


2-12-2016

## The Smart Grid in Massachusetts: A Proposal for a Consumer Data Privacy Policy

Andrew Bartholomew

*Boston College Law School*, [andrew.bartholomew@bc.edu](mailto:andrew.bartholomew@bc.edu)

Follow this and additional works at: <http://lawdigitalcommons.bc.edu/ealr>

 Part of the [Consumer Protection Law Commons](#), [Energy and Utilities Law Commons](#), [Internet Law Commons](#), and the [State and Local Government Law Commons](#)

---

### Recommended Citation

Andrew Bartholomew, *The Smart Grid in Massachusetts: A Proposal for a Consumer Data Privacy Policy*, 43 B.C. Env'tl. Aff. L. Rev. 79 (2016), <http://lawdigitalcommons.bc.edu/ealr/vol43/iss1/4>

This Notes is brought to you for free and open access by the Law Journals at Digital Commons @ Boston College Law School. It has been accepted for inclusion in Boston College Environmental Affairs Law Review by an authorized administrator of Digital Commons @ Boston College Law School. For more information, please contact [nick.szydowski@bc.edu](mailto:nick.szydowski@bc.edu).

# THE SMART GRID IN MASSACHUSETTS: A PROPOSAL FOR A CONSUMER DATA PRIVACY POLICY

ANDREW BARTHOLOMEW\*

**Abstract:** The advent of the smart grid—a way of incorporating digital technology into the electrical grid to enable two-way communication between utilities and customers—raises a number of data privacy concerns. This new infrastructure will generate incredible amounts of information about customer electricity usage, even enabling those with access to it to see how power is being used within the home in real time. Customers must be assured that their usage data will be protected from breach or sale to unapproved third parties, while they still retain the ability to allow approved vendors to analyze it for the customer’s benefit. To protect this information, Massachusetts should adopt new regulations building off its existing data privacy law and considering other states’ attempts at smart grid privacy policies, as well as the federal government’s recommendations. This will ensure that the Bay State is prepared for widespread implementation of smart grid technology.

## INTRODUCTION

For those in the energy generation and regulatory community, the advent of smart grid technology has brought both much excitement and many questions.<sup>1</sup> From claims that the implementation of the smart grid will revolutionize energy delivery in the same way the Internet changed the way we share information, to assertions that it will be instrumental in combating climate change, the possibilities of such an immense project seem limited only by one’s imagination.<sup>2</sup> Although the definition of the “smart grid” is occasionally disputed, it primarily refers to the ability for electricity and information to flow two ways to create an “automated, widely distributed energy delivery network.”<sup>3</sup>

---

\* Executive Note Editor, BOSTON COLLEGE ENVIRONMENTAL AFFAIRS LAW REVIEW, 2015–2016.

<sup>1</sup> See Joel B. Eisen, *Smart Regulation and Federalism for the Smart Grid*, 37 HARV. ENVTL. L. REV. 1, 2–4 (2013).

<sup>2</sup> See *id.*

<sup>3</sup> H. Russell Frisby, Jr. & Jonathan P. Trotta, *The Smart Grid: The Complexities and Importance of Data Privacy and Security*, 19 COMMLAW CONSPECTUS 297, 299–300 (2011) (internal citation omitted).

On June 12, 2014, the Massachusetts Department of Public Utilities (“DPU”) published a report detailing its order to modernize the electric grid.<sup>4</sup> Although some specifics are laid out as to what the DPU expects of electric distribution companies going forward (i.e., each company must submit a ten-year grid modernization plan outlining how it proposes to make measurable progress towards a list of goals), some key issues are left open.<sup>5</sup> Specifically, privacy and cybersecurity concerns will be a formidable legal obstacle to the implementation of the smart grid in Massachusetts.<sup>6</sup> This is due to the wide-spread collection and analysis of consumer-specific data necessary for the technology to serve its intended purpose.<sup>7</sup> Customers must know and feel confident in the policies that will protect their anonymity from unauthorized third parties, but at the same time they must be able to consent to the release of such information when it is beneficial for them.<sup>8</sup> One scholar even questions whether “[r]egulators might be tempted to use Smart Grid data to achieve environmental goals, at the expense of consumer privacy.”<sup>9</sup> Privacy concerns surrounding the smart grid revolution are prevalent in every jurisdiction contemplating this momentous shift, and a case study of the approaches taken by certain states at the forefront of the movement—particularly Massachusetts—can serve as a model for future regulations.<sup>10</sup>

