electric meters and system-wide sensors. Additionally, the more widespread use of technologies like solar rooftop PV and electric vehicles are requiring new approaches for distribution network planning and management.²⁸

Electric and natural gas utilities traditionally employed meter readers who traveled from building to building each month to record energy use data from analog meters at every residence and business. The meter reader brought these data back to the utility, which calculated the amount of electricity used by each building, multiplied it by the cents per kilowatt-hour charged for the electricity, added fuel, transmission, and other surcharges, and then sent the monthly bill to the customer. Very few utilities still use this approach, as most have invested

26. See Alexandra B. Klass & Elizabeth J. Wilson, *Energy Consumption Data: The Key to Improved Energy Efficiency*, 6 SAN DIEGO J. CLIMATE & ENERGY L. 69, 82–84 (2015) (describing federal quadrennial building energy surveys).

27. See Poyan Pourbeik et al., *The Anatomy of a Power Grid Blackout*, 4 IEEE POWER & ENERGY MAG. 22 (Sept.–Oct. 2006).

28. See Fabrizio Pilo et al., *New Electricity Distribution Network Planning Approaches for Integrating Renewable*, 2 WILEY INTERDISC. REV.: ENERGY & ENV'T 140–57 (Mar.–Apr. 2013), <http://onlinelibrary.wiley.com/doi/10.1002/wene.70/pdf> [<http://perma.cc/DFN4-PPBY>].

in automatic metering infrastructure, which remotely collects, tabulates, and bills customers.²⁹

The one-way energy information flow of historic manual and automatic meters transitioned to two-way communication technology in the late 2000s and early 2010s as utilities started to deploy advanced meter infrastructure (AMI).³⁰ Using wireless or fiber networks, these “smart meters” allow two-way flows of energy use information between the utility and the customer several times per day and, in some circumstances, more frequent real-time information flows. These advanced meters could let consumers have more information about their energy consumption and costs.

As of July 2014, the most recent year for which data is available, U.S. utilities had installed over fifty million smart meters (43 percent for residential customers),³¹ though the penetration levels varied significantly by state. For instance, California, Texas, and Arizona had installed smart meters for over 50 percent of customer meters while Minnesota, New York, and Iowa fell below 15 percent of customer meters.³² Smart meter installation varies by utility too. As of 2012, Pacific Gas & Electric (CA), Florida Power & Light (FL), Southern California Edison (CA), Oncor Electric (TX), Georgia Power (GA), Center Point (TX), PPL Electric (PA), and San Diego Gas and Electric (CA) each had over 1.3 million smart meters installed. Another thirty-nine utilities in twenty additional states had over one hundred thousand customers with smart meters, yet over one thousand utilities had fewer than one hundred AMIs installed.³³ Most smart meter rollouts have proceeded smoothly, but some have faced significant opposition from consumers worried about health, privacy, and safety issues associated with smart meters.³⁴

29. See Jim Roche, *AMR vs. AMI*, ELECTRIC LIGHT & POWER (Oct. 1, 2008), http://www.elp.com/articles/powergrid_international/print/volume-13/issue-10/features/amr-vs-ami.html [<http://perma.cc/PWC9-UR5N>]; Tom D. Tamarkin, *Automatic Meter Reading*, PUB. POWER MAG. (Sept.–Oct. 1992), http://www.masters.dgtu.donetsk.ua/2013/etf/dolgikh/library/Automatic_Power_Reading.pdf [<http://perma.cc/R3FZ-NR9U>].

30. EDISON FOUND., *supra* note 4 (showing an increase in smart meter installation from 6 percent of U.S. homes in 2007 to 43 percent in 2014).

31. See *Frequently Asked Questions*, U.S. ENERGY INFO. ADMIN. (Apr. 25, 2016), <http://www.eia.gov/tools/faqs/faq.cfm?id=108&t=3> [<http://perma.cc/R78X-BKWW>].

32. See EDISON FOUND., *supra* note 4; *Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861 Detailed Data Files*, *supra* note 19; *Smart Meter Deployments Continue to Rise*, U.S. ENERGY INFO. ADMIN. (Nov. 1, 2012), <http://www.eia.gov/todayinenergy/detail.cfm?id=8590> [<http://perma.cc/5F9H-UEP9>].

33. The EIA tracks smart meter installations in Form EIA-861. See *Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861 Detailed Data Files*, *supra* note 19. For an overview of the use of smart meters in Europe, see Eric Marx, *Smart Meters About to Take Center Stage in Europe's Electrical Grids*, CLIMATEWIRE (Oct. 2, 2015), <http://www.eenews.net/climatewire/2015/10/02/stories/1060025742> [<http://perma.cc/ZJB4-WKK8>] (reporting on German laws mandating smart meters, less than stellar performance of smart meters in Scandinavia, and general confusion in Great Britain).

34. See Andy Balaskovitz, *Despite Court Setbacks, Michigan Smart-Meter Opponents 'Not Going Away'*, MIDWEST ENERGY NEWS (July 28, 2015),

The absence of a standardized format for smart meters to collect and store data is one of the many barriers to widespread use of energy consumption data.³⁵ Utilities can collect data subhourly (e.g., five-, fifteen-, or thirty-minute intervals), hourly, daily, or monthly and choose whether or not to share it, with whom to share it, and in what format to make it available. While subhourly energy use data may allow customers to manage their immediate energy use, and variable pricing may incentivize them to do so, such data on energy use over longer time periods could also help customers decide on investments in energy efficient upgrades. Moreover, energy consumption data available at the subhourly level could further allow consumers to participate in energy markets either directly or through third-party aggregators. Although subhourly data could reveal occupancy patterns, which raises privacy and safety concerns, legacy or lagged hourly or monthly data likely does not raise the same concerns.

While smart meters can collect copious quantities of energy use data, utility smart meter programs have not consistently used that data to improve management of distribution systems or to help consumers save money. In the United States, some state public utility commissions (PUCs) have mandated consumer interfaces for smart meters, but in most states, the utilities decide what kind of or *if* a consumer interface will be included with the meter installation.³⁶ Not all of the installed smart meter projects include consumer interface devices that allow consumers to know how much energy they are using or to manage their electricity use in real time. While many smart meter programs promise dynamic pricing, many utilities do not in fact offer it. Further, state PUCs have often been slow to approve time-based rate tariffs like time-of-use pricing, real-time pricing, variable peak pricing, and critical peak pricing.³⁷ Approximately sixty million U.S. residential utility customers have

<http://midwestenergynews.com/2015/07/28/despite-court-setbacks-michigan-smart-meter-opponents-not-going-away> [<http://perma.cc/PZG5-LCHQ>] (reporting on series of three decisions by the Michigan Court of Appeals upholding efforts by Michigan's two largest utilities to install smart meters in customer homes and rejecting efforts by smart meter opponents to prevent installation of smart meters on privacy and public health grounds); STOP SMART METERS!, <http://stopsmartmeters.org> [<http://perma.cc/6LCA-YJ9W>] (last visited May 12, 2016).

35. For a discussion of the Green Button initiative, which is one format numerous utilities have adopted, see *infra* Part II.A.

36. See, e.g., SMART METER TEXAS, UNDERSTANDING SMART METER TEXAS 4 (Nov. 3, 2014) ("SMT is the product of a collaborative stakeholder-driven process initiated by the Public Utility Commission of Texas (PUCT), designed to support the Advanced Metering System (AMS) deployment in the Texas competitive electricity market by leveraging the wealth of Customer usage data made available by smart meters and the associated AMS communications and information technology infrastructure."); see also *Frequently Asked Questions*, SMART METER TEXAS, https://www.smartmetertexas.com/CAP/public/home/home_faq.html#a1 [<https://perma.cc/FZH5-X7ZP>] (last visited May 12, 2016).

37. See *Time Based Rate Programs*, SMARTGRID.GOV, https://www.smartgrid.gov/recovery_act/deployment_status/time_based_rate_programs [<http://perma.cc/2P6W-Q7JU>] (last visited May 12, 2016).

access to variable pricing programs that offer “time-of-use rates” (which divide a twenty-four-hour period into on-peak and off-peak pricing periods of several hours each, with lower retail electricity rates at night and at other times of lower electricity demand), “real-time rates” (where retail electricity prices vary hour by hour or in even smaller increments based on actual wholesale electricity prices during that time period), or other variable pricing options.³⁸ However, these programs have not proven very popular with consumers as only four million residential customers in the United States are enrolled in variable pricing programs.³⁹

Additionally, demand devices that link consumer energy use with the smart grid have been slow to sell. While consultants estimate that worldwide smart appliance sales will top \$35 billion by 2020, appliance manufacturers currently sell them at a price premium and market penetration is low.⁴⁰ Notably, there is a difference between providing consumers with energy data and giving them information to help them decide how they use energy.⁴¹ A comparison between gasoline consumption and electricity consumption is illustrative. While consumers can watch the cost of gasoline increase with the amount of gas pumped into the tank, most electricity consumers today can only see the total amount of energy used in their monthly bill and thus do not have a good idea of how much energy individual appliances use or how to shift energy use for demand-side management.⁴²

The most common form of demand-side management is “demand response,” a practice where wholesale electricity market operators, such as regional transmission organizations, pay large electricity consumers, such as Target, Walmart, sports stadiums, and industrial facilities, to reduce their

38. See, e.g., AHMAD FARUQUI ET AL., BRATTLE GRP., TIME-VARYING AND DYNAMIC RATE DESIGN 12–16 (July 2012), www.raponline.org/document/download/id/5131 [<https://perma.cc/6DKL-C3D2>]; Coley Girard, *Time Varying Rates: An Idea Whose Time Has Come?*, ADVANCED ENERGY ECON. (Mar. 12, 2015, 1:33 PM), <http://blog.aee.net/time-varying-rates-an-idea-whose-time-has-come> [<https://perma.cc/7HVU-5RP9>]; Kari Lydersen, *Groups Pursue Time-of-Use Electricity Pricing in Illinois*, MIDWEST ENERGY NEWS (Feb. 24, 2015), <http://midwestenergynews.com/2015/02/24/groups-pursue-time-of-use-electricity-pricing-in-illinois> [<https://perma.cc/QWS7-DGFR>]; OFFICE OF THE OHIO CONSUMERS’ COUNCIL, SMART GRID: DYNAMIC AND TIME-OF-USE PRICING (2016), http://www.occ.ohio.gov/publications/electric/Factsheet_Smart_Grid_Dynamic_Pricing.pdf [<https://perma.cc/CSY5-HTUQ>].

39. See *Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861 Detailed Data Files*, *supra* note 19.

40. See PIKE RESEARCH, SMART APPLIANCES (2012), <http://www.navigantresearch.com/research/smart-appliances> [<http://perma.cc/8VVU-NVTF>].

41. For a discussion of the additional data and analysis required to incentivize actual change in the commercial sphere through energy benchmarking, see Karen Palmer & Margaret Walls, *Can Benchmarking and Disclosure Laws Provide Incentives for Energy Efficiency Improvements in Buildings?* (Res. for the Future Discussion, Paper No. 15-09), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2564251 [<https://perma.cc/VTP9-HXZS>].

42. Mooney, *supra* note 13 (discussing the transparency to consumers of changes in gasoline prices, which quickly prompts consumer response, versus lack of transparency to consumers of changes in electricity prices and corresponding lack of consumer response).

electricity consumption at times when there is increased demand on the electric grid—for example, on hot summer days when air conditioning use is high.⁴³ A recent report from the Rocky Mountain Institute discussed the enormous potential for a type of demand-side electricity management, which it termed “demand flexibility,” to decrease energy costs.⁴⁴ Demand flexibility is distinguished from demand response in that the former actually shifts electricity demand from high-demand times to lower-demand times, while demand response merely decreases demand at peak times.⁴⁵ The report termed this shiftable demand “flexiwatts,”⁴⁶ which, in conjunction with time-of-use rates, can avoid an estimated \$9 billion per year in grid investments.⁴⁷ The study examined four major household electricity loads that could be shifted in time: air conditioning, electric water heaters, electric dryers, and electric car charging.⁴⁸ In that examination, the study found that manipulation of these flexiwatts (i.e., shifting the demands either to periods when demand for electricity is low or to periods when energy-producing installations, such as solar rooftop PV, are at their highest output⁴⁹) resulted in flattened daily electric demand curves, reduced peak load on the grid,⁵⁰ and estimated energy costs saving for residential customers of 10 to 40 percent.⁵¹ While utilities might lose revenues⁵² from decreased consumption, widespread use of demand-flexibility technology would save them as much as \$80 million per year in planned grid upgrades, which should offset loss of revenues.⁵³

Energy consumption data has the potential to transform the management of the electric system by allowing consumers to increase energy efficiency, produce their own energy, make better financial decisions, and create new

43. In 2016, the U.S. Supreme Court held that FERC’s authority to regulate wholesale electricity sales under the Federal Power Act extended to the regulation of demand response. In doing so, it upheld an order by the Commission that encouraged the use of demand response by requiring that demand response participants be paid to reduce electricity at the same rate as power plants were paid to generate electricity. In its decision, the Court recognized that demand response programs eased pressure on the electric grid, reduced the need for new electricity generation, and promoted lower wholesale electricity prices. *See* FERC v. Elec. Power Supply Ass’n, 136 S. Ct. 760 (2016).

44. PETER BRONSKI ET AL., ROCKY MOUNTAIN INST., THE ECONOMICS OF DEMAND FLEXIBILITY: HOW “FLEXIWATTS” CREATE QUANTIFIABLE VALUE FOR CONSUMERS AND THE GRID (Aug. 2015), http://www.rmi.org/electricity_demand_flexibility [<https://perma.cc/8EX5-KBYT>].

45. David Ferris, *Nest Best, Tesla Worst in a Suite of Tools that Could Save Utilities Billions*, ENERGYWIRE (Aug. 27, 2015), <http://www.eenews.net/energywire/2015/08/27/stories/1060023999> [<http://perma.cc/535P-GNWN>].

46. BRONSKI ET AL., *supra* note 44, at 6.

47. *Id.* at 7.

48. *Id.* at 23.

49. *Id.* at 24.

50. *Id.* at 17.

51. *Id.* at 30.

52. *See* Herman K. Trabish, *How Demand Flexibility Is About to Transform Electricity Delivery*, UTILITY DIVE (Aug. 26, 2015), <http://www.utilitydive.com/news/how-demand-flexibility-is-about-to-transform-electricity-delivery/404431> [<http://perma.cc/JE4Y-AAKP>].

53. Ferris, *supra* note 45.

energy business models. Energy consumption data can help utilities target homes and businesses for energy efficiency improvements and tailor efficiency programs to best meet customer energy use needs.⁵⁴ For example, utilities like Green Mountain Power in Vermont are helping customers create “E-homes” by financing deep energy retrofits with the costs spread over multiple payments that appear on the customer’s monthly electric bills. *The New Yorker* magazine reported on one family in Vermont that insulated the walls, changed the lighting in their home to LED lights, added heat pumps for air and water heating, and added solar PV to the roof.⁵⁵ Instead of using 325 gallons of fuel oil as it had in 2014, the family used none after these modifications and reduced their electricity use by 17 percent. Green Mountain Power is also able to briefly cycle air conditioners and water heaters during times of peak energy demand to control costs and avoid the need to buy or build expensive new energy generation plants.⁵⁶

Municipalities or state governments could similarly use energy consumption data to better tailor programs and services for citizens. Access to energy consumption data is necessary for building owners and managers to comply with municipal benchmarking statutes, and for municipalities to evaluate the effectiveness of such statutes.⁵⁷ Local governments need access to city-wide data to judge the effectiveness of energy efficiency initiatives other than benchmarking as well.⁵⁸ Access to these data would allow for better program implementation, accountability, and evaluation.

Energy consumption data could also help size and target systems to allow homes and businesses to produce their own energy, adopt electric vehicles, and

54. See ANNE MCKIBBIN, UNLEASHING THE POWER OF BIG DATA ON EFFICIENCY? NOT SO FAST 8-213 (2014), http://www.elevateenergy.org/wp/wp-content/uploads/Big_Data_on_Efficiency.pdf [<http://perma.cc/PNH9-7ZZR>] (discussing the varied consumer-benefitting uses of energy consumption data).

55. See Bill McKibben, *Power to the People*, NEW YORKER (June 29, 2015), <http://www.newyorker.com/magazine/2015/06/29/power-to-the-people> [<http://perma.cc/3V58-BNFQ>].

56. See GREEN MOUNTAIN POWER, GMP INNOVATION, INTEGRATED RESOURCE PLAN 5-3 (2014), http://www.greenmountainpower.com/upload/photos/4775_GMP_Innovation.pdf [<https://perma.cc/RNQ5-CW7A>] (discussing “frequency regulation”).

57. See *infra* Part II.C and accompanying text (discussing benchmarking initiatives at the state and local levels); see also *infra* notes 126–29 and accompanying text (discussing Colorado’s altered aggregation standard for building owners and managers to overcome this problem); *Better Buildings Accelerator: Energy Data*, U.S. DEP’T ENERGY, <http://www1.eere.energy.gov/buildings/betterbuildings/accelerators/energy.html> [<http://perma.cc/LP2C-FJ5D>] (last visited May 12, 2016) (detailing a program to streamline access to whole-building data for building owners and managers).

58. California, for example, permits disclosure of customer-specific energy data to government entities, including state universities and municipalities, but requires a nondisclosure agreement, which diminishes the utility of the information since it cannot be published. See AUDREY LEE & MARZIA ZAFAR, CAL. PUB. UTIL. COMM’N, ENERGY DATA CENTER: BRIEFING PAPER 2, 8–9 (Sept. 2012), http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/Pre_2013_PPD_Work/EnergyDataCenterFinal.pdf [<https://perma.cc/SB9B-V9NV>].

aid in the development of community micro grids.⁵⁹ Indeed, some homes and businesses have used distributed generation technologies like solar PV or small wind turbines to produce electricity, ensure power quality, and participate in demand response programs.⁶⁰ And many distributed generation systems are getting cheaper, which could push more customers to produce their own energy. For example, installed prices for solar projects have dropped by 50 percent since 2009 and are now at “grid parity” in many electricity markets.⁶¹ Of the approximately 6,200 megawatts (MW) of solar PV installed in 2014,⁶² most were large-scale utility installations while less than half were residential and nonresidential projects. Residential and nonresidential installations remain more costly because of “soft costs,” such as those associated with supply chain costs, financing, and permitting.⁶³ But availability of energy consumption data could help reduce these costs by increasing transaction transparency.

Disclosure of residential energy use data helps homebuyers and renters understand energy costs of their prospective homes and make better financial decisions.⁶⁴ These data can also allow lending institutions to ensure that borrowers can afford their mortgages. One study found that more energy efficient homes have a lower risk of mortgage default.⁶⁵ Some utilities refuse to share past energy use information with prospective buyers or renters, resulting

59. See CHRISTOPHER VILLARREAL ET AL., CAL. PUB. UTIL. COMM’N, MICROGRIDS: A REGULATORY PERSPECTIVE (Apr. 14, 2015), www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5118 [<http://perma.cc/L79F-KB6T>] (discussing potential benefits of microgrids to consumers as well as to regional grid management operations).

60. See Barney L. Capehart, *Distributed Energy Resources (DER)*, WHOLE BUILDING DESIGN GUIDE (Oct. 23, 2014), <http://www.wbdg.org/resources/der.php> [<http://perma.cc/7RDX-SMT3>].

61. See Mike Munsell, *GTM Research: 20 US States at Grid Parity for Residential Solar*, GREENTECH MEDIA (Feb. 10, 2014), <http://www.greentechmedia.com/articles/read/GTM-Research-20-US-States-at-Grid-Parity-for-Residential-Solar> [<https://perma.cc/AD8U-AUYB>]; MARK BOLINGER & JOACHIM SEEL, UTILITY-SCALE SOLAR 2014 i-ii, 11–19 (Sept. 2015), https://emp.lbl.gov/sites/all/files/lbnl-1000917_0.pdf [<https://perma.cc/U3US-RUF9>]; Galen Barbose & Naïm Darghouth, TRACKING THE SUN VIII 15 (Aug. 2015), https://emp.lbl.gov/sites/all/files/lbnl-188238_2.pdf [<https://perma.cc/9FDB-597C>].

62. *Solar Market Insight Report 2015 Q1*, SOLAR ENERGY INDUSTRIES ASS’N (2015), <http://www.seia.org/research-resources/solar-market-insight-report-2015-q1> [<http://perma.cc/CG6W-WUQP>].

63. *NREL Releases New Roadmap to Reducing Solar PV “Soft Costs” by 2020*, NAT’L RENEWABLE ENERGY LABORATORY (Sept. 25, 2013), <http://www.nrel.gov/news/press/2013/5306.html> [<http://perma.cc/767U-ZSMG>].

64. See Scott Cooney, *Tell Freddie & Fannie to Include Home Efficiency in Buyer Disclosures*, CLEAN TECHNICA (Mar. 10, 2016), <http://cleantechnica.com/2016/03/10/freddie-fannie-fhfa-home-efficiency-buyer-disclosures> [<https://perma.cc/2GWQ-FS45>] (arguing that because of the impact utility payments have on mortgage affordability, those costs should be disclosed prior to purchase).