Part I of this Note will lay out how the existing energy grid in the United States functions, how the smart grid promises to alter this infrastructure, and some states’ early attempts at crafting regulations to accommodate the smart grid.<sup>11</sup> Part II explores privacy concerns implicated by smart grid technology, including criminal activity used by law enforcement and policymakers and direct marketing opportunities.<sup>12</sup> Part III details existing federal and state privacy laws that are either inadequate to protect against these concerns, or that may serve as a helpful model for future regulations.<sup>13</sup> Finally, Part IV proposes some recommendations with which a Massachusetts smart grid data privacy policy should ultimately conform.<sup>14</sup>

---

<sup>4</sup> See generally MASS. DEP’T OF PUB. UTILS., INVESTIGATION BY THE DEPARTMENT OF PUBLIC UTILITIES ON ITS OWN MOTION INTO MODERNIZATION OF THE ELECTRIC GRID, D.P.U. 12-76-B (2014) [hereinafter D.P.U. 12-76-B], <http://www.mass.gov/eea/docs/dpu/orders/dpu-12-76-b-order-6-12-2014.pdf> [<http://perma.cc/MSZ9-NAH9>].

<sup>5</sup> See *id.* at 2, 34–35.

<sup>6</sup> See *id.* at 34–35; Eisen, *supra* note 1, at 16.

<sup>7</sup> See D.P.U. 12-76-B, *supra* note 4, at 5, 34.

<sup>8</sup> *Id.* at 34–36.

<sup>9</sup> Eisen, *supra* note 1, at 16.

<sup>10</sup> See *infra* notes 15–263 and accompanying text.

<sup>11</sup> See *infra* notes 15–94 and accompanying text.

<sup>12</sup> See *infra* notes 95–135 and accompanying text.

<sup>13</sup> See *infra* notes 136–216 and accompanying text.

<sup>14</sup> See *infra* notes 217–263 and accompanying text.

## I. ENERGY DISTRIBUTION AND THE SMART GRID

## A. The Existing Energy Grid

The energy grid in the United States is a system of interconnected high voltage transmission lines that allows power plants to distribute electricity to consumers.<sup>15</sup> Our current grid was built in the 1890s and has been gradually improved upon as technology has advanced.<sup>16</sup> Today, it consists of more than 9200 “electric generating units with more than 1 million megawatts of generating capacity connected to more than 300,000 miles of transmission lines.”<sup>17</sup> Generators, typically burning fossil fuels, send electricity to transformers which convert the voltage to extremely high levels to prepare it for long distance transmission.<sup>18</sup> This energy is then carried along power lines to reach its destination.<sup>19</sup> When it reaches a local distribution bus, the electricity is “stepped down” to a lower voltage.<sup>20</sup> The electricity is then carried along distribution lines—the elevated wires often seen alongside residential streets—to homes.<sup>21</sup> But before it can be transferred to residences, transformers again step down the power to two hundred and forty volts.<sup>22</sup> The two hundred and forty volt electricity current enters consumers’ homes through a typical watt-hour meter that lets the power company charge for electricity consumption.<sup>23</sup> Although the system just described forms a somewhat national grid, these networks ultimately operate on a

---

<sup>15</sup> *Electricity Explained: How Electricity Is Delivered to Consumers*, U.S. ENERGY INFO. ADMIN., [http://www.eia.gov/energyexplained/index.cfm?page=electricity\\_delivery](http://www.eia.gov/energyexplained/index.cfm?page=electricity_delivery) [perma.cc/VT66-S926] (last updated Dec. 7, 2015).

<sup>16</sup> *What Is the Smart Grid?: The Smart Grid*, OFFICE OF ELEC. DELIVERY & ENERGY RELIABILITY, U.S. DEP’T OF ENERGY, [https://www.smartgrid.gov/the\\_smart\\_grid/smart\\_grid.html](https://www.smartgrid.gov/the_smart_grid/smart_grid.html) [https://perma.cc/JV8R-5TD8].

<sup>17</sup> *Id.*

<sup>18</sup> Marshall Brain, *How Power Grids Work*, SMITH COLL., [http://www.science.smith.edu/~jcardell/Courses/EGR220/ElecPwr\\_HSW.html](http://www.science.smith.edu/~jcardell/Courses/EGR220/ElecPwr_HSW.html) [http://perma.cc/9W7J-8AZR].

<sup>19</sup> *Id.*

<sup>20</sup> *Id.* Sometimes called a distribution substation, the local distribution bus lowers the voltage level for eventual use by industrial, commercial, or residential customers. *Illustrated Glossary: Substations*, U.S. DEP’T OF LABOR, OCCUPATIONAL SAFETY & HEALTH ADMIN., [https://www.osha.gov/SLTC/etools/electric\\_power/illustrated\\_glossary/substation.html](https://www.osha.gov/SLTC/etools/electric_power/illustrated_glossary/substation.html) [https://perma.cc/F3X5-QKNV].

<sup>21</sup> Brain, *supra* note 18; *Electricity Explained: How Electricity Is Delivered to Consumers*, *supra* note 15. Distribution lines are frequently underground in cities and newer developments, a technique that is more expensive up front, but more reliable once built. Frank Alonso & Carolyn A.E. Greenwell, *Underground vs. Overhead: Power Line Installation—Cost Comparison and Mitigation*, ELEC-TRIC LIGHT & POWER (Feb. 1, 2013), [http://www.elp.com/articles/powergrid\\_international/print/volume-18/issue-2/features/underground-vs-overhead-power-line-installation-cost-comparison.html](http://www.elp.com/articles/powergrid_international/print/volume-18/issue-2/features/underground-vs-overhead-power-line-installation-cost-comparison.html) [http://perma.cc/NF79-7RTJ].

<sup>22</sup> Brain, *supra* note 18. Although a 240-volt current is distributed to American homes, the typical power outlet supplies only 120 volts. *Id.*

<sup>23</sup> *Id.*

smaller, local level.<sup>24</sup> Many local grids are interconnected for reliability and commercial purposes, forming larger, more dependable networks to coordinate the electricity supply.<sup>25</sup> These networks of local grids may include many states, and occasionally Mexico and Canada.<sup>26</sup>

The Federal Energy Regulatory Commission (“FERC”) is an independent government agency responsible for regulating the transmission of natural gas, oil, and wholesale electricity across state lines.<sup>27</sup> The North American Electric Reliability Corporation (“NERC”), on the other hand, was established by the electric industry to ensure that the United States electrical grid was reliable and secure.<sup>28</sup> NERC is overseen by FERC, as well as by governmental bodies in Canada.<sup>29</sup> Essentially, NERC exists to establish criteria that ensure the bulk power system will be able to successfully operate and inter-operate in accordance with defined reliability standards.<sup>30</sup> It does not, however, deliver power directly to homes and businesses,

<sup>24</sup> See *id.*; *Electricity Explained: How Electricity Is Delivered to Consumers*, *supra* note 15. The interconnected transmission system is operated on a “control area” basis. MARK BABULA, ISO NEW ENG. INC., NEW ENGLAND’S BULK ELECTRIC POWER GRID 5 (n.d.), [http://www.nedrix.com/PDF/Power\\_Grids\\_Across\\_New\\_England.pdf](http://www.nedrix.com/PDF/Power_Grids_Across_New_England.pdf) [<http://perma.cc/GVQ7-GW7H>]. For example, New England is a control area. *Id.* at 4–6. Within a control area, the distribution system is usually operated by a distribution utility in close coordination with the ISO/RTO (Independent System Operator/Regional Transmission Operator), discussed later. *Id.* at 2, 6. Generally, the distribution utility would not be issuing dispatch instructions to generators, although it might be directly controlling load through various demand response programs. *Id.* at 7. The real-time decisions that balance load and generation and ensure the grid is able to respond to contingencies such as a generator tripping offline occur at the control area level. *Id.* at 6.