65. See ROBERTO QUERCIA ET AL., UNIV. OF N.C. CTR. FOR COMMUNITY CAP., HOME ENERGY EFFICIENCY AND MORTGAGE RISKS (Mar. 2013), http://www.imt.org/uploads/resources/files/IMT_UNC_HomeEEMortgageRisksfinal.pdf [<http://perma.cc/ZR22-GE4Z>] (comparing 71,000 Energy Star and non-Energy Star homes to find that the mortgage default rate was 32 percent less for the energy efficient homes).

in an important information asymmetry.⁶⁶ Historical energy use information can be particularly useful for low-income residents and renters, as energy costs eat up a larger share of their income.⁶⁷ For example, an estimated 33 percent of renters in Minnesota spend more than 10 percent of their income on home energy bills.⁶⁸ In some locations, advances in localized energy production technologies (such as rooftop solar PV) and careful management can actually eliminate utility bills entirely, releasing low-income residents from a substantial burden.⁶⁹ For renters, homebuyers, and financial institutions alike, access to past energy use data is critical for making informed financial decisions.

Energy use consumer interfaces can inform consumers of how they are using energy and help them respond to market signals, where available. As energy demand and utility transmission capacity vary with the time of day, the marginal cost of producing electricity may also change. Wholesale electricity markets reflect these variable rates, yet most electric customers still pay a flat retail price with each kilowatt-hour costing the same amount. This is true even though the wholesale market price can vary by two orders of magnitude. Energy advocates imagine a world where utilities use electricity rates to shape consumer behavior and customers' bills reflect actual market prices.⁷⁰ For example, when prices are high, consumers could shut off electric load devices manually or by using preprogrammed commands built into appliances. A new generation of "smart" consumer appliances, including air conditioners, thermostats, water heaters, or refrigerators, can be programmed to automatically cycle their energy use in response to signals or preset price points sent by the utilities or third-party aggregators.⁷¹ This would not affect the performance of the appliance, but it would allow the electric utility or a third-party aggregator to change levels of electricity demand and manage the grid system more efficiently and economically. More active demand management could also support the grid's taking on higher levels of renewable energy resources like wind and solar generation.

66. See Danielle Winner, *Data Access Rules: Energy Bill Disclosure in the Rental and Housing Markets* (Apr. 26, 2015) (unpublished MPP professional paper, Humphrey School of Public Affairs), <http://conservancy.umn.edu/handle/11299/172486> [https://perma.cc/RZ8Q-6XXP].

67. See *id.* at 10.

68. See *id.* at 10–11.

69. Brittany Patterson, *Energy Efficiency: Will Zero-Net-Energy Homes be the Wave of the Future?*, CLIMATEWIRE (Aug. 21, 2015), <http://www.eenews.net/climatewire/2015/08/21/stories/1060023742> [http://perma.cc/UA2E-R8N6].

70. See *Rate Design for the Distribution Edge*, *supra* note 20.

71. Aggregators are independent third parties that work with utilities on behalf of a group of customers to reduce energy usage during periods of peak demand, high wholesale electricity prices, system constraints, or emergencies. See, e.g., PAC. GAS & ELEC., DEMAND RESPONSE FACT SHEET, AGGREGATOR PROGRAMS (Aug. 2013), http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/demandresponse/amp/fs_aggregatorprograms.pdf [https://perma.cc/GQ74-L43E].

Energy consumption data could also help the private sector target installations and create new energy business models. Independent nonutility companies like SolarCity, which has a market capitalization of \$5.3 billion and operations in eighteen states, are using economies of scale to install solar panels on rooftops of residential and commercial buildings, as well as installing energy storage devices.⁷² And SolarCity's technology is spreading rapidly. In 2014, the company installed roughly 500 MW of solar power; by 2018, it projects to install 4,000 MW of solar power each year.⁷³ Energy consumption data are critical components of these new business models and future grid operations. As a result, it is extremely important to begin creating legal frameworks and standardized data formats for energy consumption data. This would ensure that these data, when appropriately disclosed to third parties and the public, can be best used to facilitate the delivery of cutting-edge energy services—those that have the potential to reduce energy demand, increase the use and efficiency of renewable energy, and cut electricity prices for consumers.

II.

LEGAL AND POLICY DEVELOPMENTS GOVERNING ENERGY CONSUMPTION DATA⁷⁴

This Section briefly discusses developing federal, state, and local policies governing the collection and use of energy consumption data and their inadequacies. First, Part II.A details federal energy data policies, as well as the initial efforts to balance the benefits of making data available with any countervailing privacy interests. Next, Part II.B considers state law, particularly the statutory and regulatory developments that attempt to set initial levels for the disclosure of aggregated data⁷⁵ and to govern when customer consent is

72. See Molly Canales, Press Release, *SolarCity Introduces Affordable New Energy Storage Services Across the U.S.*, SOLARCITY (Apr. 30, 2015), <http://www.solarcity.com/newsroom/press/solarcity-introduces-affordable-new-energy-storage-services-across-us> [<http://perma.cc/8SHB-QMY6>]; *SolarCity Corp.*, MARKETWATCH (July 28, 2015), <http://www.marketwatch.com/investing/stock/scty> [<http://perma.cc/YC8L-CT9M>].

73. See Ian Clover, *SolarCity Outlook Disappoints Despite 20% Q3 Revenue Increase*, PV MAG. (Nov. 7, 2014), http://www.pv-magazine.com/news/details/beitrag/solarcity-outlook-disappoints-despite-20-q3-revenue-increase_100017097/#axzz3hD3B1ebY [<http://perma.cc/4NNX-DZMT>]; David Ferris, *SolarCity's CEO on Competition, Pain and Having Elon Musk as a Cousin*, E&E NEWS (Nov. 10, 2014), <http://www.eenews.net/stories/1060008602> [<http://perma.cc/VRN2-BCAT>].

74. For a more detailed discussion of existing federal, state, and local policies governing energy consumption data, see Klass & Wilson, *supra* note 26.

75. Aggregated data refers to combined individual data. In this context, individual energy customer data are aggregated into groups to protect privacy and make analysis easier. See, e.g., Gelareh Taban & Alvaro A. Cárdenas, *Data Aggregation as a Method of Protecting Privacy in Smart Grid Networks*, IEEE SMART GRID (Mar. 2012), <http://smartgrid.ieee.org/newsletters/march-2012/data-aggregation-as-a-method-of-protecting-privacy-in-smart-grid-networks> [<https://perma.cc/JF4W-TZ92>] (discussing data aggregation methods and benefits).

required to disclose certain types of energy consumption data. Finally, Part II.C surveys state and local energy “benchmarking” laws that attempt to collect data on multitenant and public buildings to improve their energy efficiency. Those laws also use energy consumption data to meet state and local greenhouse gas emission reduction targets.

A. Federal Energy Data Policies

There are a number of federal initiatives designed to promote better access to, and use of, energy consumption data. The EIA conducts a number of energy consumption surveys approximately every four years, including the Commercial Buildings Energy Consumption Survey, the Residential Energy Consumption Survey, and the Manufacturing Energy Consumption Survey, all designed to track changes in energy use across the country and project future growth.⁷⁶ Beyond simply surveying current conditions, the federal government has created more prescriptive programs for the creation and dissemination of energy consumption data.

1. ENERGY STAR Portfolio Manager

EPA’s ENERGY STAR Portfolio Manager is a program that analyzes a building’s attributes, such as building type, available space, and energy consumption by fuel type.⁷⁷ Portfolio Manager assigns each building a score between one and one hundred, with fifty being an average score and a score of seventy-five or better indicating top performance and potential eligibility for ENERGY STAR certification.⁷⁸ Once a building owner enters a building’s data into Portfolio Manager, the owner (and other members of the public if the data is disclosed⁷⁹) can compare the building’s rating with similar buildings or with

76. See Klass & Wilson, *supra* note 26, at 82–84 (describing surveys); *Commercial Buildings Energy Consumption Survey*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/consumption/commercial> [<http://perma.cc/RKH6-ZGX3>] (last visited May 12, 2016); *Manufacturing Energy Consumption Survey*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/consumption/manufacturing> [<http://perma.cc/AH38-38RZ>] (last visited May 12, 2016); *Residential Energy Consumption Survey*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/consumption/residential> [<http://perma.cc/DH3J-Y9HC>] (last visited May 12, 2016).

77. See *How the 1–100 Energy Star Score Is Calculated*, ENERGY STAR, <http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/understand-metrics/how-1-100> [<https://perma.cc/KK4E-3YEM>] (last visited May 12, 2016).

78. See *Understand How Portfolio Manager Calculates Metrics*, ENERGY STAR, <http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/understand-metrics> [<http://perma.cc/S3FR-REBU>] (last visited May 12, 2016).

79. Current public disclosure schemes are extremely limited, providing little data beyond the existence of ENERGY STAR-labeled buildings and their yearly scores. See, e.g., *ENERGY STAR Labeled Facilities in Minneapolis, MN*, ENERGY STAR, http://www.energystar.gov/index.cfm?fuseaction=labeled_buildings.showResults&STR=&OWNER_ID=&VIEW=&YEAR=&MINI=&S_CODE=ALL%2CMN%2CMN&FILTER_B_ID=&ZIP=&STARTNUM=1&city=MINNEAPOLIS%2C%20MN&PROFILES [<https://perma.cc/G6TK-5YWT>] (last visited May 12, 2016) (providing, at minimum, addresses, years labeled, and ratings for Energy Star-labeled commercial buildings). Owners can themselves opt to share data with specific other parties, but sharing is not

national medians.⁸⁰ The building owner can also obtain an ENERGY STAR performance document that summarizes the building's energy consumption data.⁸¹

Portfolio Manager has been extremely successful in increasing building owners' awareness of energy efficiency opportunities,⁸² incentivizing energy efficiency projects by enabling comparisons to similar types of buildings or national medians,⁸³ and providing a consistent framework for publishing energy efficiency data.⁸⁴ Portfolio Manager is a particularly effective way for building owners to monitor energy consumption, and it valuably aids compliance with efficiency benchmarking mandates.⁸⁵

Still, the system is not perfect. Mandated public disclosures are extremely limited and of little use to energy researchers.⁸⁶ Portfolio Manager allows building owners to share and compare their data with other users, including researchers who create Portfolio Manager accounts, but the decision to disclose that information is entirely at the discretion of the building owners.⁸⁷ Voluntary

required. *See Share and Request Data*, ENERGY STAR, <http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/share-and-request-data> [<http://perma.cc/6YAA-CKZJ>] (last visited May 12, 2016).

80. *See Ways Everyone Can Benchmark Performance*, ENERGY STAR, <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/interpret-your-results/ways> [<https://perma.cc/PYH4-J75Y>] (last visited May 12, 2016).

81. *See* ENERGY STAR, PORTFOLIO MANAGER QUICK START GUIDE (June 2013), https://www.energystar.gov/sites/default/files/tools/EnergyStar_QuickStart_508.pdf [<http://perma.cc/HJ5B-RAYN>]; *see also Sample ENERGY STAR Performance Documents*, ENERGY STAR, <http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/verify-and-document/sample> [<https://perma.cc/J7U8-P3S7>] (last visited May 12, 2016).

82. *See About ENERGY STAR for Commercial and Industrial Buildings*, ENERGY STAR, <http://www.energystar.gov/buildings/about-us> [<http://perma.cc/545R-A99A>] (last visited May 12, 2016); *cf. ENERGY STAR Treasure Hunt Guide: Simple Steps to Finding Energy Savings*, ENERGY STAR, <https://www.energystar.gov/buildings/tools-and-resources/energy-star-treasure-hunt-guide-simple-steps-finding-energy-savings> [<https://perma.cc/4E69-9UWX>] (last visited May 12, 2016) (detailing how to organize "Energy Treasure Hunts" to improve energy efficiency in industrial and manufacturing facilities).

83. *See About ENERGY STAR*, ENERGY STAR, <https://www.energystar.gov/about> [<http://perma.cc/AA3X-YQDD>] (last visited May 12, 2016); *see also* ENERGY STAR, SAMPLE ENERGY STAR PROGRESS & GOALS REPORT, http://www.energystar.gov/sites/default/files/tools/Progress%20and%20Goals%20Sample_0.pdf [<https://perma.cc/GR7Q-QNAS>] (last visited May 12, 2016).

84. *See About ENERGY STAR for Commercial and Industrial Buildings*, *supra* note 82; ENERGY STAR, OVERVIEW OF 2014 ACHIEVEMENTS (Apr. 1, 2015), https://www.energystar.gov/ia/partners/publications/pubdocs/Overview%20of%20Achievements_508Compliant.pdf [<https://perma.cc/WY4T-BH5V>]; ENERGY STAR, NATIONAL, STATE, AND LOCAL GOVERNMENTS LEVERAGING ENERGY STAR (Dec. 18, 2014), http://www.energystar.gov/sites/default/files/tools/ES_Government-Factsheet_121914.pdf [<http://perma.cc/RJ5V-9W9K>].

85. *About ENERGY STAR for Commercial and Industrial Buildings*, *supra* note 82; OVERVIEW OF 2014 ACHIEVEMENTS, *supra* note 84; ENERGY STAR, NATIONAL, STATE, AND LOCAL GOVERNMENTS LEVERAGING ENERGY STAR, *supra* note 84.

86. *See supra* text accompanying note 79.

87. *See Share and Request Data*, *supra* note 79.

disclosures alone are not effective in building a representative dataset, particularly as high-performing buildings are likely more willing to share their data (as it reflects positively on them), while low-performing buildings are likely less willing to do so. This, of course, assumes that building owners are able to employ Portfolio Manager at all—in multitenant buildings where tenants pay utilities directly for their electricity use, building owners may be unable to amass the data necessary to use Portfolio Manager for the building.⁸⁸ In short, Portfolio Manager is currently insufficient to meet the needs of government, third-party researchers, and other energy-efficiency stakeholders.

2. *Green Button*

In 2011, the White House issued a challenge for electricity providers to make energy consumption data more readily available to customers in a uniform format. The energy sector responded by developing the “Green Button” initiative.⁸⁹ More than thirty-five utilities and electricity suppliers have adopted Green Button since its official launch in 2012.⁹⁰ The initiative complies with the Energy Service Provider Interface data standard, which requires a common XML format for energy usage information and a data exchange protocol that facilitates the automatic transfer of energy data from a utility to a third party once a customer has authorized sharing that data.⁹¹ This standardized format allows utilities and energy management companies to follow a consistent approach for data presentation. It also allows third-party

88. See *infra* notes 121–24 and accompanying text; see also ANDREA KRUKOWSKI & CLIFF MAJERSIK, INSTITUTE FOR MARKET TRANSFORMATION, UTILITIES’ GUIDE TO DATA ACCESS FOR BUILDING BENCHMARKING (Mar. 1, 2013), http://www.energydataalliance.org/wp-content/uploads/2011/07/IMT_Report_-_Utilities_Guide_-_March_2013.pdf [<http://perma.cc/2AD5-7Y7X>] (detailing both the need and the current difficulties for utilities to provide whole-building data to building owners); ENERGY STAR, UTILITIES PROVIDING ENERGY DATA FOR BENCHMARKING IN ENERGY STAR PORTFOLIO MANAGER (Jan. 2016), https://www.energystar.gov/sites/default/files/tools/Web_Services_Fact_Sheet_01202016_508_1.pdf [<https://perma.cc/N7AK-5546>] (listing utilities that voluntarily provide whole-building aggregate data for the purposes of Portfolio Manager benchmarking).

89. See, e.g., Nick Sinai & Matt Theall, *Expanded “Green Button” Will Reach Federal Agencies and More American Energy Consumers*, WHITE HOUSE (Dec. 5, 2013, 10:31 AM), <http://www.whitehouse.gov/blog/2013/12/05/expanded-green-button-will-reach-federal-agencies-and-more-american-energy-consumers> [<http://perma.cc/H4JY-TWA3>]; *Green Button*, ENERGY.GOV, <http://www.energy.gov/data/green-button> [<http://perma.cc/7BHN-LQL4>] (last visited May 12, 2016) [hereinafter *Green Button*]; *Green Button*, PAC. GAS & ELEC., <http://www.pge.com/myhome/addservices/moreservices/greenbutton> [<http://perma.cc/G5AZ-BHJE>] (last visited May 12, 2016).

90. See Monisha Shah & Nick Sinai, *Green Button: Enabling Energy Innovation*, WHITE HOUSE BLOG (May 2, 2013, 9:12 AM), <https://www.whitehouse.gov/blog/2013/05/02/green-button-enabling-energy-innovation> [<https://perma.cc/WM29-ZFXP>]; *Green Button*, *supra* note 89. For a list of the total entities, now numbering approximately seventy-five, which have adopted the program, see GREEN BUTTON DATA, <http://www.greenbuttondata.org> [<http://perma.cc/8K3Y-JP9X>] (last visited May 12, 2016).

91. *Green Button*, *supra* note 89; see also *An Overview of the Green Button Initiative*, GREEN BUTTON DATA, <http://www.greenbuttondata.org/learn> [<http://perma.cc/Y9UA-JM8B>] (last visited May 12, 2016).

developers like energy efficiency service providers to create software to analyze data across markets, rather than having to develop different software to interface with each utility's proprietary system.⁹² The Green Button protocol permits utilities to provide data in fifteen-minute, hourly, daily, or monthly intervals at their discretion.⁹³

The Green Button software has two primary capabilities. The first, the *Download My Data* feature, lets utility customers download their energy consumption data to their own computers with the click of a button.⁹⁴ Customers may subsequently choose to upload these data to a third-party application.⁹⁵ The second, the *Connect My Data* feature, allows utility customers to share their data upon consent and request the secure transfer of their energy consumption data directly to a third party.⁹⁶

While the software is an important component in engaging individual consumers with their energy use and promoting individual energy efficiency programs, it has not proved especially useful for third-party researchers and policy makers because consumers must consent for their data to be transferred to third parties, the transfer process is voluntary, and few utilities have adopted the program.⁹⁷ Consumers may choose to share their individual data with a variety of third parties, so that the third party can interpret or track information, or so that the third party may suggest energy efficiency upgrades.⁹⁸ Thus, if a customer gives consent and if the third party meets testing and certification protocol, the data can be transferred via Green Button. Without customer consent, however, third-party researchers and policy makers cannot obtain either aggregated or unaggregated data. The program's effectiveness is also limited because it is voluntary and only a limited number of electric utilities have adopted it.⁹⁹ Thus, Green Button offers a valuable standard data interface for consumers and third parties, but it is of very limited use to groups desiring a wider scope of information.

92. SEE ACTION, A REGULATOR'S PRIVACY GUIDE TO THIRD-PARTY DATA ACCESS FOR ENERGY EFFICIENCY 4 (Dec. 2012), https://www4.eere.energy.gov/seeaction/system/files/documents/cib_regulator_privacy_guide_0.pdf [<https://perma.cc/E43Q-CCFY>].

93. See *Green Button*, *supra* note 89.

94. See *id.*

95. See *id.*

96. See *id.*

97. See SEE ACTION, *supra* note 92, at vi.

98. See *id.* at 2.

99. See *supra* notes 90, 97. Resistance to the program is strongest among those utilities that have developed proprietary data-sharing software not in compliance with the Green Button standards. See, e.g., *IN RE PROPOSED RULES RELATING TO DATA ACCESS & PRIVACY FOR ELEC. UTILS.*, 4 COLO. CODE REGS. § 723-3 (2015); *DATA ACCESS AND PRIVACY RULES FOR GAS UTILS.*, 4 COLO. CODE REGS. § 723-4 ¶ 132.

3. *Developments in Federal Privacy Protections for Energy Consumption Data*

In 2015, the U.S. Department of Energy released a Voluntary Code of Conduct (VCC) on data privacy and the smart grid.¹⁰⁰ It intended the VCC to instill consumer confidence by addressing privacy concerns regarding energy consumption data.¹⁰¹ The VCC specifies policies for the following categories: Customer Notice and Awareness, Customer Choice and Consent, Customer Data Access, Data Integrity and Security, and Self-Enforcement Management and Redress.¹⁰² Of greatest relevance to this Article is the section on the release of data without customer consent. Release is permissible if “the methodology used to aggregate or anonymize Customer Data strongly limits the likelihood of reidentification of individual customers or their Customer Data from the aggregated or Anonymized data set.”¹⁰³ The VCC defines “aggregated data” as “a combination of data elements for multiple customers to create a data set that is sufficiently anonymous so that it does not reveal the identity of an individual customer.”¹⁰⁴

While acknowledging the need to provide for the release of aggregated data is certainly a step in the right direction, the efficacy of the VCC is somewhat compromised by its failure to specify options for different levels of aggregation. The VCC could have set the specific minimum number of customers whose data must be combined to create the data set and a maximum percentage any one customer’s data can make of the data set. For example, a “15/15 aggregation level” requires a minimum of fifteen customers’ data to be combined, and no one customer’s data can comprise more than 15 percent of the released data set.¹⁰⁵ Although no one methodology can eliminate reidentification risks—as these risks depend on the customer class, the granularity, the time frame, and other factors—a more detailed analysis of the issue in the VCC would have been helpful. This is particularly true because policy makers frequently clash with privacy advocates over the aggregation level.¹⁰⁶ Furthermore, the DOE’s silence on the subject is of no help resolving the issue.

100. U.S. DEP’T OF ENERGY, VOLUNTARY CODE OF CONDUCT (VCC): FINAL CONCEPTS AND PRINCIPLES (Jan. 12, 2015), http://www.energy.gov/sites/prod/files/2015/01/f19/VCC%20Concepts%20and%20Principles%202015_01_08%20FINAL.pdf [<http://perma.cc/XH38-LBBM>].

101. See *DOE Preparing Voluntary Code of Conduct for Consumer Data Privacy*, SMARTGRID NEWS (Jan. 8, 2015), <http://www.smartgridnews.com/story/doe-preparing-voluntary-code-conduct-consumer-data-privacy/2015-01-08> [<http://perma.cc/BXS4-96VH>].

102. U.S. DEP’T OF ENERGY, *supra* note 100, at 2.

103. *Id.* at 8.

104. *Id.* at 3; see also SEE ACTION, *supra* note 92, at 3 (“Aggregated data are data that the utility assembles from multiple residences, tenants, or commercial buildings to provide information about energy consumption across a specified area.”); REGULATORY ASSISTANCE PROJECT, DRIVING BUILDING EFFICIENCY WITH AGGREGATED CUSTOMER DATA 6–7 (July 2013) (same).

105. LEE & ZAFAR, *supra* note 58, at 9–10.

106. See *id.* at 2.

Beyond the VCC, federal court decisions governing privacy protections for data in other contexts will likely be relevant to developing standards governing privacy concerns associated with energy consumption data. Notably, when defendants have raised claims in criminal prosecutions that there is an expectation of privacy in utility records under the Fourth Amendment to the U.S. Constitution, courts have rejected such arguments under the “third-party” doctrine: that information given by a customer to a business as part of a commercial relationship is not protected.¹⁰⁷ However, recent Supreme Court cases on other forms of technology have recognized the privacy implications of businesses’ increased capacity to store large amounts of personal data and accordingly have rewritten the standard for Fourth Amendment privacy expectations regarding GPS tracking¹⁰⁸ and cell phones.¹⁰⁹ Although it has yet to do so, it is unclear whether the Court will extend this line of reasoning to future energy consumption data cases.

B. State Energy Data Laws and Policies

State governments have taken a variety of approaches to make energy consumption data available to customers and third parties. A major concern in every state deliberation over the release of data to third parties is the perceived risk that especially granular data (e.g., energy consumption broken down into fifteen-minute intervals and tied to a particular address) could fall into the wrong hands and aid in criminal activity. For instance, a burglar could determine times of day a residence is likely unoccupied.¹¹⁰ Additional concerns exist regarding the potential uses for the data. The data could be used for marketing purposes¹¹¹ or could expose criminal activity or zoning violations.¹¹²

107. See, e.g., *Naperville Smart Meter Awareness v. City of Naperville*, No. 11-C-9299, 2014 WL 4783823 (N.D. Ill. Sept. 25, 2014) (finding, under the third-party doctrine, no reasonable expectation of privacy in aggregate measurements of electrical usage); *United States v. McIntyre*, 646 F.3d 1107 (8th Cir. 2011) (finding, under the third-party doctrine, no reasonable expectation of privacy in residential electricity usage records); *United States v. Hamilton*, 434 F. Supp. 2d 974 (D. Or. 2006) (finding, under the third-party doctrine, no reasonable expectation of privacy in utility records); *Samson v. State*, 919 P.2d 171 (Alaska 1996); *United States v. Porco*, 842 F. Supp. 1393 (D. Wyo. 1994).

108. *United States v. Jones*, 132 S. Ct. 945 (2012) (holding that attaching a GPS tracking device to a vehicle was a “search” within the meaning of the Fourth Amendment and required a warrant).

109. *Riley v. California*, 134 S. Ct. 2473 (2014) (holding that a warrant is required to search a cell phone). For a discussion on the evolving standards of privacy in Supreme Court jurisprudence, see Matthew B. Kugler & Lior Jacob Strahilevitz, *Surveillance Duration Doesn’t Affect Privacy Expectations: An Empirical Test of the Mosaic Theory*, SUP. CT. REV. (forthcoming 2016) (discussing *Jones* and *Riley* cases and exploring public opinion surveys on how general expectations of privacy in a given context should shape Fourth Amendment doctrine).

110. See BRANDON J. MURRILL ET AL., CONG. RESEARCH SERV., SMART METER DATA: PRIVACY AND CYBERSECURITY 6 (2012) (describing potential use of new residential smart meter data for law enforcement, criminal, and marketing purposes).

111. For an example of large-scale marketing efforts based on energy use data, see *Market Research on Energy Efficiency and Demand*, ENERDATA, <http://www.enerdata.net/enerdatauk/energy->

Responding to these privacy concerns has so far been left entirely to the states, as neither Congress nor any federal agency has created specific privacy policies governing energy consumption data.¹¹³

When states have considered customers' access to their own data, nearly all have decided that customers should have access.¹¹⁴ Some states require data to be provided in specific formats, including those compatible with ENERGY STAR Portfolio Manager or Green Button.¹¹⁵ A recently proposed Colorado PUC rule contained a similar requirement, but area utilities with data-provision programs already in place protested, and the PUC declined to adopt the requirement.¹¹⁶

At least two states, Vermont and Wisconsin, address privacy issues by formally contracting with third-party energy efficiency program administrators. Vermont's "Efficiency Vermont" program and Wisconsin's "Focus on Energy" program grant state contractors access to customer energy consumption data to further state energy efficiency policies.¹¹⁷ Utilities or customers can share their data with Efficiency Vermont, which can then share it with other third parties for energy efficiency purposes, provided that the third party signs Efficiency Vermont's Privacy Policy or that the data is aggregated to no smaller than the

advisory/energy-efficiency/efficiency-research.php [http://perma.cc/DW2C-FAFY] (last visited May 15, 2016).

112. See, e.g., *United States v. Kyllo*, 190 F.3d 1041, 1043 (9th Cir. 1999), *rev'd on other grounds*, 533 U.S. 27 (2001) (describing the use of monthly electricity use records to identify potential marijuana grow operation); Mikhail A. Lisovich et al., *Inferring Personal Information from Demand-Response Systems*, IEEE SECURITY & PRIVACY 11, 13 (Jan.-Feb. 2010), http://wisl.ece.cornell.edu/wicker/SWicker_lisovich [http://perma.cc/XHN5-V6TT].

113. See *supra* notes 100–09 and accompanying text (describing applicable federal privacy law); Klass & Wilson, *supra* note 26, at 86–88 (same), 89–100 (state privacy policies).

114. See SEE ACTION, *supra* note 92, at viii, 24. Rules and statutes in California, Colorado, Illinois, Oklahoma, Pennsylvania, Texas, and Washington have all stipulated this to be the case. See CAL. PUB. UTIL. CODE § 8380(b)(4) (2012); 4 COLO. CODE REGS. § 723-3-3026(d) (2014); ILL. ADMIN. CODE tit. 83, § 410.210 (2014); OKLA. STAT. tit. 17, § 710.4(A) (2011); 66 PA. CONS. STAT. ANN. § 2807(d)(2) (2008); 2 TEX. UTIL. CODE ANN. § 39.107(b) (2013); 16 TEX. ADMIN. CODE § 25.130(j)(1) (2014); WASH. ADMIN. CODE § 480-100-153(1) (2014).

115. See, e.g., WASH. REV. CODE § 19.27A.170(1) (2009) (“[Q]ualifying utilities shall maintain records of the energy consumption data of all nonresidential and qualifying public agency buildings to which they provide service. This data must be maintained for at least the most recent twelve months in a format compatible for uploading to the United States environmental protection agency’s energy star portfolio manager.”); *id.* § 19.27A.170(2) (“[A] qualifying utility shall upload the energy consumption data for the accounts specified by the owner or operator for a building to the United States environmental protection agency’s energy star portfolio manager.”).

116. See RULES RELATING TO DATA ACCESS AND PRIVACY, *supra* note 99, ¶¶ 130, 132.

117. For information regarding Efficiency Vermont and its services, see *General Energy Efficiency Utility Information*, VT. PUB. SERV. BOARD, <http://psb.vermont.gov/utilityindustries/eu/generalinfo> [http://perma.cc/HT33-BWQT] (last visited May 15, 2016). For examples of services provided by Focus on Energy, see *Residential*, FOCUS ON ENERGY, <https://focusonenergy.com/residential> [https://perma.cc/K22G-W3T2] (last visited May 15, 2016); see also *For Your Business*, FOCUS ON ENERGY, <https://focusonenergy.com/business> [http://perma.cc/RK3W-RALL] (last visited May 15, 2016).

“town” level.¹¹⁸ Wisconsin’s Focus on Energy administrator enters into individual agreements with utilities detailing how data will be handled and used; the agreements contain confidentiality and data retention policies and provide for a monetary penalty for unauthorized release of the data.¹¹⁹ These energy efficiency program administrators are different than a usual third-party researcher or vendor in that they are under contract with the state, and data management practices are part of those contracts. Other third-party researchers or vendors may lack state backing and would be unable to use this method to obtain the data they desire.¹²⁰

States that do not contract with an independent third party for coordinated energy efficiency programs have enacted laws governing the ability of third parties to obtain access to energy consumption data.¹²¹ For example, third parties cannot obtain individual customer data without express customer consent in Colorado, Texas, and Washington.¹²²

Some states believe that aggregated data does not pose the same privacy concerns as individualized data; those states provide mechanisms for third parties to obtain aggregated data without customer consent.¹²³ Aggregated data is often extremely useful for benchmarking and targeting energy efficiency opportunities. However, in most states the ability to obtain it is uncertain or subject to stringent requirements,¹²⁴ often diminishing its utility. Existing state policies are discussed below:

Colorado: In 2012, Colorado adopted a “15/15” rule for the release of aggregated customer data to building owners and other third parties.¹²⁵ While many believed, at the time, that the rule was a reasonable compromise point between the interests of researchers, the public, and consumers, it proved problematic in practice. Multitenant building owners, for example, whose tenants are responsible for their own utility contracts, were unable to get a report of total energy use in their building unless the building contained more than fifteen electric meters.

118. *Efficiency Vermont Privacy Policy*, EFFICIENCY VT., <https://www.encyvermont.com/About-Us/Privacy-Policy> [<http://perma.cc/X3CJ-C6UJ>] (last visited May 15, 2016); *see also* SEE ACTION, *supra* note 92, at 11.

119. *See* LEE & ZAFAR, *supra* note 58, at 9.

120. *See, e.g.*, WIS. STAT. § 196.374(2)(a) (2014) (“The utilities may not execute a contract . . . unless the [Public Service] Commission has approved the contract.”).

121. *See* SEE ACTION, *supra* note 92, at 6.

122. *See, e.g.*, 4 COLO. CODE REGS. § 723-3-3032 (2014); 2 TEX. UTIL. CODE ANN. § 39.107 (2013); WASH. ADMIN. CODE § 480-100-153 (2014).

123. *See, e.g.*, 4 COLO. CODE REGS. § 723-3-3033; WASH. ADMIN. CODE § 480-100-153(7).

124. *See* SEE ACTION, *supra* note 92, at 6, 8; *see also* *Data Access*, ACEEE, <http://database.aceee.org/state/data-access> [<https://perma.cc/57AE-BLRH>] (last visited May 15, 2016) (cataloguing state policies providing third-party access to utility data).

125. 4 COLO. CODE REGS. § 723-3-3031(a)–(f); *see also supra* text accompanying note 104 (defining “aggregated data”).

In an influential 2014 study by the Pacific Northwest National Laboratory, six utilities provided information about their commercial building customers for an examination of the effect various aggregation standards would have on data release.¹²⁶ The study found that at a 15/15 aggregation level, only one of the six utilities had more than 10 percent of its multitenant commercial buildings eligible for reporting, and two of the six had no buildings eligible for reporting.¹²⁷ This illustrates the extreme burden a 15/15 rule imposes on the availability of whole-building energy consumption data.

The same study examined the degree of similarity between a multitenant building's average meter profile and a particular tenant's individual meter. It found that though a sharp decline in similarity occurred between two- and three-meter buildings, and three- and four-meter buildings, the declines were generally much more gradual in buildings with more than four meters.¹²⁸ This suggests that a 15/15 standard is needlessly overprotective from a privacy standpoint.

In 2015, the Colorado PUC modified its 15/15 rule to permit the release of less-aggregated data to building owners (a 4/50 aggregation level), provided the property owner agrees to a nondisclosure agreement and a stipulated range of acceptable uses for the data.¹²⁹ A requirement that only four customers can constitute an acceptable data set, with one customer's data comprising at most 50% of the set, vastly increases the availability and utility of the data. This change will likely improve the ability of property owners to benchmark their buildings, use programs such as the ENERGY STAR Portfolio Manager, and more specifically evaluate potential efficiency upgrades.

California: In 2014, the California PUC adopted rules providing for access to energy consumption data by local governments, researchers, and the public.¹³⁰ The decision evaluated different "use cases" and created varying rules for the release of data depending on the nature of the data in question and who requests it.¹³¹ For example, residential customer data released publicly without customer consent is to be aggregated to the zip code level, provided personal identifying information is stripped out and more than one hundred residential customers are present in the zip code.¹³² A variety of other combinations of requesting entity and data sought are contemplated in the

126. See O.V. LIVINGSTON ET AL., COMMERCIAL BUILDING TENANT ENERGY USAGE DATA AGGREGATION AND PRIVACY, PAC. NORTHWEST NAT'L LABORATORY (Oct. 2014), http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23786.pdf [<http://perma.cc/6MNH-FAVS>].

127. See *id.* at 23. The remaining three utilities had potential reporting rates of 0.6 percent, 5 percent, and 5 percent. *Id.*

128. See *id.* at 22.

129. 4 COLO. CODE REGS. § 723-3-3034.

130. See Decision Adopting Rules to Provide Access to Energy Usage-Related Data While Protecting Privacy of Personal Data, 2014 WL 1931946 (May 1, 2014).

131. *Id.* at *11.

132. *Id.* at *15.

rulemaking.¹³³ The data access regime created has been reasonably successful—within the first month over 100 third parties registered with the Commission.¹³⁴

The California PUC also considered the creation of a statewide Energy Data Center to collect and retain some level of aggregated energy consumption data for public and third party access,¹³⁵ but ultimately declined to create one at the time, agreeing to study the issue in subsequent agency proceedings.¹³⁶ A working group convened prior to the ruling discussed using a 15/15 aggregation standard, which suggests 15/15 would be a likely starting point if the PUC ever considers moving to an aggregation standard.¹³⁷

New York: In 2010, the New York Public Service Commission (PSC) established a process to provide building owners access to their tenants' energy consumption data, aggregated to the building level.¹³⁸ This decision helps New York City building owners to comply with local building efficiency and benchmarking laws discussed in Part II.C, but does little to provide data access to researchers or governments.

A 2010 New York PSC decision specifically authorized the release of personally identifiable customer data for use in an energy efficiency service program that sought to encourage a 2 percent decrease in energy use per customer by providing comparisons between a customer's data and that of their neighbors.¹³⁹ The utilities were not required to obtain customer consent for the release of their data, though the energy efficiency program administrators were subjected to a strict nondisclosure agreement.¹⁴⁰

133. *See id.* at *28–78.

134. *See* MICHAEL MURRAY & JIM HAWLEY, GOT DATA? THE VALUE OF ENERGY DATA ACCESS TO CONSUMERS 17 (2016).

135. *See* Decision Adopting Rules to Provide Access to Energy Usage-Related Data While Protecting Privacy of Personal Data, *supra* note 130, at *3; LEE & ZAFAR, *supra* note 58, at 2–7 (outlining the potential for a state Energy Data Center).

136. *See* Decision Adopting Rules to Provide Access to Energy Usage-Related Data While Protecting Privacy of Personal Data, *supra* note 130, at *16.

137. *See* Order Instituting Rulemaking to Consider Smart Grid Technologies Pursuant to Federal Legislation and on the Commission's Own Motion to Actively Guide Policy in California's Development of a Smart Grid System, 2014 WL 1931946, at *68–69 (Cal. Pub. Util. Comm'n, May 1, 2014).

138. *See* Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service & Comprehensive Management Audit of Consolidated Edison Company of New York, Inc., 2010 WL 1255789 (N.Y. Pub. Serv. Comm'n, Mar. 26, 2010).

139. *See* Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, 2010 WL 5030878 (N.Y. Pub. Serv. Comm'n, Dec. 3, 2010).

140. *See id.* One unique facet of the New York system is that if a data request requires a manual review of billing information, the utility is empowered to recover from the requestor the costs of providing the data. Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service & Comprehensive Management Audit of Consolidated Edison Company of New York, Inc., *supra* note 138, at 8.

Oklahoma: Oklahoma law permits the release of aggregated energy consumption data without customer consent for energy assistance and conservation purposes, provided “all identifying information has been removed such that the individual usage data of a customer cannot without extraordinary effort and expertise be associated with the identifying information of that customer.”¹⁴¹ While no specific aggregation level is stipulated, the law requires a “sufficient number of similarly situated customers . . . so that the daily usage routines or habits of an individual customer could not reasonably be deduced.”¹⁴²

Michigan: The Michigan PSC considered consumer data privacy issues in a series of 2013 decisions. It ultimately directed Michigan utilities to issue data privacy tariffs requiring customer consent for disclosure of individual energy consumption data, but provided for the release of aggregated data without consent.¹⁴³ The PSC did not specify a required level of aggregation, though earlier documents refer favorably to the 15/15 standard.¹⁴⁴

Minnesota: The Minnesota PUC created a workgroup in 2013 to draft desired energy consumption data practices.¹⁴⁵ The workgroup issued a final report for public comment in September 2014, recommending a range of “use cases” similar to the 2014 California rule.¹⁴⁶ The PUC has not yet released a formal ruling on the issue.

Illinois: In 2013, the Illinois Commerce Commission (ICC) began to investigate the privacy issues associated with energy consumption data and develop methods for third-party disclosure that would be consistent with Illinois law.¹⁴⁷ A January 2014 hearing adopted the 15/15 aggregation standard,¹⁴⁸ which was unchanged on rehearing in July 2014.¹⁴⁹ In August 2014, the Environmental Defense Fund and the Citizens Utility Board filed a

141. OKLA. STAT. tit. 17, § 710.3(1) (2011).

142. *Id.* § 710.7(B)(2).

143. *See In re Comm’n’s Own Motion, to Review Issues Concerning Customer Info. & Data Privacy Related to Advanced Metering Infrastructure Deployment*, 2013 WL 5761073 (Oct. 17, 2013).

144. *See In re Comm’n’s Own Motion, to Review Issues Concerning Customer Information & Data Privacy Related to Advanced Metering Infrastructure Deployment*, 2013 WL 3355856, at *12 (June 28, 2013).

145. *See In re Comm’n Inquiry into Privacy Policies of Rate-Regulated Energy Utils.*, 2013 WL 3009192, at *5 (June 17, 2013).

146. MINN. PUB. UTIL. COMM’N, USE AND LIMITATIONS ON USE OF CUSTOMER ENERGY USAGE DATA: BALANCING CUSTOMER PRIVACY AND MINNESOTA’S ENERGY GOALS 38 (Sept. 15, 2014), <https://www.edockets.state.mn.us/Efiling/edockets/searchDocuments.do?method=viewDocument&documentId={E73ECFE2-6CC9-4934-8364-6AE4F2EDE59D}&documentTitle=20149-103119-01&userType=public> [https://perma.cc/6B87-V6LS].

147. *See Ill. Commerce Comm’n on its Own Motion, Order*, 2014 WL 580077, at *16 (Jan. 28, 2014).

148. *See id.*

149. *See Ill. Commerce Comm’n on its Own Motion, Order on Rehearing*, 2014 WL 3890904, at *9 (July 30, 2014).

motion to adopt the Illinois Open Data Access Framework,¹⁵⁰ and the ICC opened a proceeding in January 2015.¹⁵¹ The Illinois Open Data Access Framework would require that customers be given access to their own use data in intervals of less than one hour and be empowered to authorize sharing of the data with third-party service providers.¹⁵² In late March 2016, the ICC issued a final order authorizing release of the past twenty-four months of consumer data to third parties upon authorization by the consumer.¹⁵³

In sum, states are for the most part in the early phases of addressing energy consumption data access and privacy. The states that have begun the process have appropriately addressed customer access issues but are far from resolving more difficult issues surrounding third-party access and data standardization.

C. State and Local “Benchmarking” Programs

Many state and local governments have created energy consumption data policies¹⁵⁴ that are designed to increase energy efficiency and inform potential purchasers of a building’s current level of energy efficiency and eventual energy costs.¹⁵⁵ These policies are often referred to as commercial building “benchmarking” programs, where the energy used by a building is tracked and summarized on an annual basis, enabling comparison to similar buildings under

150. Petition of the Citizens Utility Board and Environmental Defense Fund to Initiate a Proceeding to Adopt the Illinois Open Data Access Framework (Aug. 15, 2014), <https://www.icc.illinois.gov/docket/files.aspx?no=14-0507&docId=217753> [https://perma.cc/X8A8-9Z9M]; see also Kari Lydersen, *Illinois Grapples with Question of Who Owns Energy Data*, MIDWEST ENERGY NEWS (Aug. 28, 2014), <http://midwestenergynews.com/2014/08/28/illinois-grapples-with-question-of-who-owns-energy-data> [https://perma.cc/7YB8-CT95].

151. Ill. Commerce Comm’n on its Own Motion, Order Initiating Proceeding, 2015 WL 413246 (Jan. 28, 2015).

152. SMART GRID LEGAL NEWS, OPEN DATA ACCESS FRAMEWORK, http://www.smartgridlegalnews.com/Illinois_Open_Data_Access_Framework_0814.pdf [https://perma.cc/J6X8-AE4F] (last visited May 15, 2016).

153. Investigation into the Customer Authorization Required for Access by Third Parties Other than Retail Electric Suppliers to Advanced Metering Infrastructure Interval Meter Data (Mar. 23, 2016), <https://www.icc.illinois.gov/docket/files.aspx?no=15-0073&docId=240497> [https://perma.cc/483N-BWS5].