<sup>25</sup> *Electricity Explained: How Electricity Is Delivered to Consumers*, *supra* note 15.

<sup>26</sup> *Id.*

<sup>27</sup> *What FERC Does*, FED. ENERGY REGULATORY COMM’N, <http://www.ferc.gov/about/ferc-does.asp> [<https://perma.cc/58QZ-VFB2>] (last updated June 24, 2014).

<sup>28</sup> *Electricity Explained: How Electricity Is Delivered to Consumers*, *supra* note 15; N. AM. ELEC. RELIABILITY CORP., FREQUENTLY ASKED QUESTIONS 1 (2012) [hereinafter FREQUENTLY ASKED QUESTIONS], [http://www.nerc.com/AboutNERC/Doents/FAQs\\_DEC12.pdf](http://www.nerc.com/AboutNERC/Doents/FAQs_DEC12.pdf) [<http://perma.cc/AA82-PRPN>]. NERC was established by the electricity industry—per the recommendation of the Federal Power Commission, the entity that would later become FERC—in 1968 in response to a 1965 blackout that left 30 million without power. N. AM. ELEC. RELIABILITY CORP., HISTORY OF NERC 1 (2012) [hereinafter HISTORY OF NERC] [http://www.nerc.com/AboutNERC/Documents/History\\_Dec12.pdf](http://www.nerc.com/AboutNERC/Documents/History_Dec12.pdf) [<http://perma.cc/QAB7-C8XE>]. The council was formed to exchange and disseminate information and to review, discuss, and assist in resolving interregional power coordination matters. *Id.*

<sup>29</sup> FREQUENTLY ASKED QUESTIONS, *supra* note 28, at 3.

<sup>30</sup> See *id.* at 6–7. NERC is regulated by FERC and establishes criteria and metrics to define and measure reliability, as well as the protocols used by the industry to ensure the grid is operated in a manner to deliver the target level of reliability. Kathy Larsen, *Bottom Line in Power Grid Reliability: Who’s the Boss, NERC or FERC?*, PLATTS, MCGRAW HILL FIN.: THE BARREL (May 24, 2012, 11:26 AM), [http://blogs.platts.com/2012/05/24/bottom\\_line/](http://blogs.platts.com/2012/05/24/bottom_line/) [<http://perma.cc/PN6P-259H>]. NERC used to be an organization established by the utility industry to provide self-regulation. *Id.* In 2003, Congress required FERC to establish a reliability coordinator that could establish legally enforceable standards. *Id.* FERC designated NERC to perform this role, and FERC must approve any new NERC standards and criteria. *Id.*

a service that is instead generally provided by a local utility of some kind.<sup>31</sup> Though it is not a governmental agency, NERC was granted authority by the Energy Policy Act of 2005 to act as an “audited self-regulatory electric reliability organization spanning North America.”<sup>32</sup> Some NERC members, including U.S. states and Canadian provinces, have formed regional organizations with missions similar to NERC, but operating on a smaller scale.<sup>33</sup> These organizations—referred to as Independent System Operators (“ISOs”) and Regional Transmission Organizations (“RTOs”)—are part of a national standard design advocated by FERC.<sup>34</sup>

The ISO that manages and operates the grid shared by all New England states is ISO New England (“ISO-NE”), a not-for-profit corporation that directs electricity to the area and administers the wholesale electricity markets within the region.<sup>35</sup> Power plants generate electricity, which electric utilities or suppliers buy wholesale in the market and sell to retail consumers.<sup>36</sup> ISO-NE is responsible for regulating this distribution by continuously forecasting energy demand throughout the day and throughout the year, thus maintaining a continuous balance between supply (generation) and demand (load), and ensuring that the grid can sustain electricity usage when it reaches its peak.<sup>37</sup> Based on its forecasts, ISO-NE can instruct power generators in the region to start up, shut down, raise, or lower generation, or modify their schedules to meet the hourly projections of electricity consumption.<sup>38</sup> ISO-NE coordinates its activities with other regional power organizations to ensure the grid’s reliability.<sup>39</sup>