154. *U.S. Building Benchmarking and Transparency Policies*, INST. FOR MARKET TRANSFORMATION, http://www.imt.org/uploads/resources/files/IMT_USbenchmarking_060515.jpg [https://perma.cc/S75F-EK3E] (last visited May 26, 2016) (listing current benchmarking programs in U.S. states and cities); see also *Jurisdictions*, BUILDINGRATING.ORG, <http://www.buildingrating.org/jurisdictions> [https://perma.cc/QNG2-ARYJ] (last visited May 15, 2016) (cataloging all benchmarking-type ordinances across the globe).

155. PALMER & WALLS, *supra* note 41 (laying out the probable, intended effects of benchmarking laws and the types of data collection and analysis required to judge their effectiveness). A 2015 study by the Department of Energy found that energy codes generally were successful in increasing energy efficiency. Ryan Meres, *Do Energy Codes Work?*, BUILDER ONLINE (Jan. 4, 2016), http://www.builderonline.com/building/code/do-energy-codes-work_o [https://perma.cc/WR8J-9DRK].

similar conditions on a local, state, or national level. Seattle,¹⁵⁶ Portland,¹⁵⁷ Berkeley,¹⁵⁸ San Francisco,¹⁵⁹ Austin,¹⁶⁰ Boulder,¹⁶¹ Minneapolis,¹⁶² Kansas City,¹⁶³ Chicago,¹⁶⁴ Atlanta,¹⁶⁵ Cambridge,¹⁶⁶ Boston,¹⁶⁷ New York,¹⁶⁸ Philadelphia,¹⁶⁹ and Washington, D.C.,¹⁷⁰ all impose some form of benchmarking. Most building owners comply by using ENERGY STAR Portfolio Manager.¹⁷¹ Benchmarking is particularly difficult in situations where

156. SEATTLE, WASH., CODE ch. 22.920, § 6-7-31(C) (2010) (requiring tracking and annual reporting of energy performance of non residential building and multifamily buildings over 20,000 sq. ft.). In March 2016 the City Council amended the code to require public disclosure of energy performance. *See* Seattle, Wash., Ordinance 125,000 (Mar. 10, 2016).

157. PORTLAND, OR., CODE ch. 17.104 § 10-7.7-2(a) (2015) (requiring use of ENERGY STAR Portfolio Manager and an annual report of energy performance of commercial buildings over 20,000 sq. ft.).

158. BERKELEY, CAL., CODE ch. 19.81 (2015) (requiring use of ENERGY STAR Portfolio Manager and an annual report of energy performance for buildings over 25,000 sq. ft., or at time of sale for smaller buildings and single-family buildings regardless of size).

159. S.F., CAL., ENVTL. CODE ch. 20 (2010) (requiring use of ENERGY STAR Portfolio Manager and an annual report of energy performance for nonresidential buildings over 10,000 sq. ft.).

160. AUSTIN, TEX., CITY CODE ch. 6-7 (requiring annual energy audits of commercial buildings over 10,000 sq. ft.).

161. BOULDER, COLO., CODE ch. 7.7 (2015) (requiring benchmarking for existing commercial buildings over 50,000 sq. ft. and new buildings over 10,000 sq. ft.).

162. MINNEAPOLIS, MINN., CODE ORDINANCES § 47.190 (2012) (requiring an annual energy use report for nonresidential and nonindustrial buildings over 50,000 sq. ft.).

163. KANSAS CITY, MO., CODE OF ORDINANCES art. XVI (2015) (requiring use of ENERGY STAR Portfolio Manager and an annual energy use report for municipal buildings over 10,000 sq. ft. and institutional, commercial, and multifamily residential buildings over 50,000 sq. ft.).

164. CHI., ILL., MUN. CODE ch.18-24 (2013) (requiring an annual energy use report for municipal, commercial, and residential buildings over 50,000 sq. ft.). The Archdiocese of Chicago recently committed to benchmarking all its 2,700 buildings in response to Pope Francis's encyclical on environmental stewardship (only 20 of the 2,700 buildings fell within the purview of the existing municipal benchmarking ordinance). Tony Briscoe, *Archdiocese of Chicago to Monitor Buildings as Part of Green Efforts*, CHI. TRIB. (July 24, 2015), <http://www.chicagotribune.com/news/ct-archdiocese-epa-initiative-met-20150724-story.html> [<http://perma.cc/FBX5-JBUK>].

165. ATLANTA, GA., LAND DEV. CODE § 8-2002 (2015) (requiring annual energy reports for commercial and municipal buildings over 25,000 sq. ft.).

166. CAMBRIDGE, MASS., MUN. CODE ch. 8.67 (2014) (requiring an annual energy use report for municipal buildings over 10,000 sq. ft., nonresidential buildings over 25,000 sq. ft., and residential buildings containing fifty or more units).

167. BOS., MASS., CODE § 7-2.2 (2013) (requiring an annual energy use report for buildings over 35,000 sq. ft.).

168. N.Y.C., N.Y., LOCAL LAW no. 84 (2009) (requiring an annual energy use report for buildings over 50,000 sq. ft.).

169. PHILA., PA., CODE ch. 9-3400 (2012) (requiring an annual energy use report for commercial buildings over 50,000 sq. ft.).

170. WASH., D.C., MUN. REGS. tit. 20, ch. 35, § 3513 (2012) (requiring an annual energy use report for buildings over 50,000 sq. ft.).

171. Indeed, some of the benchmarking statutes require use of Portfolio Manager. *See supra* notes 157-59, 163. According to EPA, over 40 percent of U.S. commercial buildings are monitored with Portfolio Manager. *See* Beth Mattson-Teig, *Stepping on the Scale: The Impact of Incentivizing Benchmarking for Building Owners*, URBAN LAND (Mar. 3, 2016), <http://urbanland.uli.org/sustainability/stepping-scale-impact-incentivizing-benchmarking-building-owners> [<https://perma.cc/8MQ5-LUC8>].

commercial tenants pay electricity bills directly to the utility. This billing arrangement requires a mechanism for building owners to obtain access to customer utility data in order to calculate the energy use of the whole building.¹⁷²

Some municipalities have instituted benchmarking programs for residential, usually multifamily, buildings in addition to the programs for commercial structures. The cities that have done so include Seattle, Berkeley, Austin, Kansas City, Chicago, Atlanta, Cambridge, Boston, Philadelphia, New York, and Washington, D.C.¹⁷³ Other cities, such as Denver and New Orleans, require only the benchmarking of public buildings.¹⁷⁴

Some states and municipalities require disclosure of a building's energy consumption data whenever the building is sold or leased.¹⁷⁵ Statewide time-of-sale disclosures are in effect in California¹⁷⁶ and Washington.¹⁷⁷ Additionally, the cities of Austin,¹⁷⁸ Berkeley,¹⁷⁹ Philadelphia,¹⁸⁰ and Seattle¹⁸¹ have such requirements in place.

172. See PALMER & WALLS, *supra* note 41, at 11–12 (discussing current limitations in existing building benchmarking laws, including the difficulty building owners face in obtaining tenant electricity data); Mattson-Teig, *supra* note 171 (“In the past, real estate owners have struggled to get energy data directly from the utility company. Greenprint is working on key initiatives to help its members extract data from utilities, and states are passing ordinances that mandate access to that information.”).

173. See *U.S. Building Benchmarking and Transparency Policies*, *supra* note 154.

174. See *id.*

175. The European Union also requires benchmarking at time of sale or lease of all buildings. See Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on The Energy Performance of Buildings, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0031> [<https://perma.cc/CD4Z-DTM8>]; Mark King, *Energy Efficiency Ratings to be Compulsory for Home Sales*, *GUARDIAN* (Aug. 12, 2010), <http://www.theguardian.com/money/2010/aug/12/energy-efficiency-ratings-home-sales> [<http://perma.cc/C4LM-JSA2>]. A portion of Australia, the Australian Capital Territory, also requires the provision of benchmarking reports at the time of sale or lease of residential property. CIVIL LAW (SALE OF RESIDENTIAL PROPERTY) ENERGY EFFICIENCY RATINGS GUIDELINES DETERMINATION 2009 (No. 2) (2009).

176. CAL. PUB. RES. CODE § 25402.10 (2007) (requiring disclosure of an energy consumption report to any prospective whole-building buyer or tenant, or any prospective lender that would finance the entire building).

177. WASH. REV. CODE ch. 19.27A (2009) (requiring disclosure of an energy consumption report to any prospective buyer or tenant of a commercial building over 10,000 sq. ft., or any prospective lender that would finance the entire building).

178. AUSTIN, TEX., CODE tit. 6, ch. 6–7 (2008) (requiring disclosure of an energy consumption report to any prospective buyer of a residence more than ten years old).

179. BERKELEY, CAL., CODE ch. 19.81 (2015) (requiring creation of an energy consumption report for public disclosure at time of sale of any building under 25,000 sq. ft.).

180. PHILA., PA., CODE § 9-3402 (2012) (requiring disclosure of an energy consumption report upon request of any prospective purchaser or lessor of commercial space over 25,000 sq. ft.).

181. SEATTLE, WASH., CODE ch. 22.920 (2010) (requiring disclosure of an energy consumption report upon request of any prospective purchaser or lessor of nonresidential buildings over 10,000 sq. ft. or completed after January 1, 2011, or any prospective lender that would finance such a building).

Individual utilities in some cities have developed programs to help building owners comply with benchmarking rules.¹⁸² For example, the Potomac Electric Power Company (PEPCO) in Washington, D.C., created the Building Electricity Consumption Data Request Form, which allows building owners to bypass the difficult task of obtaining energy consumption data separately from every tenant account. Instead, PEPCO provides the aggregated total for the entire building directly to the owner.¹⁸³ Naturally, in states that require a 15/15 aggregation level for any release of energy consumption data, benchmarking programs are extremely difficult to implement, except in the largest buildings. This may be one of the major forces prompting reconsideration of the 15/15 standard.¹⁸⁴

III.

DATA DISCLOSURE IN RELATED CONTEXTS: HEALTH CARE, EDUCATION, AND ENVIRONMENTAL DATA

While current federal and state policies governing energy consumption data require significant development, policy makers need not start from scratch. There are many existing federal policies pertaining to data collection and protection, including laws governing health care data, education data, and industrial environmental and chemical emissions data. There are also a myriad of state laws that provide protection for various types of individual, corporate, and industry data. This Section discusses some of the existing legal frameworks for different types of data and their potential use in developing similar structures for the collection and distribution of energy consumption data.

There are two different types of potential protection for energy consumption data: (1) principles governing privacy rights, which apply to individuals, and (2) statutory protections for trade secrets and other confidential business information, which apply to business entities. Many states, local governments, and public utility commissions have used the term “privacy” broadly in shaping their policies on the collection and disclosure of energy consumption data. But there is a fairly broad consensus among privacy law experts that common law and constitutional “privacy rights”¹⁸⁵ apply only to

182. ENERGY STAR, UTILITIES PROVIDING ENERGY DATA FOR BENCHMARKING IN ENERGY STAR PORTFOLIO MANAGER, *supra* note 88.

183. *Energy Benchmarking*, PEPCO, <http://www.pepco.com/my-business/energy-benchmarking> [<http://perma.cc/DY5L-N979>] (last visited May 15, 2016).

184. *See supra* note 127 and accompanying text. For a more thorough examination of municipal benchmarking programs, see Klass & Wilson, *supra* note 26, at 102–10.

185. “Privacy law is a patchwork of legal sources: the Constitution, state constitutions, federal and state statutes, and common law.” Elizabeth Pollman, *A Corporate Right to Privacy*, 99 MINN. L. REV. 27, 31 n.20 (2014). “Privacy” has been defined as including (1) physical intrusions, such as hiding in someone else’s bedroom; (2) informational intrusions, such as reading someone else’s personal email; (3) decisional intrusions, such as states banning assisted suicide or gay marriage; (4) proprietary intrusions, such as using someone’s photograph for commercial gain without permission; and (5) associational intrusions, such as demanding membership at a private club. ANITA L. ALLEN,

individuals and not to corporations.¹⁸⁶ While principles of privacy law may not protect corporations, laws governing trade secrets and confidential business information do provide protection for corporations that may be put at a competitive disadvantage by the disclosure of data regarding their business practices.¹⁸⁷

A. *Federal Privacy Protections for Individuals: Health Care and Education Data*

There is a long history of constitutional, common law, and statutory protection of privacy rights—from the Fourth Amendment right to be free from “unreasonable searches and seizures” to the judicial acceptance of Samuel Warren and Justice Louis Brandeis’s “privacy torts” and the resulting growth of statutory privacy protection in the late twentieth century.¹⁸⁸ More recently, information privacy law has evolved to respond to developments in technology and the Internet.¹⁸⁹ Two modern federal statutes have attempted to balance privacy rights with the benefits of data disclosure for research purposes and policy development: (1) the Health Insurance Portability and Accountability Act of 1996 (HIPAA), which applies to health care data, and (2) the Family Educational Rights and Privacy Act (FERPA), which applies to education data.

PRIVACY LAW AND SOCIETY 3–5 (2007); see also Daniel J. Solove, *A Taxonomy of Privacy*, 154 U. PA. L. REV. 477, 489 (2006) (“[T]here are four basic groups of harmful activities: (1) information collection, (2) information processing, (3) information dissemination, and (4) invasion. Each of these groups consists of different related subgroups of harmful activities.”). Privacy has also been defined as a general concept “encompassing solitude, seclusion, confidentiality, secrecy, anonymity, data protection, data security, fair information practices, modesty, and reserve.” ALLEN, *supra*, at 5. Experts recognize, however, that “defining privacy has proven to be quite complicated, and many commentators have expressed great difficulty in defining precisely what privacy is.” DANIEL J. SOLOVE & PAUL M. SCHWARTZ, *INFORMATION PRIVACY LAW* 42 (2011).

186. See, e.g., Fed. Commc’ns Comm’n v. AT&T, 562 U.S. 397 (2011) (holding that the “personal privacy” exemption to production of data under Freedom of Information Act does not apply to corporations); RESTATEMENT (SECOND) OF TORTS § 652I (AM. LAW INST. 1977) (“A corporation, partnership or unincorporated association has no personal right of privacy.”); ALLEN, *supra* note 185, at 113 (“The rule of common law has been that a corporation may not assert a right to privacy, but must rely on the law of defamation, trade secrets, copyright, and unfair trade practices to protect secrets and reputation.”); Pollman, *supra* note 185 (discussing AT&T and issues surrounding privacy rights and corporations and concluding that under most circumstances, corporations should not hold a constitutional right to privacy); Scott A. Hartman, Comment, *Privacy, Personhood, and the Courts: FOIA Exemption 7(C) in Context*, 120 YALE L.J. 379 (2010) (explaining how general principles of privacy law as well as Fourth Amendment privacy protections apply only to individuals and not to corporations).

187. See RESTATEMENT (SECOND) OF TORTS, *supra* note 186 (“[A corporation] has, however, a limited right to the exclusive use of its own name or identity in so far as they are of use or benefit, and it receives protection from the law of unfair competition. To some limited extent this may afford it the same rights and remedies as those to which a private individual is entitled.”).

188. Daniel J. Solove, *A Brief History of Information Privacy Law*, in PROSKAUER ON PRIVACY: A GUIDE TO PRIVACY AND DATA SECURITY LAW IN THE INFORMATION AGE 1–3, 1.4.3.B (Kristen J. Mathews ed., 2014).

189. See, e.g., *id.*

This Section discusses both statutes below with a particular focus on the circumstances under which third parties may access health and education data.

1. *Health Care Data: HIPAA's Privacy Rule, Electronic Medical Records, and Electronic Health Records*

One of the main privacy concerns with energy consumption data is that its disclosure would compromise identifying information about electricity customers and their energy usage. The health care industry has faced similar privacy issues related to the disclosure of patients' protected health information for research purposes. Federal regulations governing health care providers have addressed the need for balancing patient privacy against research and development initiatives by permitting disclosure through deidentification, limited data sets, and patient consent waivers. The methods of deidentification used in the health care context are useful in considering issues of privacy in the energy consumption context.

In 1996, Congress enacted HIPAA, which addressed, among other things, increasing patients' ability to access their health records, privacy protections for individually identifiable health information, and the creation of electronic medical records.¹⁹⁰ The Department of Health and Human Services (HHS) then enacted the HIPAA Privacy Rule in 2002, which governs the privacy of medical information and patient access to their own medical records.¹⁹¹

The Privacy Rule establishes a category of health information, referred to as "protected health information" (PHI), which may be used or disclosed to others only in certain circumstances or under certain conditions.¹⁹² PHI is a subset of what is known as "individually identifiable health information."¹⁹³ Subject to certain exceptions, the Privacy Rule applies to "covered entities" that create or manage individually identifiable health information.¹⁹⁴ Covered entities include health plans and health care providers.¹⁹⁵ While some

190. Health Insurance Portability and Accountability Act of 1996, Pub. L. 104th Cong. (1996) (codified as amended in scattered sections of the U.S. Code).

191. See Standards for Privacy of Individually Identifiable Health Information, 40 C.F.R. §§ 160.101–160.552, 162.100–162.1802, 164.102–164.535 (2011); see also U.S. DEP'T OF HEALTH & HUMAN SERVS., HEALTH SERVICES RESEARCH AND THE HIPAA PRIVACY RULE (May 20, 2005), <https://privacyruleandresearch.nih.gov/pdf/HealthServicesResearchHIPAAPrivacyRule.pdf> [<https://perma.cc/NH63-ZJL9>] (setting forth requirements and elements of the HIPAA Privacy Rule); SOLOVE & SCHWARTZ, *supra* note 185, at 463 (discussing the HIPAA Privacy Rule); William McGeveran et al., *Deidentification and Reidentification in Returning Individual Findings from Biobank and Secondary Research: Regulatory Challenges and Models for Management*, 13 MINN. J. OF L. SCI. & TECH. 485, 498 (2012); Ctrs. for Disease Control & Prevention, *HIPAA Privacy Rule and Public Health, Guidance from CDC and the U.S. Department of Health and Human Services*, 52 MORBIDITY & MORTALITY WEEKLY REP., Apr. 11, 2003, <http://www.cdc.gov/mmwr/pdf/other/m2e411.pdf> [<http://perma.cc/4USS-MJVM>].

192. 45 C.F.R. § 160.103 (2014) (defining "protected health information").

193. *Id.* (defining "individually identifiable health information").

194. *Id.* (listing "covered entities").

195. *Id.*

researchers will fall outside the covered entity category, others may be included if they are also health care providers and engage in covered electronic transactions.¹⁹⁶ But importantly, the Privacy Rule still impacts researchers who are not covered entities if they obtain data supplied by covered entities.¹⁹⁷

The Privacy Rule permits covered entities to use or disclose PHI to researchers with the individual's consent or without consent if certain conditions are met.¹⁹⁸ A patient's valid authorization for disclosure is permission that has not passed the agreed-upon expiration date, meets the application requirements of Privacy Rule section 164.508(c), contains a description of the proposed use of PHI, and provides a right to revoke permission by the individual.¹⁹⁹ Conditions for acceptable use without consent may include disclosures required by law, disclosures for public health activities, or disclosures for health oversight activities.²⁰⁰ To disclose PHI to researchers without patient consent, a covered entity must meet one of the following conditions: (1) "de-identifying" the data consistent with provisions of the Privacy Rule (at which point, strictly speaking, it is no longer PHI); (2) providing a limited data set and entering into a data use agreement with the recipient; or (3) obtaining an Institutional Review Board (IRB) or a Privacy Board's waiver of the consent requirements.²⁰¹ Each of these options is explained below.

196. U.S. DEP'T OF HEALTH & HUMAN SERVS., HEALTH SERVICES RESEARCH AND THE HIPAA PRIVACY RULE, *supra* note 191 ("Researchers are not themselves covered entities, unless they are also health care providers and engage in any of the covered electronic transactions. If, however, researchers are employees or other workforce members of a covered entity (e.g., a covered hospital or health plan), they may have to comply with that entity's Privacy Rule policies and procedures.").

197. 45 C.F.R. § 164.512(i)(2) (providing regulations for researchers to follow when accessing information for covered entities).

198. 45 C.F.R. § 164.508(a) ("Except as otherwise permitted or required by this subchapter, a covered entity may not use or disclose protected health information without an authorization that is valid under this section. When a covered entity obtains or receives a valid authorization for its use or disclosure of protected health information, such use or disclosure must be consistent with such authorization.").

199. *Id.* § 164.508(c) (providing requirements for proper authorization of PHI use by a covered entity).

200. 45 C.F.R. § 164.512 (providing uses and disclosures for which an authorization or opportunity to agree or object is not required).

201. For specific information on these conditions, see 45 C.F.R. § 164.508(a)(1) ("When a covered entity obtains or receives a valid authorization for its use or disclosure of protected health information, such use or disclosure must be consistent with such authorization."), § 164.512(i) (obtaining documentation from the Institutional Review Board (IRB) or Privacy Board that then satisfies this subsection), § 164.512(i)(1)(ii) (disclosing PHI for reviews preparatory to research with representations by the researcher satisfying this section), § 164.514(a)–(c) (setting standard for deidentifying personal information), § 164.514(e)(4)(i) ("A covered entity may use or disclose a limited data set under paragraph (e)(1) of this section only if the covered entity obtains satisfactory assurance, in the form of a data use agreement that meets the requirements of this section, that the limited data set recipient will only use or disclose the protected health information for limited purposes."), § 164.532(c) (allowing uses or disclosures of PHI based on permission predating the Privacy Rule through the authorization of an individual, the informed consent of the individual to participate in the research, or a waiver by the IRB).