The demand for electricity in New England during peak periods is growing faster than average demand.<sup>40</sup> To satisfy demand during those peaks—which only occur a few days or hours a year—expensive generation plants would have to be built to supply enough electricity.<sup>41</sup> It is inefficient

<sup>31</sup> See FREQUENTLY ASKED QUESTIONS, *supra* note 28, at 6–7.

<sup>32</sup> *Id.* at 3; HISTORY OF NERC, *supra* note 28, at 3. “‘Self-regulatory’ refers to a non-governmental entity to which the government has delegated power.” FREQUENTLY ASKED QUESTIONS, *supra* note 28, at 3.

<sup>33</sup> *Electricity Explained: How Electricity Is Delivered to Consumers*, *supra* note 15.

<sup>34</sup> *Id.*

<sup>35</sup> *About Us*, ISO NEW ENG., <http://www.iso-ne.com/about> [<http://perma.cc/J7MK-Z8AJ>].

<sup>36</sup> *Administering the Wholesale Electricity Markets*, ISO NEW ENG., <http://www.iso-ne.com/about/what-we-do/three-roles/administering-markets> [<http://perma.cc/6DHL-CDHD>].

<sup>37</sup> *Operating the Power System*, ISO NEW ENG., <http://www.iso-ne.com/about/what-we-do/three-roles/operating-grid> [<http://perma.cc/B7Z7-LR8Y>].

<sup>38</sup> *Id.*

<sup>39</sup> *Id.*

<sup>40</sup> *Id.*

<sup>41</sup> *Explainer: Base Load and Peaking Power*, KCET: REWIRE, <http://www.kcet.org/news/define/rewire/explainers/explainer-base-load-and-peaking-power.html> [<http://perma.cc/DP6X-XTGF>] (“A peaking power plant is one we can switch on when we need additional power, which will come online without much delay and start generating power on a moments’ notice . . . . Most

and expensive for these resources to be built if they are to run so infrequently.<sup>42</sup> Instead, a more efficient plan for managing peak demand may be an approach that shifts focus away from the electricity supply side of this problem and more toward the demand itself.<sup>43</sup>

### *B. The Arrival of the Smart Grid: Revolutionizing Energy Delivery*

A typical electric customer's only interaction with a utility currently involves a wire into the house, a monthly bill (often still on paper), and maintenance teams that repair downed wires during storms.<sup>44</sup> A typical utility meter has basic mechanical instruments and only measures electricity usage.<sup>45</sup> Customers may not be able to see their usage data on their utility's website.<sup>46</sup> Instead, the data available usually consists of monthly usage totals but does not disclose how much of that total can be attributed to certain appliances or how customers might respond to this information to save energy and money.<sup>47</sup>

The smart grid will create a new, interactive relationship between grid operators, utilities, and customers.<sup>48</sup> "Advanced metering infrastructure, better known as smart meter technology, is the smart grid component most visible to consumers."<sup>49</sup> Smart meters will allow customers to have a clear and real-time picture of how much electricity they are using, when they are using it, and how much it costs.<sup>50</sup> Combined with an updated pricing scheme, consumers will be able to save money by using less power when electricity is most expensive.<sup>51</sup>

---

peak power in the US comes from gas-fired plants. Despite gas' low price these days, peak power remains more expensive per kilowatt than base load."); *Operating the Power System*, *supra* note 37.

<sup>42</sup> *Operating the Power System*, *supra* note 37.