Deidentified Data: The Privacy Rule permits covered entities to use and disclose deidentified data without patient consent and without further restrictions on use or disclosure because deidentified data are not PHI and thus not subject to the Privacy Rule.²⁰² A covered entity may deidentify PHI by (1) removing every one of eighteen identifiers enumerated in section 164.514(b)(2) of the Privacy Rule²⁰³ or (2) having a qualified statistician determine that the risk is very small that the information could be used, alone or in combination with other reasonably available information, by the anticipated recipient to identify the subject of the information.²⁰⁴

Limited Data Sets: In situations where deidentified data lacks information needed for health services research, such as zip codes or dates of treatment, a covered entity may provide the data to a researcher as a limited data set without patient consent.²⁰⁵ Limited data sets are data sets stripped of certain direct identifiers specified in the Privacy Rule. Limited data sets may be used or disclosed only for public health, research, or health care operation purposes.²⁰⁶ Before disclosing a limited data set to a researcher, a covered entity must enter into a data use agreement with the researcher that specifies who will receive the

202. *See id.* § 164.502(d)(2) (“Health information that meets the standard and implementation specifications for de-identification under § 164.514(a) and (b) is considered not to be individually identifiable health information, i.e., de-identified.”).

203. Data with these eighteen identifiers removed are considered deidentified, unless the covered entity has actual knowledge that it would be possible to use the remaining information alone or in combination with other information to identify the subject. *See id.* § 164.514(b)(2)(ii).

204. *See id.* § 164.514(b) (“A covered entity may determine that health information is not individually identifiable health information only if: (1) A person with appropriate knowledge of and experience with generally accepted statistical and scientific principles and methods for rendering information not individually identifiable: (i) Applying such principles and methods, determines that the risk is very small that the information could be used.”); U.S. DEP’T OF HEALTH & HUMAN SERVS., HEALTH SERVICES RESEARCH AND THE HIPAA PRIVACY RULE, *supra* note 191, at 4 (“The second way to de-identify PHI is to have a qualified statistician determine, using generally accepted statistical and scientific principles and methods, that the risk is very small that the information could be used, alone or in combination with other reasonably available information, by the anticipated recipient to identify the subject of the information. The qualified statistician must document the methods and results of the analysis that justify such a determination.”).

205. *See* 45 C.F.R. § 164.514(e)(3)(i) (“A covered entity may use or disclose a limited data set under paragraph (e)(1) of this section only for the purposes of research, public health, or health care operations.”); HEALTH SERVICES RESEARCH AND THE HIPAA PRIVACY RULE, *supra* note 191, at 4 (“When such indirect identifiers are needed for the research, a covered entity may provide the data to a researcher as a limited data set. No Authorization or waiver or alteration of Authorization by an IRB or Privacy Board is required for a covered entity to use or disclose a limited data set.”).

206. *See* 45 C.F.R. § 164.514(e)(2) (listing the direct identifiers that are excluded under the Privacy Rule for limited data sets). *But see* HEALTH SERVICES RESEARCH AND THE HIPAA PRIVACY RULE, *supra* note 191, at 4 (“Importantly, unlike de-identified data, PHI in limited data sets may include the following: Addresses other than street name or street address or post office boxes, all elements of dates (such as admission and discharge dates), and unique codes or identifiers not listed as direct identifiers at section 164.514(e).”).

limited data set, establishes how the recipient may use and disclose the data, and provides assurances that the data will be protected.²⁰⁷

Waiver or Alteration of the Authorization Requirement by an IRB or Privacy Board: Where deidentified data or limited data sets are not sufficient for research purposes, the Privacy Rule allows for an IRB or a Privacy Board to grant a waiver of the patient consent otherwise required for the covered entity to disclose PHI for research use.²⁰⁸ The criteria set forth in the Privacy Rule for evaluating a waiver request include: (1) whether the use or disclosure involves no more than a minimal risk to the privacy of individuals; (2) whether there is an adequate plan to destroy identifiers at the earliest opportunity; (3) whether there are adequate written assurances that the PHI will not be reused by or disclosed to any other entity, except as required by law or for authorized oversight of the research; and (4) whether the research could be practicably conducted without the waiver for access to PHI.²⁰⁹

HIPAA also encouraged the creation of electronic medical records—digitized scans of whatever paper records a clinician would normally produce in the course of treatment.²¹⁰ These records were to be maintained at the location of their creation and be available for transfer at the request of the patient or the patient’s physician, much as paper records would have been.²¹¹ In 2004, President Bush announced a goal for most Americans to have electronic health records within ten years.²¹² Electronic health records (EHR) are different from electronic medical records in that they are designed to synthesize medical information from all of a patient’s health care providers. They result in a higher standard of care by, for example, controlling for negative drug interactions and minimizing duplicative testing, among other things.²¹³ Provisions of the

207. See 45 C.F.R. § 164.514(e)(4) (providing the requirements for a data use agreement, its allowed contents, and its permitted uses).

208. See 45 C.F.R. § 164.532(a) (“[A] covered entity may use or disclose protected health information, consistent with paragraphs (b) and (c) of this section, pursuant to an authorization or other express legal permission obtained from an individual permitting the use or disclosure of protected health information, informed consent of the individual to participate in research, a waiver of informed consent by an IRB, or a waiver of authorization in accordance with § 164.512(i)(1)(1).”); HEALTH SERVICES RESEARCH AND THE HIPAA PRIVACY RULE, *supra* note 191, at 5 (“The Privacy Rule permits a covered entity to use or disclose PHI for research purposes without Authorization (or with an altered Authorization) if the covered entity receives proper documentation that an IRB or Privacy Board has granted a waiver (or an alteration) of the Authorization requirement for the research use or disclosure of PHI.”).

209. See 45 C.F.R. § 164.512(i)(iii)(C)(2)(ii) (listing the IRB or privacy board waiver criteria); HEALTH SERVICES RESEARCH AND THE HIPAA PRIVACY RULE, *supra* note 191, at 5 (summarizing the waiver criteria under the Privacy Rule).

210. See Peter Garrett & Joshua Seidman, *EMR vs. HER—What Is the Difference?*, HEALTH IT BUZZ (Jan. 4, 2011), <http://www.healthit.gov/buzz-blog/electronic-health-and-medical-records/emr-vs-ehr-difference> [<http://perma.cc/94VN-R9QD>].

211. See *id.*

212. Nicholas P. Terry & Leslie P. Francis, *Ensuring the Privacy and Confidentiality of Electronic Health Records*, 2007 U. ILL. L. REV. 681.

213. See Garrett & Seidman, *supra* note 210.

American Recovery and Reinvestment Act of 2009 (ARRA)²¹⁴ and the Patient Protection and Affordable Care Act of 2010 (ACA) substantially furthered this goal by funding the development and incentivizing the adoption of electronic health records technologies, rather than depending on the private market to further this stated presidential goal.²¹⁵ Patients maintain a degree of control over the contents of their electronic health records and can request that some medical information be withheld from the record.²¹⁶ However, the general effect of the ARRA and ACA is to greatly increase the amount of sensitive patient information recorded, maintained, and shared among health care providers. The Department of Health and Human Services recognized that the increasing adoption of electronic health records created certain privacy issues and decided to modify the HIPAA rules accordingly. The new rules prohibit the sale of protected information without consent, limit disclosures for purposes of marketing and fundraising, and facilitate certain types of disclosures (e.g., disclosure of a decedent's electronic health records).²¹⁷ These modifications, generally speaking, further limit the use of PHI.

The potential relationship between electronic health records and energy consumption data bears some comment. A major goal of the HIPAA Privacy Rule was to give patients the right to access their own health records so they could exercise more control over their medical care, transfer their records to other doctors more easily, and increase efficiencies in their care.²¹⁸ The creation of electronic health records enhanced the ability of patients and third parties to access such records because of the greater ease in transferring them.²¹⁹ The same should be true in the energy context—state or federal policies designed to give consumers greater access to their own energy consumption data and an increased ability to transfer that data to third parties will likely increase efficiencies in energy use and demand.

214. 42 U.S.C. § 300jj-11 (2009) (creating the Office of the National Coordinator for Health Information Technology with the stated goal of ensuring all Americans use electronic health records by 2014).

215. 42 U.S.C. § 17935 (2010) (stipulating restrictions on disclosure of patient health information).

216. *Id.* § 17935(a) (providing limited circumstances in which patients may request treatment information be withheld from their EHR).

217. 45 C.F.R. §§ 160, 164 (2013); *see also* Modifications to the HIPAA Privacy, Security, Enforcement, and Breach Notification Rules, 78 Fed. Reg. 5566 (Jan. 25, 2013).

218. *See* LISA M. BOYLE, HIPAA: A GUIDE TO HEALTH CARE PRIVACY AND SECURITY LAW 4:1–3 (2015); BARRY R. FURROW ET AL., 3 HEALTH LAW §§ 4–15 (2014); U.S. DEP'T OF HEALTH & HUMAN SERVS., THE HIPAA PRIVACY RULE'S RIGHT OF ACCESS AND HEALTH INFORMATION TECHNOLOGY, <http://www.hhs.gov/sites/default/files/ocr/privacy/hipaa/understanding/special/healthit/eaccess.pdf> [<http://perma.cc/NB3B-JTAD>]; Memorandum from Leon Rodriguez, Dir., Office for Civil Rights, Right to Access (Sept. 13, 2013), <http://bluebuttonconnector.healthit.gov/right-to-access-memo> [<http://perma.cc/925Y-TCWE>].

219. *See* BARRY R. FURROW ET AL., 6 HEALTH LAW 308–09 (2008) (quoting the Department of Health and Human Services); Leslie M. Tector & Robyn Shapiro, *Privacy, PHRs, and Social Media*, in 2 E-HEALTH, PRIVACY, AND SECURITY LAW 64–65 (W. Andrew H. Gant III ed., 2011).

The particular sensitivity of health care data, especially its potential to adversely affect future employment or insurance prospects, creates privacy concerns not broadly present in energy consumption data. There may be a privacy interest in residential energy data, but it is not on the same scale as the interest present in health care data. However, the potential for improved resource allocation through the disclosure of data is similar in both sectors. Some experts have suggested that as much as one-third of U.S. health care spending is directed to inappropriate, useless, or harmful care because of unavailable, nonexistent, or actively concealed data, although other estimates are lower.²²⁰ Per classical economic theory, this massive market error can best be corrected by providing more data, which would eliminate the information asymmetry and thus increase the competitiveness of the market.²²¹ Hopefully, this would increase transparency and improve both efficiencies and outcomes for customers.

The health care sector's development of health information exchanges to reduce costs and health care inefficiencies²²² can also provide guidance for similar efforts in the energy sector.²²³ Health information exchanges exist to facilitate the movement of medical records among otherwise unrelated health care providers so that these records can follow patients as they receive care from a variety of sources.²²⁴ This is the "primary use" of the patient data collected by the exchange.²²⁵ "Secondary uses" of the data include medical research, such as enrollment in clinical trials; quality reporting, both at the patient and the provider level; and public health reporting.²²⁶ Privacy issues are naturally a concern for these exchanges.²²⁷ As such, the eHealth Initiative has convened a workgroup to recommend "best practices for sharing data with

220. See Frank Pasquale, *Grand Bargains for Big Data: The Emerging Law of Health Information*, 72 MD. L. REV. 682, 689 (2013) (citing SHANNON BROWNLEE, OVERTREATED: WHY TOO MUCH MEDICINE IS MAKING US SICKER AND POORER 5 (2007)); HEALTH AFFAIRS, HEALTH POLICY BRIEF (Dec. 13, 2012), http://healthaffairs.org/healthpolicybriefs/brief_pdfs/healthpolicybrief_82.pdf [<https://perma.cc/5K8Z-JSNX>] (discussing nature of wasteful or inefficient health care spending in the United States). *But see, e.g.*, Peter Ubel, *Found: Billions of Wasted Medicare Dollars*, FORBES (Nov. 18, 2014), <http://www.forbes.com/sites/peterubel/2014/11/18/found-billions-of-wasted-medicare-dollars> [<http://perma.cc/793B-A59R>] (reporting on a Harvard study finding only 3 percent waste in Medicare spending).

221. See Pasquale, *supra* note 220, at 688.

222. See EHEALTH INITIATIVE, MIGRATING TOWARD MEANINGFUL USE: THE STATE OF HEALTH INFORMATION EXCHANGE 13 (2009), https://ehi-rails-app.s3.amazonaws.com/uploads/article/file/169/2009_eHL_HIE-Survey-Report.pdf [<https://perma.cc/7QZN-2PF4>].

223. See *What is a Regional Health Information Organization (RHIO)?*, U.S. DEP'T HEALTH & HUMAN SERVS., <http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/Collaboration/whatisrhio.html> [<http://perma.cc/7DNL-LUJJ>].

224. See Jason S. Shapiro & Gilad Kuperman, *Health Information Exchange*, in 2 MEDICAL INFORMATICS: AN EXECUTIVE PRIMER 147 (Ken Ong ed., 2011).

225. See *id.*

226. See *id.* at 154–56.

227. See *id.* at 24; Deven McGraw et al., *Privacy as an Enabler, Not an Impediment: Building Trust into Health Information Exchange*, 28 HEALTH AFF. 416 (2009).

third parties and [to] build consensus around appropriate secondary data users.”²²⁸ These health information exchanges function much like the energy data centers discussed below, which can provide analogous services.²²⁹

2. Education Data: FERPA and Related Policies

Privacy of individual student records is protected under the Family Educational Rights and Privacy Act (FERPA), enacted in 1974.²³⁰ Under FERPA, only the following parties may receive students’ Personally Identifiable Information (PII)²³¹ without student or parent consent: (1) teachers and other school officials with a “legitimate educational interest” in the student; (2) authorized representatives of various federal and state education agencies in connection with evaluation of federally-supported education programs; and (3) organizations conducting studies on behalf of educational agencies or institutions for the purpose of developing, validating, or administering predictive tests; administering student aid; or improving instruction.²³² No other parties may receive PII without student or parental consent under FERPA.²³³ Those acquiring PII must enter written agreements

228. EHEALTH INITIATIVE, DATA ANALYTICS WORK GROUP 34 (Sept. 3, 2015), <https://www.ehdc.org/articles/417-data-analytics-workgroup-materials-9-3-15> [<https://perma.cc/X6MD-UJNG>].

229. For examples of the types of services a third-party developer with access to a health information exchange can provide, see DBMOTION, A PRACTICAL APPROACH TO RHIO FORMATION 5–7 (Jan. 2006), http://www.providersedge.com/ehdocs/ehr_articles/A_Practical_Approach_to_RHIO_Formation.pdf?wttag=wttag250 [<http://perma.cc/K9JL-XLJT>].

230. Family Educational Rights and Privacy Act (FERPA), 20 U.S.C.A. § 1232g (2013), 34 C.F.R. pt. 99. For an overview of FERPA protections and other issues in the education data context, see *Student Privacy*, ELECTRONIC PRIVACY INFO. CTR., <https://epic.org/privacy/student> [<http://perma.cc/5WHB-BSHC>] (last visited May 15, 2016).

231. FERPA regulations define “personally identifiable information” as including, but not limited to, “[t]he student’s name; the name of the student’s parent or other family members; the address of the student or student’s family; a personal identifier, such as the student’s Social Security Number, student number, or biometric record; other indirect identifiers, such as the student’s date of birth, place of birth, and mother’s maiden name; other information that, alone or in combination, is linked or linkable to a specific student that would allow a reasonable person in the school community, who does not have personal knowledge of the relevant circumstances, to identify the student with reasonable certainty; and information requested by a person who the educational agency or institution reasonably believes knows the identity of the student to whom the education record relates.” 34 C.F.R. § 99.3 (2012).

232. 20 U.S.C.A. § 1232g(b)(1); 34 C.F.R. § 99.31.

233. 20 U.S.C.A. § 1232g(b)(1) (“No funds shall be made available under any applicable program to any educational agency or institution which has a policy or practice of permitting the release of education records . . . without the written consent of their parents to any individual, agency, or organization, other than to the following.”); 34 C.F.R. § 99.30 (“The parent or eligible student shall provide a signed and dated written consent before an educational agency or institution discloses personally identifiable information from the student’s education records, except as provided in § 99.31.”); see also DATA QUALITY CAMPAIGN, COMPLYING WITH FERPA AND OTHER PRIVACY AND SECURITY LAWS AND MAXIMIZING APPROPRIATE DATA USE: A STATE POLICYMAKERS’ GUIDE (Mar. 2013), <http://dataqualitycampaign.org/wp-content/uploads/files/Complying%20with%20FERPA%2003.2013.pdf> [<http://perma.cc/6SDU-MRF5>].

with the educational institution outlining the requirements for data use, such as the destruction of data once the information is no longer needed.²³⁴

To avoid unauthorized disclosure of PII from education records, FERPA requires schools, school districts, and states to protect such data when they publish reports on student achievement or share students' data with external researchers.²³⁵ Holders of individual records must deidentify the data (remove or obscure any PII from student records) if they wish to disclose it. This requirement minimizes the risk of unintended disclosure of the data. FERPA allows schools to share deidentified data without consent for any purpose with any party, including parents, the public, and researchers.²³⁶ Deidentification is considered successful when there is no reasonable basis to believe that the remaining information in the records can be used to identify an individual.²³⁷

Deidentified data are generally released in the form of aggregated data (such as tables showing numbers of enrolled students by race, age, and sex)²³⁸ or microdata (such as individual-level student assessment results by grade and school).²³⁹ Individual-level data may be released with or without an attached record code, which allows education researchers to track the performance of

234. 34 C.F.R. § 99.31(a)(6)(iii)(C)(4) (“Requires the organization to destroy all personally identifiable information when the information is no longer needed for the purposes for which the study was conducted and specifies the time period in which the information must be destroyed.”).

235. 20 U.S.C.A. § 1232g (“No funds shall be made available under any applicable program to any educational agency or institution which has a policy or practice of releasing, or providing access to, any personally identifiable information in education records other than directory information, or as is permitted under paragraph (1).”); PRIVACY TECH. ASSISTANCE CTR., DATA DE-IDENTIFICATION: AN OVERVIEW OF BASIC TERMS (May 2013), http://ptac.ed.gov/sites/default/files/data_deidentification_terms.pdf [<http://perma.cc/G7F4-NMJR>].

236. 34 C.F.R. § 99.30 (“The parent or eligible student shall provide a signed and dated written consent before an educational agency or institution discloses personally identifiable information from the student’s education records, except as provided in § 99.31.”); *id.* §99.31(b)(1) (“An educational agency or institution . . . may release the records or information without the consent required by § 99.30 after the removal of all personally identifiable information.”).

237. *Id.* § 99.31(b)(1) (“An educational agency or institution . . . may release the records or information without the consent required by § 99.30 after the removal of all personally identifiable information provided that the educational agency or institution or other party has made a reasonable determination that a student’s identity is not personally identifiable.”); *see* DATA QUALITY CAMPAIGN, *supra* note 233, at 8 (“The regulations require a state or local educational authority to use ‘reasonable methods’ to ensure ‘to the greatest extent practicable’ that any individual or entity designated as its authorized representative to receive data to conduct evaluations, audits, or compliance activities (1) uses student data only for authorized evaluation, audit, or other compliance purposes; (2) protects the data from further disclosure or other uses; and (3) destroys the data when no longer needed for the authorized purpose.”).

238. *See* DATA QUALITY CAMPAIGN, *supra* note 233, at 5 (“State longitudinal data systems may obtain and disclose anonymous or aggregate student information derived from student records provided the information is not personally identifiable.”).

239. *See id.* at 6 (“The regulations authorize disclosures of education records to evaluate programs of the agency or institution receiving the records. Thus, the state education data system would be authorized to disclose student education records to a state workforce agency for the purpose of evaluating not only programs administered by state education agencies or districts but also job training programs administered by the workforce agency.”).

individual students without revealing those students' identities (since the record code cannot be based on students' personal information).²⁴⁰ The researchers can use the code only to match individual records across previously deidentified data files from the same source (e.g., to compare student assessment results from the same school district over several years).²⁴¹ The researchers cannot use the code to access the original data source without consent.²⁴²

Holders of individual records can use the following techniques to protect PII:

Anonymization: This is a process that produces deidentified data in which individual records cannot be linked back to an original student record system or to other individual records from the same source because the resulting data do not include the code needed to link the records.²⁴³ Anonymized data is not useful for monitoring the progress and performance of individual students but can be used for other research or training purposes.²⁴⁴

Blurring: This is a disclosure limitation method that reduces the precision of the disclosed data to minimize the certainty of individual identification.²⁴⁵ Possible ways to blur data include converting continuous data elements into categorical data elements; aggregating data across small groups of respondents and reporting rounded values and ranges instead of exact counts; or replacing an individual's actual reported value with the average group value.²⁴⁶

Masking: This disclosure limitation method "masks" the original values in a data set to achieve data privacy protection.²⁴⁷ This general approach either uses various techniques to replace sensitive information with realistic but inauthentic data or modifies original data values based on predetermined masking rules (e.g., by applying a transformation algorithm).²⁴⁸ The purpose of

240. 34 C.F.R. § 99.31(b)(2) (describing the use of a record code for research purposes).

241. *Id.* ("An educational agency or institution, or a party that has received education records or information from education records under this part, may release de-identified student level data from education records for the purpose of education research by attaching a code to each record that may allow the recipient to match information received from the same source. . . .").

242. *Id.* § 99.31(b)(2)(ii) ("The record code is used for no purpose other than identifying a de-identified record for purposes of education research and cannot be used to ascertain personally identifiable information about a student.").

243. PRIVACY TECH. ASSISTANCE CTR., *supra* note 235, at 2 (summarizing the process of anonymization for personal education under FERPA).

244. *Id.* (discussing potential uses and pitfalls of anonymized data).

245. *Id.* (outlining the use of blurring to protect personal education data from disclosure).

246. *Id.* ("There are many possible ways to implement blurring, such as by converting continuous data elements into categorical data elements (e.g., creating categories that subsume unique cases), aggregating data across small groups of respondents, and reporting rounded values and ranges instead of exact counts to reduce the certainty of identification. Another approach involves replacing an individual's actual reported value with the average group value; it may be performed on more than one variable with different groupings for each variable.").

247. *Id.* at 5 ("[A] disclosure limitation method that is used to "mask" the original values in a data set to achieve data privacy protection.").

248. *Id.* (describing how the masking technique works to protect personal information).

this technique is to retain the structure and functional usability of the data, while concealing information that could lead to direct or indirect identification of an individual student.²⁴⁹ One such masking method is known as data perturbation, which is a statistical technique used to prevent identification of individuals from unique or rare population groups.²⁵⁰ Examples of perturbation include swapping data among individual cells to introduce uncertainty (the data user will not know whether the real data values correspond to certain records) and introducing “noise,” or errors, into the data (e.g., by randomly misclassifying values of a categorical variable).²⁵¹

Despite the protections offered by FERPA, the debate over the privacy of student data continues. For example, in September 2014, the California legislature enacted the Student Online Personal Information Protection Act, which specifically prohibits the sale of student data by third-party education technology vendors and the use of student data to create a profile for any noneducational purpose.²⁵² Permissible disclosure is strictly limited to contracted third parties forbidden from using the information for any purpose other than the contracted one (e.g., a third party may be contracted to improve the functionality of the technology or services provided and may only use the disclosed data for that purpose).²⁵³ In addition to narrowing the permissible use of student data by third parties, the California statute strengthens privacy protections by imposing liability directly on the third-party providers who sell student data.²⁵⁴ Focused mostly on restricting access to student data by profit-seeking third-party vendors, the California law includes an exception allowing disclosure of data for “legitimate research purposes.”²⁵⁵

The White House supported the introduction of a similar bill, the Student Digital Privacy and Parental Rights Act of 2015,²⁵⁶ though there are some

249. *Id.* (stating the determined purpose behind the use of the masking technique).

250. For an overview of the disclosure limitation method of perturbation, see *id.*

251. *Id.* (providing examples of how perturbation works as a disclosure limitation method in order to protect personal information).

252. CAL. BUS. & PROF. CODE § 22584 (2014).

253. *Id.*; see also *California’s Student Online Personal Information Privacy Act Is the First State Law to Comprehensively Address Student Privacy*, COOLEY CLIENT ALERTS (Oct. 9, 2014), <http://www.cooley.com/california-student-online-personal-information-protection-act-first-state-law-to-address-student-privacy> [<http://perma.cc/HZ8N-TAPY>].

254. *California’s Student Online Personal Information Privacy Act Is the First State Law to Comprehensively Address Student Privacy*, *supra* note 253. Under FERPA, liability for misuse of student data exists only between the school district (provided it receives federal funding) and the Department of Education. See *id.*

255. CAL. BUS. & PROF. CODE § 22584(e)(2) (permitting disclosure “(A) as required by state or federal law and subject to the restrictions under applicable state and federal law or (B) as allowed by state or federal law and under the direction of a school, school district, or state department of education, if no covered information is used for any purpose in furtherance of advertising or to amass a profile on the student for purposes other than K–12 school purposes”).

256. See Natasha Singer, *Legislators Introduce Student Digital Privacy Bill*, N.Y. TIMES: BITS (Apr. 29, 2015, 1:09 PM), <http://bits.blogs.nytimes.com/2015/04/29/legislators-introduce-student-digital-privacy-bill> [<http://perma.cc/9TCK-YA9F>].

doubts about its eventual passage.²⁵⁷ The provisions of the federal bill are essentially the same as the California statute, though the federal bill allows disclosure of information at the request of a student or parent to further postsecondary or employment opportunities.²⁵⁸ The Department of Education, meanwhile, has released a “Model Terms of Service” (Model) for contracts between schools and third parties to whom data is provided.²⁵⁹ The Model recommends a contractual commitment by third parties to refrain from reidentifying data and a general contractual prohibition on the release of identifiable data.²⁶⁰

While concerns over data release exist across both the energy and education sectors, there is substantially greater resistance to the collection and consolidation of education data.²⁶¹ For example, massive resistance from parent groups caused the downfall of education technology company InBloom, which sought to consolidate student data (attendance, grades, disciplinary violations, etc.) in one cloud-based location in an attempt to simplify record keeping and record transfer for school districts.²⁶² Parent groups voiced concerns over the volume of data collected, protections of that data, and the possibility of certain data causing harm later—for instance, early disciplinary issues or low test scores impacting later assessments of students.²⁶³ These kinds of concerns are not particularly applicable to energy consumption data. There seems relatively little chance that energy data would have any deleterious future effects on homeowners or other electricity users. Potential misuse of energy consumption data seems restricted to situations like the burglar scenario, which applies

257. See *Student Data Privacy: The States Are in the Lead*, COOLEY CLIENT ALERTS (Mar. 27, 2015), <http://www.cooley.com/student-data-privacy-states-are-in-lead> [<https://perma.cc/TSM3-LVfV>] (suggesting that the bill is not politically viable, but that its provisions may be incorporated into the pending renewal of FERPA).

258. See *id.*

259. PRIVACY TECH. ASSISTANCE CTR., PROTECTING STUDENT PRIVACY WHILE USING ONLINE EDUCATIONAL SERVICES: MODEL TERMS OF SERVICE (Jan. 2015), http://ptac.ed.gov/sites/default/files/TOS_Guidance_Jan%202015_0.pdf [<https://perma.cc/S9VN-GW9D>].

260. See Matt Johnson, *U.S. Department of Education’s New Data Privacy Guidance: Why It Matters*, COOLEYGO, <https://www.cooleygo.com/us-department-education-data-privacy-guidance> [<http://perma.cc/UHW8-JJDN>] (last visited May 15, 2016).

261. *But cf.* DARRELL M. WEST, BIG DATA FOR EDUCATION: DATA MINING, DATA ANALYTICS, AND WEB DASHBOARDS (Sept. 2012), <http://www.brookings.edu/~media/Research/Files/Papers/2012/9/04%20education%20technology%20west/04%20education%20technology%20west.pdf> [<http://perma.cc/X3KQ-WGQ2>] (demonstrating the tangible benefits of education technology and data collection, and suggesting that “[u]sing privacy arguments to stop research that helps students is counter-productive”).

262. Natasha Singer, *InBloom Student Data Repository to Close*, N.Y. TIMES: BITS (Apr. 21, 2014, 1:21 PM), <http://bits.blogs.nytimes.com/2014/04/21/inbloom-student-data-repository-to-close> [<https://perma.cc/45LP-L3VE>].

263. Natasha Singer, *Deciding Who Sees Students’ Data*, N.Y. TIMES (Oct. 5, 2013), <http://www.nytimes.com/2013/10/06/business/deciding-who-sees-students-data.html> [<http://perma.cc/R5K8-VKJ5>].

primarily to real-time subhourly data and not to less-granular or historic data.²⁶⁴ Concerns about the use of personal data by profit-seeking third parties, as illustrated by the California education statute, do apply to energy consumption data, especially given the proliferation of energy efficiency service providers seeking to market services and software that require knowledge of a consumer's energy use. But misuse of education data can have an impact on students far into the future, and those risks are minimal to nonexistent in the context of energy consumption data. Thus, the benefits of greater disclosure of a broader range of energy consumption data are likely to outweigh the risks.

3. *Current Debates over the Effectiveness of Deidentification Methods*

Although the deidentification methods discussed above can protect personal information from unauthorized use by rendering that information nonidentifiable, critics of deidentification claim that these methods are not always effective. They assert that studies supporting the effectiveness of deidentification methods are based on unrealistic models of what a potential reidentifier would do.²⁶⁵ These critics argue that “[m]ost ‘anonymized’ datasets require no more skill than programming and basic statistics to de-anonymize” and thus compromise privacy rights.²⁶⁶ Indeed, because social networks provide easy access to personal details, such as a one's home or work location, it is a fairly straightforward process to obtain personal information from deidentified data.²⁶⁷ Based on these concerns, critics argue against making personal data more readily available to researchers unless more robust protections are developed.

At the same time, supporters of deidentification argue that concerns regarding the risk of reidentification are overblown.²⁶⁸ Supporters point to

264. See *infra* notes 360–66 and accompanying text (discussing levels of granularity).

265. See, e.g., ARVIND NARAYANAN & EDWARD W. FELTEN, NO SILVER BULLET: DE-IDENTIFICATION STILL DOESN'T WORK 1 (July 9, 2014), <http://randomwalker.info/publications/no-silver-bullet-de-identification.pdf> [<https://perma.cc/3CPQ-X5VN>] (pointing out inaccuracies in claims by supporters of deidentification).

266. *Id.*; see also Yves-Alexandre de Montjoye et al., *Unique in the Crowd: The Privacy Bounds of Human Mobility*, SCI. REP. 3 (2013), <http://www.nature.com/articles/srep01376> [<https://perma.cc/6V6H-JQX2>] (finding that human mobility traces are highly unique and thus do not allow for anonymity in data sets).

267. See De Montjoye et al., *supra* note 266, at 2 (“Four randomly chosen points are enough to uniquely characterize 95 percent of the users ($\epsilon > .95$), whereas two randomly chosen points still uniquely characterize more than 50 percent of the users ($\epsilon < .5$).”).

268. See ANN CAVOUKIAN & DAN CASTRO, BIG DATA AND INNOVATION, SETTING THE RECORD STRAIGHT: DE-IDENTIFICATION DOES WORK 1 (2014) (“Contrary to what misleading headlines and pronouncements in the media almost regularly suggest, datasets containing personal information may be de-identified in a manner that minimizes the risk of re-identification, often while maintaining a high level of data quality.”); Jane Yakowitz, *Tragedy of the Data Commons*, 25 HARV. J.L. & TECH. 1, 4 (2011) (“So far, there have been no known occurrences of improper re-identification of a research dataset. Even the hypothetical risks are smaller than other information-based risks (from data spills or hacking, e.g.) that we routinely tolerate for convenience.”).

deidentification rules within laws like HIPAA that require data users to remove both direct and indirect identifiers that may easily lead back to an individual.²⁶⁹ To test these rules, the Department of Health and Human Services Office of the National Coordinator for Health Information Technology attempted to reidentify the data of fifteen thousand patient records and had a low match rate of 0.013 percent.²⁷⁰ Supporters contend that overall, although examples exist of unsuccessful deidentification of personal information,²⁷¹ large entities charged with deidentifying data use additional methods such as data swapping and obfuscation to ensure data security. Thus, the risk to personal information through reidentification is minimal.²⁷² Supporters also suggest that the proper response to any deidentification problems is to have robust civil and criminal enforcement mechanisms in place for anyone attempting to improperly reidentify personal data. More importantly, they argue that the benefits of making such health, education, and other data available to researchers for scientific and policy advancements far outweigh the risk of privacy breaches. The response should not be to withhold valuable data from researchers due to fear of reidentification.²⁷³

Concerns over reidentification and abuse of data are particularly trenchant in the health care and education spheres. In both industries, the data collected can be personally revealing and potentially damaging if publicized improperly. Energy consumption data, to a large degree, lacks the severity of these concerns. Personal energy consumption, or the kWh used by a customer's appliances each month, if made public, is almost certainly less revealing than a medical file and less damaging than a school disciplinary history. Furthermore, the nature of health care and education research often requires deidentified (rather than aggregated) data, as research is often longitudinal—that is, research in those industries often follows a particular patient or student over a

269. See 45 C.F.R. § 164.514(b)(2)(ii) (2010) (HIPAA Standards for Privacy of Individually Identifiable Health Information); Yakowitz, *supra* note 268, at 23 (outlining HIPAA rules regarding the removal of identifiers).

270. See Justin Brickell & Vitaly Shmatikov, *The Cost of Privacy: Destruction of Data-Mining Utility in Anonymized Data Publishing*, PROC. 14TH ACM SIGKDD INT'L CONF. ON KNOWLEDGE DISCOVERY & DATA MINING 70, 72 (2008) (describing a study to reidentify patient records deidentified under HIPAA standards); Yakowitz, *supra* note 268, at 28 (“The team determined that it was able to accurately re-identify two of the 15,000 individuals, for a match rate of 0.013 percent.”).

271. See Paul Ohm, *Broken Promises of Privacy: Responding to the Surprising Failure of Anonymization*, 57 UCLA L. REV. 1701, 1717–20 (2010) (discussing examples of unsuccessful deidentification, such as a Massachusetts hospital data that failed to sufficiently cluster the indirect identifiers, and the AOL search query data that failed to remove last names); Yakowitz, *supra* note 268, at 36 (describing Ohm's study).

272. See CAVOUKIAN & CASTRO, *supra* note 268, at 1 (“While nothing is perfect, the risk of re-identification of individuals from properly de-identified data is significantly lower than indicated by commentators on the primary literature.”); Yakowitz, *supra* note 268, at 40 (“Data presents no more risk (and often less risk) than our garbage.”).

273. See Yakowitz, *supra* note 268, at 5, 48–50.

period of years.²⁷⁴ While energy consumption data research may also be longitudinal, such research is often more interested in aggregate trends—for example, total energy usage—than in individual data.²⁷⁵ Energy policies are judged by their effectiveness across programs, whole neighborhoods, cities, or states, and such judgments do not meaningfully rely on individual data. Preventing reidentification should certainly be a goal of any data disclosure policy. But the lower risks of disclosure and the generally lower utility of deidentified energy consumption data mean that much of the current debate over deidentification methods may not be as critical in the energy data context as it is in the health and education data contexts.

B. Protections for Corporate Data: The Toxics Release Inventory and the Greenhouse Gas Reporting Program

Most experts agree that “privacy” protections in constitutions, federal and state statutes, and the common law apply to individuals and not to corporations.²⁷⁶ Instead, laws concerning trade secrets and confidential business information (CBI) act as the primary protections for energy consumption data for commercial entities, industries, and other corporations.²⁷⁷ This Section explores the laws governing the use and disclosure of emissions data, chemical data, and other process-related data from industrial facilities and buildings under federal environmental laws; in doing so, it focuses on the protections in those laws for trade secrets and CBI. The approaches Congress and federal agencies have taken in those areas provide helpful models in shaping future policies regarding the collection and disclosure of commercial and industrial energy consumption data.

As an initial matter, it is important to define “emissions data” and “CBI.” The EPA uses multiple definitions for “emissions data.” One such definition is “[i]nformation necessary to determine the identity, amount, frequency, concentration, or other characteristics . . . of any emission.”²⁷⁸ Emissions

274. This is not to suggest that aggregated data is of no use in the medical or educational research context—for example, it may be important to know how many patients had tuberculosis or how many students graduated in a year.

275. While some research is certainly concerned with judging the efficacy of energy efficiency programs on an individual level, presumably such data could be provided voluntarily by program participants.

276. See *supra* note 186 and accompanying text.

277. See, e.g., RESTATEMENT (SECOND) OF TORTS, *supra* note 186 (“It has . . . a limited right to the exclusive use of its own name or identity in so far as they are of use or benefit, and it receives protection from the law of unfair competition.”).

278. 40 C.F.R. § 2.301(a)(2)(i) (2011); Letter from Clean Air Task Force et al. to Adm’r Lisa P. Jackson, Env’tl. Protection Agency (EPA), Re: Proposed Deferral of Greenhouse Gas Reporting and Call for Information 6 (Mar. 7, 2011), http://www.eenews.net/assets/2011/03/08/document_gw_01.pdf [<http://perma.cc/5RLT-GEXR>] (response to the EPA’s deferral of the collecting of greenhouse emissions data).

equations inputs, for example, fit this definition.²⁷⁹ Emissions data may also simply be “[a] general description of the location and/or nature of the source.”²⁸⁰ Any emissions data the EPA collects in accordance with the Clean Air Act must be made available to for public scrutiny.²⁸¹

EPA defines Confidential Business Information as any information pertaining to business interests that has been developed or acquired by a business where: (1) the business has asserted a CBI claim that has not expired, been waived, or withdrawn; (2) the business has taken reasonable measures to protect the information’s confidentiality; (3) the information is not reasonably obtainable without the business’s legitimate consent; (4) no statute specifically requires its disclosure; and either (a) the business demonstrates that disclosure is likely to cause substantial competitive harm; or (b) the business voluntarily submits the information to the government, and disclosure is likely to impair the government’s ability to obtain the necessary information in the future.²⁸² “[A] business [has] the right to preserve the confidentiality of business information and to limit its use or disclosure by others in order that the business may obtain or retain business advantages it derives from its rights in the information.”²⁸³

EPA has used these definitions in a variety of statutes and regulations governing the collection and use of environmental data.²⁸⁴ These regulations

279. See Letter from Clean Air Task Force et al., *supra* note 278, at 6 (“It is these data, after all, which EPA and the public must rely upon to determine emissions because reporters using equations are, by definition, not directly measuring their emissions.”); Proposed Confidentiality Determinations for Data Required Under the Mandatory Greenhouse Gas Reporting Rule, 75 Fed. Reg. 39,109 (proposed July 7, 2010) (final rule on inputs deferred for separate rulemaking, 79 Fed. Reg. 63,754 (Oct. 24, 2014)) (“[O]nce a facility selects a calculation method, then the equation becomes the only way for determining such emissions.”).

280. 40 C.F.R. § 2.301(a)(2)(i) (2011); Letter from Clean Air Task Force et al., *supra* note 278 at 6.

281. 42 U.S.C. § 7414 (1990) (“Any records, reports or information obtained under subsection (a) of this section shall be available to the public, except that upon a showing satisfactory to the Administrator by any person that records, reports, or information, or particular part thereof, (other than emission data) to which the Administrator has access under this section if made public, would divulge methods or processes entitled to protection as trade secrets.”); see also Appropriations Act, Explanatory Statement 1254 (2008) (directing the EPA to exercise its authority under the CAA); Letter from Clean Air Task Force et al., *supra* note 278, at 6 (explaining the obligations of the EPA in public disclosure of emissions data under the CAA).

282. 40 C.F.R. § 2.208 (1993).

283. 40 C.F.R. § 2.201(e) (1976).

284. See, e.g., *Confidential Business Information for GHG Reporting*, U.S. EPA, <https://www.epa.gov/ghgreporting/confidential-business-information-ghg-reporting> [<https://perma.cc/E5WF-FHMG>] (last visited May 15, 2016); *Pesticide Registration Manual: Chapter 15—Submitting Data and Confidential Business Information*, U.S. EPA, <https://www.epa.gov/pesticide-registration/pesticide-registration-manual-chapter-15-submitting-data-and-confidential> [<http://perma.cc/S9L2-7HJK>] (last visited May 15, 2016) (detailing CBI submission under the Federal Insecticide, Fungicide, and Rodenticide Act); *Review of Confidential Business Information Claims under TSCA*, U.S. EPA, <https://www.epa.gov/tsc-cbi> [<https://perma.cc/KPW8-Q8M6>] (last visited May 15, 2016).

include the Toxics Release Inventory and the Greenhouse Gas Reporting Program, both of which are discussed below.

1. *The Toxics Release Inventory and Disclosure of Chemical Data*

Since the enactment of the first major federal environmental statutes in the 1970s, Congress has routinely included in statutes such as the Clean Air Act and the Clean Water Act provisions that require companies emitting pollutants to disclose that information to EPA and the public.²⁸⁵ But the federal environmental statute that most directly uses the power of information to both inform the public and reduce pollution is the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA).²⁸⁶ Congress enacted EPCRA in response to public concern over a series of deadly toxic releases, including the 1984 release of methyl isocyanate at the Union Carbide Plant in Bhopal, India, which resulted in thousands of fatalities.²⁸⁷ EPCRA section 313 created the Toxics Release Inventory (TRI), a federal database that tracks the use and management of certain toxic chemicals that may pose a threat to human health and the environment.²⁸⁸

The TRI covers companies with ten or more employees that operate in particular industrial categories such as manufacturing, mining, and electric utilities, and emit more than threshold amounts of over 650 toxic chemicals.²⁸⁹

285. See, e.g., 42 U.S.C.A. § 7414 (West 1990) (Clean Air Act) (“[T]he Administrator may require any person who owns or operates any emission source, who manufactures emission control equipment or process equipment . . . on a one-time, periodic or continuous basis to—(A) establish and maintain such records; (B) make such reports.”); 33 U.S.C.A. § 1318 (West 1987) (Clean Water Act) (“[T]he Administrator shall require the owner or operator of any point source to (i) establish and maintain such records, (ii) make such reports, (iii) install, use, and maintain such monitoring equipment or methods (including where appropriate, biological monitoring methods).”).

286. Emergency Planning and Community Right-To-Know Act of 1986, §§ 301–330, 42 U.S.C. §§ 11001–11050 (purpose to support and promote emergency planning and to provide the public with information about releases of toxic chemicals in their community).

287. *Learn About the Toxics Release Inventory*, U.S. EPA, <http://www2.epa.gov/toxics-release-inventory-tri-program/learn-about-toxics-release-inventory> [<http://perma.cc/7KTJ-WZ2Q>] (last visited May 15, 2016) (describing why the EPCRA was passed and Toxic Release Inventory program created).

288. The TRI provision is EPCRA § 313, 42 U.S.C. § 11023 (2012) (“The Administrator shall establish and maintain in a computer data base a national toxic chemical inventory based on data submitted to the Administrator under this section. The Administrator shall make these data accessible by computer telecommunication and other means to any person on a cost reimbursable basis.”); U.S. EPA, TOXICS RELEASE INVENTORY, http://www2.epa.gov/sites/production/files/2014-02/documents/2011_epa_tri_program_factsheet.pdf [<https://perma.cc/734X-MK5Z>] (“TRI was established in 1986 by Section 313 of the Emergency Planning and Community Right-to-Know Act and later expanded by the Pollution Prevention Act of 1990.”) (last visited May 15, 2016).

289. 42 U.S.C. § 11023 (“The requirements of this section shall apply to owners and operators of facilities that have 10 or more full-time employees . . . that manufactured, processed, or otherwise used a toxic chemical listed under subsection (c) of this section in excess of the quantity of that toxic chemical established under subsection (f).”); U.S. EPA, TOXICS RELEASE INVENTORY, *supra* note 288, at 1 (“TRI is a publicly-accessible EPA database containing information on disposal and other releases of over 650 toxic chemicals from more than 20,000 U.S. industrial facilities.”).

Facilities that have manufactured, processed, or otherwise used these chemicals within the past year must submit annual reports to EPA and state officials.²⁹⁰ For each chemical, these section 313 reports must disclose the estimated maximum amount of the chemical present in the facility in the past year; the activities and uses of the chemical at the facility; the methods for treating and disposing of waste associated with each chemical; and an estimate of the amount of the chemical entering the environment through the air, water, or other environmental medium.²⁹¹ To avoid revealing the specifics of manufacturing processes, companies make many of the section 313 disclosures in general terms—for example, the maximum amount of a chemical present in a facility is reported by indicating one of several EPA-determined ranges, and uses of chemicals are indicated without specifying an amount for each use.²⁹² Section 313 requires pollution disclosures to be the most specific—companies must specify and quantify chemical disposals and emissions either as estimates or by using specified ranges. Today, companies file over twenty thousand section 313 reports electronically each year.²⁹³ EPA compiles the data from all the section 313 reports and publishes them on a national toxic chemical inventory that is accessible to federal, state, and local officials, as well as the public.²⁹⁴

According to experts, the TRI has been extremely effective in both informing the public about the chemicals in their neighborhoods and encouraging companies to reduce their use of toxic chemicals.²⁹⁵ By requiring

290. 42 U.S.C. § 11023 (“Such form shall be submitted to the Administrator and to an official or officials of the State designated by the Governor on or before July 1, 1988, and annually thereafter on July 1 and shall contain data reflecting releases during the preceding calendar year.”); U.S. EPA, TOXICS RELEASE INVENTORY, *supra* note 288, at 1 (“Data are submitted annually by U.S. facilities that meet TRI reporting criteria.”).

291. See 42 U.S.C. § 11023(g)(1)(C); U.S. EPA, FORM R, TOXIC CHEMICAL RELEASE INVENTORY REPORTING FORM (2015).

292. U.S. EPA, FORM R, *supra* note 291.

293. *TRI Summary for the 2014 TRI National Analysis*, U.S. EPA (Jan. 19, 2016), <https://www.epa.gov/trinationalanalysis/tri-summary-2014-tri-national-analysis> [<https://perma.cc/4M4H-F3TC>] (showing 21,783 reporting facilities in 2014, the most recent year for which information is available).

294. See, e.g., J.B. RUHL ET AL., *THE PRACTICE AND POLICY OF ENVIRONMENTAL LAW* 467–68 (3rd ed. 2014); *TRI Explorer Release Reports*, U.S. EPA, www.epa.gov/triexplorer/tri_release.chemical [<http://perma.cc/Y7TT-ZVKN>] (last visited May 15, 2016). The exceptions from TRI reporting are extensive. *But see* 42 U.S.C. § 11023(a)–(c) (noting that the national inventory is best understood as a method of tracking and comparing releases from large facilities in covered industries, not as an actual estimation of the total releases of these chemicals by all users in the country).

295. See Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 261 (2001) (“[D]ata standardization allows EPA to comply with its statutory mandate to maintain TRI data in a publicly accessible computerized database. . . . By creating this performance metric, TRI both compels and enables facilities and firms to monitor their own environmental performance. It also encourages them to compare, rank, and track performance among production processes, facilities, operating units, and peer or competitor firms.”).

companies to report their toxic chemical emissions, the TRI encourages those companies to consider whether they need to use the toxic chemicals in their manufacturing processes at all or whether complete elimination or cost-effective reductions are possible.²⁹⁶ In other words, the TRI forces companies to confront their environmental performance with regard to chemical use each year and to consider the market, regulatory, and public reactions that will follow from the publication of that use.²⁹⁷ In 1988, 18,500 companies disclosed that they released 10.4 billion pounds of toxic chemicals in the prior year.²⁹⁸ By 2005, 23,461 companies filed reports; but despite an increase in reporting companies, they collectively released 4.34 billion pounds of chemicals, 58 percent lower than the total number of pounds in the 1988 report and just 32 percent of the amount of toxic chemicals per company.²⁹⁹

The TRI data has also allowed local and state regulators to establish baselines and trends in pollution performance for facilities, firms, and industrial sectors. These trends provide “the basis for comparative analysis and benchmarking of program outcomes.”³⁰⁰ Thus, the TRI has been an extremely useful and cost-effective research tool for companies to reduce the use of toxic chemicals voluntarily and for regulators to set research and enforcement priorities.³⁰¹

Section 322 of EPCRA addresses trade secrets and allows for very limited withholding of information from the public.³⁰² Under TRI regulations, a facility may only claim as a trade secret a chemical’s identity—as opposed to its

296. *See id.* (“It enables managers to engage in both internal and comparative benchmarking to establish performance baselines, set improvement targets, track progress toward those targets, and hold operational units within the firm accountable for meeting them. In this way, TRI empowers managers to translate the firm’s general environmental goals into specific performance objectives, and to incorporate environmental management.”).

297. *See, e.g.,* RUHL ET AL., *supra* note 294; Karkkainen, *supra* note 295, at 261 (“TRI-induced benchmarking creates an implicit open-ended performance standard that demands continuous improvement in relation to one’s peers and to one’s own past performance.”).

298. *See* Andrew Schatz, Note, *Regulating Greenhouse Gases by Mandatory Information Disclosure*, 26 VA. ENVTL. L.J. 335, 338 (2008) (“In 1988, 18,500 companies disclosed the release of 10.4 billion pounds of toxic chemicals in 1987.”).

299. *See id.* (citing declines in toxic releases after EPCRA and noting that the rate of decline after the early years of the program). For more information on the reporting practices and instructions used, see U.S. EPA, 2005 TOXIC RELEASE INVENTORY (TRI) PUBLIC DATA RELEASE REPORT 4 (2005), https://www.epa.gov/sites/production/files/documents/2005_national_analysis_overview_brochure.pdf [<http://perma.cc/HD55-J6BG>] (instructing companies how to file reports).

300. Karkkainen, *supra* note 295, at 310; U.S. EPA, THE TOXICS RELEASE INVENTORY IN ACTION: MEDIA, GOVERNMENT, BUSINESS, COMMUNITY, AND ACADEMIC USE OF TRI DATA 3 (July 2013), http://www2.epa.gov/sites/production/files/documents/tri_in_action_final_report_july_2013.pdf [<http://perma.cc/MK8M-7LJ4>] (“Federal, state and local governments use TRI data to develop environmental policies, establish priorities and track environmental performance.”).

301. *See* Karkkainen, *supra* note 295, at 287–310 (outlining TRI as a performance monitoring tool for environmental regulation).

302. EPCRA, 42 U.S.C. § 11042 (2012) (listing requirements for withholding information regarding chemical use or manufacturing); Pub. L. No. 99–499, 100 Stat 1613 (providing when there may be a basis for withholding information under EPCRA).

amount or use—but must still provide a generic class for the chemical.³⁰³ In order to claim a chemical identity as a trade secret, a company must meet stringent criteria in the TRI regulations, and any person may challenge a trade secret claim by petitioning EPA.³⁰⁴ According to an EPA Fact Sheet released in 2000, less than 1 percent of facilities have filed trade secret claims for chemical identity.³⁰⁵

Not surprisingly, the business community initially opposed the disclosure of chemical use data on trade secret grounds, and supporters of the law feared that trade secrets claims would significantly limit TRI data.³⁰⁶ According to Professor Sidney Wolf, both sets of fears were unfounded:

The concern about trade secrets appears unwarranted. Very few trade secret claims have been made under EPCRA. In the first year of TRI reporting, the EPA indicated that for over 19,000 facilities submitting TRI reports, only twenty-eight filed forms with trade secret claims. The EPA received about 2000 trade secret claims for MSDS information submitted under section 311 of EPCRA, a relatively modest amount considering that at least 3 million MSDS forms for over 50,000 chemicals are annually submitted under this program. Leaks of trade secret information would seem an even more tenable

303. See 42 U.S.C. § 11042 (noting that a reporting facility may withhold the specific chemical identity of a substance on trade secret grounds, provided that it discloses the “generic class or category” of the substance, submits to EPA an explanation of the basis of its trade secret claim along with confidential information on the specific chemical identity, and has not disclosed the chemical identity to other persons not bound by confidentiality agreements); U.S. EPA, THE TOXICS RELEASE INVENTORY IN ACTION, *supra* note 300; 40 C.F.R. § 350.5 (1988) (discussing assertion of claims of trade secrecy); 40 C.F.R. § 350.7(a) (“Claims of trade secrecy must be substantiated by providing a specific answer including, where applicable, specific facts, to each of the following questions with the submission to which the trade secrecy claim pertains.”); *id.* § 350.9(b) (“A determination as to the validity of a trade secrecy claim shall be initiated upon receipt by EPA of a petition under § 350.15 or may be initiated at any time by EPA.”); *id.* § 350.13(a) (“A substantiation submitted under § 350.7 will be determined to be insufficient to support a claim of trade secrecy unless the answers to the questions in the substantiation submitted under § 350.7 support all of the following conclusions.”).

304. 42 U.S.C. § 11042(b) (“No person required to provide information under this chapter may claim that the information is entitled to protection as a trade secret under subsection (a) of this section unless such person shows each of the following.”); *id.* § 11042(d)(4)(A) (“If the Administrator determines pursuant to paragraph (2) that the explanation presents insufficient assertions to support a finding that the specific chemical identity is a trade secret, the Administrator shall notify the trade secret claimant that he has 30 days to appeal the determination to the Administrator.”).

305. See U.S. EPA, THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (Mar. 2000), http://homelandsecurity.iowa.gov/documents/ierc/IERC_EPCRA_FactSheet.pdf [<http://perma.cc/8SP7-KA62>] (“In practice, less than one percent of facilities have filed such claims.”).

306. Sidney M. Wolf, *Fear and Loathing About the Public Right to Know: The Surprising Success of the Emergency Planning and Community Right-To-Know Act*, 11 J. LAND USE & ENVT. L. 217, 243 (1996) (“Most of the anxiety expressed over trade secrets came from industry and its sympathizers in government. One commentator called the requirement that businesses divulge trade secrets to the EPA a ‘formidable burden’ and one which could ‘ruin many businesses.’”); see *id.* (“Environmentalists feared that the Bush Administration EPA was moving toward being too permissive in granting trade secret protection requests for information required by EPCRA, with the result that industry would be able to withhold data necessary to protect public health and the environment.”).

concern in the few states, which have expanded their chemical information programs, but there appear to be no problems in these places as well.³⁰⁷

As a result of EPCRA, information regarding chemical releases went from private data to public data that is used effectively to both reduce emissions and shape environmental policy. Such a result clearly demonstrates the positive outcomes of providing more granular data and of efforts to balance industry sector privacy concerns with the public benefits of greater access to data on industrial chemical use and emissions.

2. EPA's Greenhouse Gas Reporting Program

In 2009, EPA enacted a rule requiring the mandatory reporting of greenhouse gas emissions from sources in the United States emitting twenty-five thousand metric tons or more of CO₂ equivalent each year.³⁰⁸ The rule applies to direct greenhouse gas emitters, fossil fuel suppliers, industrial gas suppliers, and facilities that inject CO₂ underground for sequestration and other reasons.³⁰⁹ The purpose of collecting greenhouse gas emissions data is to “provide a better understanding of the sources of greenhouse gases and to guide development of policies and programs to reduce emissions.”³¹⁰ EPA estimates that the Greenhouse Gas Reporting Program covers 85 to 90 percent of total U.S. greenhouse gas emissions from over eight thousand facilities.³¹¹ Covered facilities annually submit data collected during the prior calendar year.³¹² Facilities submit the annual reports to EPA using a greenhouse gas electronic reporting tool.³¹³

307. *Id.* at 249.

308. 40 C.F.R. § 98.2(a) (2015) (“A facility that contains any source category that is listed in Table A-4 of this subpart and that emits 25,000 metric tons CO₂e or more per year in combined emissions.”).

309. *Id.* (describing which entities are covered under the EPA rule).

310. U.S. EPA, FACT SHEET, GREENHOUSE GAS REPORTING PROGRAM IMPLEMENTATION 1 (Nov. 2013), <http://www.epa.gov/sites/production/files/2014-09/documents/ghgrp-overview-factsheet.pdf> [<http://perma.cc/VAT7-S3LZ>]. For a detailed discussion of the Greenhouse Gas Reporting Rule and the importance of complete data disclosure, see Letter from Clean Air Task Force et al., *supra* note 279, at 6.

311. U.S. EPA, FACT SHEET, *supra* note 310, at 1 (“An estimated 85-90 percent of the total U.S. GHG emissions from over 8,000 facilities are covered by the Greenhouse Gas Reporting Program.”).

312. 40 C.F.R. § 98.3 (“The annual report for reporting years 2011 and beyond must be submitted no later than March 31 of each calendar year for GHG emissions in the previous calendar year.”); U.S. EPA, FACT SHEET, *supra* note 310, at 1 (“Reports are submitted annually and provide data collected during the previous calendar year (i.e., reporting year). Reports . . . are due on March 31 for emissions in the previous calendar year.”).

313. 40 C.F.R. § 98.5 (“Each GHG report and certificate of representation for a facility or supplier must be submitted electronically in accordance with the requirements of § 98.4 and in a format specified by the Administrator.”); U.S. EPA, FACT SHEET, *supra* note 310, at 1 (“The annual reports are submitted to EPA electronically using an electronic greenhouse gas reporting tool (e-GGRT), which is accessed through the EPA web page.”).

The EPA has determined that greenhouse gas reporting data must be made available to the public unless the data qualify as CBI under the Clean Air Act.³¹⁴ Because of the large numbers of entities reporting under the Greenhouse Gas Reporting Program, EPA decided not to make individualized CBI determinations as processing such a large number of requests for CBI status would slow down the public release of the data.³¹⁵ Instead, EPA has engaged in rulemaking to determine which types of data qualify as CBI.³¹⁶ In April 2014, EPA published a more than two hundred-page rule with tables indicating which types of data constitute CBI and which types must be made public.³¹⁷ All “emissions data” is designated as public and not CBI.³¹⁸ The types of data classified as “emission data” include a wide range of information on CO₂ and other air emissions, industrial processes, and methods used to calculate greenhouse gas emissions from the facility.³¹⁹ Even data classified as CBI must be released in some form. In September 2014, EPA issued a rule containing aggregation levels at which companies must make CBI data available to the public and policy makers to better inform and guide future climate policy.³²⁰

There are several aspects of the Greenhouse Gas Reporting Program that would apply well to energy consumption data disclosures. First, broad applicability is important—greenhouse gas reporting covers 85 to 90 percent of

314. See *Confidential Business Information for GHG Reporting*, U.S. EPA, <http://www2.epa.gov/ghgreporting/confidential-business-information-ghg-reporting#overview> [<https://perma.cc/FX87-YEU3>] (last visited May 15, 2016) (providing an overview of collecting data under the Greenhouse Gas Reporting program).

315. See *id.* (“Due to the large numbers of entities reporting under the Greenhouse Gas Reporting Program and the large number of data reporting elements, EPA concluded that case-by-case determinations would not result in a timely release of non-confidential data.”).

316. See *id.* (including information on how the EPA plans to determine what data is to be protected).

317. See *id.* (“EPA has posted two tables that identify the CBI status of each data element for direct emission and supply elements.”).

318. See *Confidential Business Information for GHG Reporting*, *supra* note 314 (“[E]mission data cannot be afforded the protections of Confidential Business Information.”); U.S. EPA, GHGRP 2014: REPORTED DATA (Oct. 6, 2015), http://www2.epa.gov/sites/production/files/2015-10/documents/ghgrp_overview_report_10-06-15.pdf [<https://perma.cc/D6NZ-CY9U>] (displaying table containing designations of various types of data); see also Clean Air Act, 42 U.S.C. § 7414(c) (stating that regulated parties cannot seek trade secret status of “emissions data”); 40 C.F.R. § 301 (2015) (stating that “emissions data” as defined in the regulation is public and is not CBI).

319. U.S. EPA, GREENHOUSE GAS REPORTING PROGRAM, <http://www.epa.gov/climate/ghgreporting/documents/pdf/2014/documents/GHGRP-Table-Reported-data-direct-emitters-subparts.pdf> [<http://perma.cc/XK6L-K4U4>] (displaying table containing designations of various types of data).

320. See Greenhouse Gas Reporting Program: Publication of Aggregated Greenhouse Gas Data, 79 Fed. Reg. 32,948, 32950 (June 9, 2014), <http://www.gpo.gov/fdsys/pkg/FR-2014-06-09/pdf/2014-13425.pdf> [<https://perma.cc/JTD5-XQCD>]; see also Revisions to Reporting and Recordkeeping Requirements, and Confidentiality Determinations Under the Greenhouse Gas Reporting Program, 79 Fed. Reg. 63,750 (Oct. 24, 2014); *Confidential Business Information for GHG Reporting*, U.S. EPA, <http://www.epa.gov/climate/ghgreporting/reporters/cbi/index.html> [<http://perma.cc/QG7C-7HQ7>].

CO₂ producers,³²¹ and an energy consumption data program should aim for at least that level of applicability if 100 percent coverage is impossible. Second, preemptively specifying what constitutes a valid CBI assertion will have similar litigation quelling and publication speeding effects in the energy consumption data context as in the greenhouse gas emissions context. Whether there are valid contexts in which energy consumption data can be considered CBI, or whether all such data should be designated as public, remains to be determined. As aggregation levels are an established component of energy consumption data disclosures, perhaps they provide sufficient protection such that there are no cognizable situations where energy consumption data constitutes CBI. In either case, the Greenhouse Gas Reporting Program provides a valuable framework on which to base an energy consumption data disclosure policy.

C. Other Data Protection Schemes: U.S. Census and U.S. Energy Information Administration

Two other data protection mechanisms merit a brief discussion: the U.S. Census and the U.S. Energy Information Administration. The U.S. Census Bureau collects an enormous amount of personal data every ten years and makes that data available to researchers and the public in the form of aggregated census reports.³²² Microdata—unaggregated but anonymized data—is available to researchers at approved institutions and those who are granted access after application.³²³ Access to the unaggregated data is subject to a strict privacy policy, and inquiries are not permitted beyond the parameters of the approved project.³²⁴ However, a subset of microdata records is publicly available through the Integrated Public Use Microdata Series database.³²⁵ The subset is randomly selected from census records, and the Census Bureau generally makes between 1 and 20 percent of a year's records available.³²⁶ The Census Bureau implements a sophisticated statistical analysis to determine when certain cells of information are too sensitive for release and suppresses

321. EPA, FACT SHEET, *supra* note 310.

322. See *Decennial Census of Population and Housing*, CENSUS.GOV, <http://www.census.gov/programs-surveys/decennial-census.html> [<http://perma.cc/K9JL-XLJT>] (last visited May 15, 2016); *Research Data Products*, CENSUS.GOV, http://www.census.gov/research/data/research_data_products.html [<http://perma.cc/9XW2-HU5F>] (last visited May 15, 2016).

323. See *Restricted-Use Microdata*, CENSUS.GOV, http://www.census.gov/research/data/restricted_use_microdata.html [<http://perma.cc/G7QW-SXX4>] (last visited May 15, 2016). For the levels of aggregation present in the microdata, see *Demographic Data*, CENSUS.GOV, <http://www.census.gov/ces/dataproducts/demographicdata.html> [<http://perma.cc/FN5K-3W44>] (last visited May 15, 2016).

324. See *Data Protection*, CENSUS.GOV, http://www.census.gov/about/policies/privacy/data_protection.html [<http://perma.cc/QKE7-Q3G9>] (last visited May 15, 2016).

325. See *Integrated Public Use Microdata Series*, IPUMS.ORG, <https://usa.ipums.org/usa> [<http://perma.cc/KP2Y-WMGJ>] (last visited May 15, 2016).

326. See *Descriptions of IPUMS Samples*, IPUMS.ORG, <https://usa.ipums.org/usa/sampdesc.shtml> [<http://perma.cc/U2NX-6NVT>] (last visited May 15, 2016).

this information in public documents.³²⁷ The Census Bureau has a long history of collecting sensitive, private information for aggregation and publication; that system serves as a potent example of what an energy data collection regime could entail.

The EIA administers a nation-wide survey of electric utilities each year through Form EIA-861.³²⁸ Some of the information EIA collects and later publishes is subject to disclosure limitations, and some is not.³²⁹ EIA rationalizes that the private benefit of information suppression does not outweigh the “significant amount of information loss.”³³⁰ These disclosures can include data as granular as a utility’s electricity sales and revenue from industrial customers when that utility serves only one industrial customer.³³¹ Thus, the purportedly sensitive energy use data some industrial consumers seek to protect from disclosure under energy consumption data schemes has been publicly published since at least 1990 without apparent adverse incident.³³² This suggests that legislatures should view industrial claims of competitive disadvantage with some skepticism.

IV.

MODEL ENERGY CONSUMPTION DATA POLICIES

Model policies that govern energy consumption data must take into account questions of access, sensitivity, privacy, and confidentiality. This Section addresses each of these issues in proposing model policies for the centralization, standardization, aggregation, and security protection of energy consumption data.

A. Centralization of Data

Current data disclosure regimes place the burden of collecting, aggregating, and releasing energy consumption data on electric utilities, but there are distinct advantages to instead creating an entity specifically responsible for the management of that data. Utilities themselves may favor such a development if they believe that it would reduce their burden and insulate them from liability of improperly released data. A centralized Energy

327. See Fed. Comm. on Statistical Methodology, *Report on Statistical Disclosure Limitation Methodology* 38–40 (Statistical Pol’y Working Paper 22, 2005), <http://fcsml.sites.usa.gov/files/2014/04/spwp22.pdf> [<http://perma.cc/66LB-JEHG>].

328. See *Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861 Detailed Data Files*, *supra* note 19.

329. See Fed. Comm. on Statistical Methodology, *supra* note 327, at 42–44.

330. *Id.* at 43.

331. See, for example, the 2011 data for the single industrial customer of Cleveland Cliffs, Inc. in Minnesota. The EIA data clearly states that the customer consumed 680,316 MWhs of electricity at a price of \$30,505,000. *Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861 Detailed Data Files*, *supra* note 19.

332. See *id.*

Data Center may be best able to police what data is released to whom and to implement more complex data aggregation rules. Another advantage of an Energy Data Center would be the statistical expertise its potential staff could bring to data standardization, aggregation, and disclosure issues.

The California PUC considered the possibility of creating an Energy Data Center in 2014, eventually declining to do so at the time but leaving the option open for the future. Instead, the PUC determined that a series of refined “use cases” would “ameliorate the immediate need for a data center.”³³³ These use cases stipulate the type of data and aggregation level at which utilities can release energy consumption data to various interested parties. But a report prepared in connection with the California PUC proceedings firmly recommended creating an Energy Data Center, noting its potential productive uses as an aggregator and distributor of data to the public, an independent energy-research entity, and a partner to existing governmental agencies.³³⁴ California should continue to explore the possibility of an Energy Data Center to best address many of the access, aggregation, and privacy issues that currently limit the optimal use of energy consumption data.

At the local level, both Chicago and Los Angeles have implemented data collection and publication schemes that approximate Energy Data Centers. As part of the Retrofit Chicago initiative, the City of Chicago publishes an online “Energy Data Map” showing residential electricity and natural gas use by census tract and by block.³³⁵ Chicago utilities provide this information directly to the city.³³⁶ The Chicago map, though, does not factor in commercial or industrial data—for those blocks, the map displays the neighborhood average.³³⁷ Los Angeles, by contrast, publishes information aggregated to the “parcel” or “block group” and includes residential, commercial, and industrial information.³³⁸ The data combine both public records and previously unreleased utility data³³⁹ to create an interactive map of the city.³⁴⁰ The map’s

333. Decision Adopting Rules to Provide Access to Energy Usage-Related Data While Protecting Privacy of Personal Data, 2014 WL 1931946, at *3 (Cal. Pub. Util. Comm’n, May 1, 2014).

334. LEE & ZAFAR, *supra* note 58, at 2–3.

335. *Chicago Energy Data Map*, CITY OF CHICAGO, <http://energymap.cityofchicago.org> [<https://perma.cc/U3UN-8R2R>] (last visited May 15, 2016). The map also serves to market Retrofit Chicago’s residential energy efficiency initiatives. City of Chicago, Press Release, *Mayor Emanuel Announces Chicago Exceeds City’s Residential Retrofit Goal Ahead of Schedule* (Apr. 22, 2014), http://www.cityofchicago.org/city/en/depts/mayor/press_room/press_releases/2014/apr/mayor-emanuel-announces-chicago-exceeds-citys-residential-retrof.html [<https://perma.cc/JH88-3TWS>].

336. See City of Chicago, Press Release, *supra* note 335.

337. See *Chicago Energy Data Map*, *supra* note 335.

338. *Energy Atlas Methods, Data Overview, Parcels and Buildings*, L.A. CTY. ENERGY ATLAS, <http://www.energyatlas.ucla.edu/about/methods> [<http://perma.cc/6YFW-3SF9>] (last visited May 16, 2016) (noting that parcels are determined by the Los Angeles County Assessor’s parcel dataset, a more granular view than census districts).

339. The UCLA researchers obtained unaggregated data through negotiated nondisclosure agreements, and web display was designed to prevent deaggregation of any of the data. See *Energy Atlas Methods, Data Development, Security*, L.A. CTY. ENERGY ATLAS,

developers anticipate adding layers to the map to show average electric bills, average number of people per household, and average energy use by industrial sector.³⁴¹ These programs are helpful examples of the type of work Energy Data Centers can perform at the municipal level when governance and political structures cooperate.

The particulars of funding and administering an Energy Data Center remain an open question in most jurisdictions. In some states, PUCs have existing budgetary and legislative authority to create an Energy Data Center and to require utilities to provide customer data.³⁴² In other states, new legislation would be required to create such a program or authorize the state PUC to create it. To fund Energy Data Centers, states could use existing general revenues, a designated revenue source, or ratepayer recovery by utilities.

B. Standardization Concerns

Standardization of data across a state's utilities or on a national basis is critical to advancing all of the energy policy goals discussed in Part I. Programs to identify energy efficiency opportunities, whether private or municipal, will require standardized data inputs to be developed at scale.³⁴³ Unstandardized data releases would make state and local benchmarking programs extremely burdensome to administer.³⁴⁴ The Green Button program has so far proved a reasonably effective format for standardizing energy data to facilitate sharing and management.³⁴⁵ Green Button is standardized, nationally available and known, and serves as the basis for many energy efficiency software programs, most notably Portfolio Manager. Thus, there appears to be no reason, at this point, to advocate for any other program of energy data standardization. What is important is that the method of data release, and the data itself, is standardized.

<http://www.energyatlas.ucla.edu/about/methods> [<https://perma.cc/KMT7-LZ5Y>] (last visited May 16, 2016). These disclosures were facilitated because the project's utility partners were municipally owned. See Martin LaMonica, *Los Angeles Maps Electricity Use at the Block Level*, MIT TECH. REV. (Mar. 28, 2013), <http://www.technologyreview.com/view/512991/los-angeles-maps-electricity-use-at-the-block-level> [<http://perma.cc/6Q3E-SRZF>].

340. See Alison Hewitt, *UCLA's Free Energy Atlas Uncovers L.A. Buildings' Role in Greenhouse Gas Emissions*, UCLA NEWSROOM (Sept. 29, 2015), <http://newsroom.ucla.edu/releases/uclas-free-energy-atlas-uncovers-l-a-buildings-role-in-greenhouse-gas-emissions> [<https://perma.cc/ZJU6-6CHX>].

341. See Alison Hewitt, Press Release, *UCLA Center Creates First Interactive Electricity-Use Map of Los Angeles*, UCLA NEWSROOM (Mar. 28, 2013), <http://newsroom.ucla.edu/releases/ucla-center-creates-first-interactive-244470> [<http://perma.cc/YF46-RSP3>].

342. See LEE & ZAFAR, *supra* note 58, at 2–3, 6–7.

343. Cf. *supra* note 35 and accompanying text.

344. See *supra* Part II.C.

345. Protests against Green Button have often been lodged by utilities that have developed their own proprietary methods of data release and do not want to lose that investment. See, e.g., *supra* note 99 and accompanying text.

States have uniformly decided that a customer has the right to access their own data,³⁴⁶ and the Green Button program appears sufficient to meet this requirement. While the data itself may not be particularly legible or useful to a customer,³⁴⁷ third-party industrial software developers have begun to create numerous applications beyond Portfolio Manager to help customers interpret and manage energy data.³⁴⁸ No model data policy should restrict customers' access to their own data—they must be free to view, download, and share their data with whomever they desire.

C. Aggregation, Privacy Concerns, and Trade-Related Data

As shown by Part II's discussion of the legal and policy issues surrounding energy data access, the level of data aggregation may be the most difficult issue for consensus because of privacy concerns. Most, if not all, data-seeking parties agree that the current 15/15 standard is overly restrictive, but no clear successor has yet emerged. The American Statistical Association's Committee on Privacy and Confidentiality recommends replacing the 15/15 standard with a "p-percent" rule, where uniqueness of the data determines whether it may be disclosed.³⁴⁹ This rule would subject the data of a large industrial utility customer in a small town to higher protections than an ordinary utility commercial customer in a city (or, potentially, a large industrial customer in an area of large industrial customers) because the small town customer would be a proportionally larger energy user.³⁵⁰ The U.S. Census Bureau uses a similar method to determine when publication of certain metrics in specific census tracts constitutes a breach of privacy.³⁵¹ Adopting a more flexible approach such as the "p-percent" rule may result in a balance of privacy or CBI concerns with public interests in disclosure.

Adopting a flat, one-size-fits-all aggregation rule such as 15/15 also fails to properly recognize the substantially different privacy interests applicable to various classes of electricity customers and the different sensitivities of different types of energy use data (e.g., real-time versus historic data, or 15-minute interval versus annual data). Residential customers are the only class

346. See *supra* note 114 and accompanying text.

347. For examples of the data provided by Green Button, see *Green Button Sample Data from PG&E*, ENERGY.GOV, <http://energy.gov/downloads/green-button-sample-data-pge> [<http://perma.cc/24UW-EKKG>] (last visited May 16, 2016).

348. The Open EI (Energy Information) website lists 271 energy apps, 65 of which are specifically designed to interpret Green Button information. *Energy Apps Catalog*, OPENEI, <http://en.openei.org/apps> [<http://perma.cc/FE77-CHA6>] (last visited May 16, 2016).

349. *Human Subject Protection*, COMM. ON PRIVACY & CONFIDENTIALITY, <http://community.amstat.org/cpc/humansubjectsprotectionethicalresearchand> [<http://perma.cc/W59L-AF6K>] (last visited May 16, 2016).

350. See AMANG SUKASIH ET AL., AM. STATISTICAL ASS'N, IMPLEMENTING MULTIPLE EVALUATION TECHNIQUES IN STATISTICAL DISCLOSURE CONTROL FOR TABULAR DATA (2012), <http://www.amstat.org/meetings/ices/2012/papers/301957.pdf> [<http://perma.cc/5ZBP-EGHV>].

351. *Id.* at tbl.1.

with a recognized privacy interest in their energy consumption data³⁵² and should therefore be entitled to the most protection by aggregation in the absence of specific statutory protections for commercial or industrial customers. No study comparable to the Pacific Northwest National Laboratory (PNNL) study³⁵³ has examined the effects of aggregation requirements on residential energy reporting. As a result, it is unclear whether the same trend of declining individual similarity to the average as the aggregation threshold increases would be present in the residential context.³⁵⁴

Commercial and industrial customers, on the other hand, have no reasonable expectation of privacy in the energy consumption data context in the absence of statutes expressly creating such rights.³⁵⁵ The basis of protection for commercial energy consumption data generally arises under theories of trade secrets or CBI. Any such protection should balance proven risks of disclosure with the public interest in greater access to such data.³⁵⁶ Even when corporations plausibly assert CBI claims, the government can usually put forth a compelling interest that requires disclosure, as in the case of the TRI discussed in Part III. So while commercial and industrial customers are entitled to some protection for their energy consumption data, it is not clear that it deserves protection at the same level as that for residential customers. Notably, residential customers represent only approximately 38 percent of electricity consumption, so in order for cities and states to accurately judge their progress on energy efficiency goals, they require access to commercial and industrial consumption data as well as residential data.³⁵⁷ Where state or municipal benchmarking policies are in effect, commercial building owners require access to their tenants' data, as detailed in Part II's discussion of energy benchmarking statutes.³⁵⁸ Commercial data is key to weighing and advancing energy policy.

That is not to say commercial and industrial entities are not entitled to any protections. There are cases, particularly in the industrial setting, where knowledge of energy use could conceivably put a company at a competitive disadvantage. The 15/15 standard does not appear to proportionally respond to this competitive risk. The PNNL study demonstrated both that requiring the

352. See *supra* notes 185–86 and accompanying text.

353. See LIVINGSTON ET AL., *supra* note 126.

354. *Id.*

355. See *supra* notes 185–87 and accompanying text.

356. See *supra* note 277 and accompanying text.

357. See, e.g., *Electricity Emissions in the United States*, CTR. FOR CLIMATE & ENERGY SOLUTIONS, <http://www.c2es.org/technology/overview/electricity> [<http://perma.cc/6AS6-M7SE>] (last visited May 6, 2016) (reporting that for 2013, retail electricity sales to residential customers constituted 37.7 percent of total electricity sales, commercial customers were 36.3 percent of total electricity sales, and industrial customers made up 25.9 percent of total electricity sales); *U.S. Electricity Sales Have Decreased in Four of the Past Five Years*, U.S. ENERGY INFO. ADMIN., (Dec. 20, 2013), <http://www.eia.gov/todayinenergy/detail.cfm?id=14291> [<http://perma.cc/4NUW-PSES>] (reporting similar percentages for 2012).

358. See *supra* Part II.C.

aggregation of fifteen accounts makes single building reporting almost impossible and that the concealment of individual data does not meaningfully increase for every additional account beyond the fourth.³⁵⁹ A revised aggregation threshold for commercial and industrial concerns should take those findings into account, and a model energy data policy should abandon the overly protective 15/15 standard in favor of a more nuanced analysis based on the age of the data, the customer class, the sensitivity of the data, and the needs of electricity customers, government actors, researchers, and other third parties.

D. Security and Access

The broad variety of data types encompassed within “energy consumption data” requires that some distinctions be made to effectively discuss security measures and access restrictions. The granularity of data substantially impacts both its sensitivity and value. Granularity can be broadly broken down into the extremely granular (i.e., five-minute interval data), the semigranular (i.e., weekly or monthly data), and the nongranular (i.e., annual or longer period data). Also, when the data is published—real-time, lagged, or historic—can change the sensitivity. Different parties in the energy sector need different types of data to make different types of decisions. Each type of data should be protected differently, commensurate with its sensitivity, as shown in Figure 1 and the discussion below:

Figure 1: Data Sensitivity Based on Granularity³⁶⁰

		Temporal Aggregation					Real-time
		Annual	Seasonally/ Quarterly	Monthly	Daily	Hourly/15 min	
Geographic aggregation	Statewide						
	Utility						
	City						
	Zip Code						
	Census Block Group						
	Census Block						
	Multiple Tenants						
	Customer	Requires customer consent					
	Appliance	IOU does not possess this data, only available from customer on consent, requires special sensors					

359. See LIVINGSTON ET AL., *supra* note 126.

360. BRENDON SLOTTERBACK, MINN. PUB. UTIL. COMM’N, MN CEUD WORKGROUP, DATA USE CASES & UTILITY DATA AGGREGATION PRACTICES 9 (Oct. 18, 2013), http://mn.gov/puc/documents/pdf_files/014428.pdf [https://perma.cc/8LC5-MREK].

Figure 1 highlights how different levels of data aggregation over space and time have different levels of privacy concern, with the red squares having the most concern and the green squares the least. Real-time, customer-specific data has the greatest potential to reveal information on specific customer energy use, but it could also provide valuable information for demand side management programs or distributed energy resource technologies.

Real-Time, Subhourly Data: These data are the most sensitive, so third-party access to them without customer consent should be strictly limited. Individual customers and utilities, however, should be able to obtain this data and share it with third parties, as it could be of substantial use allowing energy consumers to participate in electricity markets and demand management projects. Even without customer consent, incorporating a time lag could help to decrease data sensitivity and allow greater disclosure.

One way for researchers to access sensitive data when consent is not feasible or available is to create “synthetic data” through modeling.³⁶¹ Researchers have begun to rely more heavily on a growing range of individual and business synthetic data to study topics from entrepreneurship and economic dynamics to food stamp and poverty programs without risking privacy breaches or disclosing CBI.³⁶² While this approach could be helpful in some cases, like evaluating city-level greenhouse gas reduction or energy efficiency programs, it would not work for market participation or building-specific program evaluation. For specific market participants, real-time data is necessary to participate in demand side management programs. And energy efficiency investments in specific buildings can only be evaluated by examining and comparing the use of energy use in those buildings before and after the retrofits.

Semigranular Hourly or Monthly Historic Data: This data is less sensitive and should be made available to researchers, policy makers, and governments once adequately aggregated. It can help design and evaluate energy efficiency programs and policies. This type of data allows policy makers to evaluate the effectiveness of energy efficient investments with real data.

Nongranular Annual Historic Energy Use Data: This data is, in most cases, hardly sensitive at all and should be made public. Many existing benchmarking statutes provide for publication of annual energy consumption data,³⁶³ and this type of data is useful primarily in that context. It can allow building owners, renters, or home purchasers to better understand the energy

361. See Viviane Callier, *How Fake Data Could Protect Real People's Privacy*, ATLANTIC (July 30, 2015), http://www.theatlantic.com/technology/archive/2015/07/fake-data-privacy-census/399974/?utm_source=SFFB [<http://perma.cc/3KEU-LHLB>].

362. See *id.*

363. See N.Y.C., N.Y., LOCAL LAW no. 84 (2009); S.F., CAL., ENVTL. CODE ch. 20 (2010); WASH., D.C., MUN. REGS. tit. 20, ch. 35, § 3513 (2012).

costs of their buildings by indicating how the property uses energy during hot and cold months.

Concerns over reidentification of individual or residential energy consumption data are generally less pressing than in other contexts, such as with health care or education data. There are, however, some legitimate concerns over the reidentification of commercial and industrial energy consumption data to the extent it might give business competitors insight into certain manufacturing or commercial operating activities. Aggregation standards have been the primary method of protecting individuals from the risk of reidentification, but other sectors provide examples of additional approaches to securing sensitive data. Researchers accessing deidentified, unaggregated census data, for example, must conduct their research in secured facilities on government-provided computers without internet or email access, and they may not bring media storage devices (CD-ROM, flash drive, etc.) into the facility.³⁶⁴ These physical protections of data could be implemented to protect sensitive energy consumption data. The education realm has adopted contracts and confidentiality agreements as a means of protecting deidentified data. When governments, researchers, energy-efficiency service providers, and others seek access to energy consumption data, they could be contractually bound not to attempt to reidentify the data they receive.³⁶⁵ While such an obligation would presumably not discourage a determined reidentifier, it would provide a clear cause of action to seek a remedy for any resulting damage. Accordingly, appropriate penalties for disclosure of data rather than refusing to make such data available in the first place may be the preferred approach. As demonstrated in Part III, there is a history of using such sanctions in other research contexts, and such an approach facilitates the disclosure, use, and analysis of data important to public policy developments.³⁶⁶

CONCLUSION

This Article explores the promise of improved access to energy consumption data as well as the current barriers that prevent access to such data. As state and local governments and electricity users attempt to improve the efficiency of their buildings, reduce greenhouse gas emissions, and realize the potential of improved demand side management of energy resources, the need for such data becomes more pressing. But the current laws that balance making such data available with any privacy or CBI interests in such data are

364. See U.S. BUREAU OF THE CENSUS, CTR. FOR ECON. RESEARCH STUDIES, THE RESEARCHER HANDBOOK 1, 3-4 (2009), http://www.census.gov/content/dam/Census/programs-surveys/sipp/methodology/Researcher_Handbook_20091119.pdf [<https://perma.cc/VF8Y-CNS6>].

365. This is a provision of the Department of Education's *Model Terms of Service*, *supra* note 259; see also ABRAMS ENVTL. LAW CLINIC, *supra* note 23, at 27-28 (discussing potential security procedures for energy consumption data).

366. See *supra* notes 265-75 and accompanying text (discussing debates over how to weigh public policy benefits of data disclosure against privacy concerns).

underdeveloped. Thus, this Article explores how more developed legal frameworks in the health care, education, and environmental emissions data contexts balance the public policy needs for data disclosures with countervailing privacy and CBI interests. A review of these analogs shows that the privacy or confidentiality interests in energy consumption data may be overstated. In any event, these frameworks demonstrate that to the extent there are such privacy or confidentiality concerns, they can be adequately addressed in most instances by aggregating the data, using historic rather than current data, or contractual and other agreements that ensure security where access to individualized data is needed. Policy makers can best balance competing interests and help achieve the promises of the smart grid by considering the full range of issues associated with data centralization, standardization, aggregation, and security. In doing so, they should fully acknowledge the public policy benefits of data access and also recognize that privacy and confidentiality concerns differ substantially depending on the granularity of the data and scope of its use.