<sup>43</sup> See D.P.U. 12-76-B, *supra* note 4, at 11; Luciano De Castro & Joisa Dutra, *The Economics of the Smart Grid*, in *Proceedings of IEEE 49th Annual Allerton Conference on Communication, Control, and Computing* 1294, 1295 (2011), <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arNumber=6120317> ("The pricing mechanisms that may be implemented in a smart grid environment more closely resemble the ones that have been advocated by economists for decades. Additionally, dynamic pricing schemes coupled with technology may grant considerable peak load reductions deferring investments. This belief is supported by the experimental evidence that has been observed in pilot programs.").

<sup>44</sup> Eisen, *supra* note 1, at 10.

<sup>45</sup> *Id.*

<sup>46</sup> *Id.*

<sup>47</sup> *Id.*

<sup>48</sup> *What Is the Smart Grid?: The Smart Home*, OFFICE OF ELEC. DELIVERY & ENERGY RELIABILITY, U.S. DEP'T OF ENERGY, [https://www.smartgrid.gov/the\\_smart\\_grid/smart\\_home.html](https://www.smartgrid.gov/the_smart_grid/smart_home.html) [<https://perma.cc/XAC8-XTSE>].

<sup>49</sup> Eisen, *supra* note 1, at 10 (internal quotation omitted).

<sup>50</sup> *What Is the Smart Grid? The Smart Grid*, *supra* note 16.

<sup>51</sup> *Id.*

This has potential benefits for utilities, as well.<sup>52</sup> For example, smart meters will allow utilities to cope with outages more efficiently and connect new customers to the grid without sending a service crew to their residence.<sup>53</sup> Remote service switches would enable the utility to remotely turn all power on or off at a particular premises.<sup>54</sup> Some of these service switch designs also provide the utility with the capability to remotely set electricity limits that, if exceeded, would turn off all power to the customer.<sup>55</sup>

### C. States' Differing Approaches to Grid Modernization

The Massachusetts grid modernization plan prescribed by DPU in June 2014 consists of two separate orders.<sup>56</sup> The first calls for distribution utilities to deploy advanced metering, and requires them to file ten-year grid modernization plans.<sup>57</sup> This order defines four broad objectives for grid modernization: “(1) [R]educ[e] the effects of outages; (2) optimiz[e] demand, which includes reducing system and customer costs; (3) integrat[e] distributed resources; and (4) improv[e] workforce and asset management.”<sup>58</sup>

---

<sup>52</sup> Eisen, *supra* note 1, at 10.

<sup>53</sup> *Id.*

<sup>54</sup> CHUCK GOLDMAN & ROGER LEVY, LAWRENCE BERKELEY NAT'L LAB., AN INTRODUCTION—SMART GRID 101: CHAPTER 4, at 10 (2011), <http://www.naruc.org/ferc/smartgrid101/smart-grid-101-chap4-metering-final-031511.pdf> [<http://perma.cc/CG47-STB8>].

<sup>55</sup> *Id.*

<sup>56</sup> D.P.U. 12-76-B, *supra* note 4, at 2–3.

<sup>57</sup> *Id.*; Claire Cameron, *Inside Massachusetts' Ambitious Plan to Modernize the Grid*, UTIL. DIVE (June 27, 2014), <http://www.utilitydive.com/news/inside-massachusetts-ambitious-plans-to-modernize-the-grid/279535/> [<http://perma.cc/KCJ9-MYTV>]; Katherine Tweed, *Does Massachusetts' Grid Modernization Plan Go Far Enough?*, GREENTECH MEDIA (June 17, 2014), <http://www.greentechmedia.com/articles/read/does-massachusetts-grid-modernization-plan-go-far-enough> [<http://perma.cc/5Q9R-3JX4>]. Eversource and National Grid, two electrical utilities serving customers in Massachusetts, released their respective plans pursuant to this order on August 19, 2015. Jim Kinney, *National Grid, Eversource File Power Transmission Network Improvement Plans for Massachusetts*, MASSLIVE (Aug. 19, 2015, 6:20 PM), [http://www.masslive.com/business-news/index.ssf/2015/08/national\\_grid\\_plan\\_could\\_add\\_025\\_to\\_1\\_to.html](http://www.masslive.com/business-news/index.ssf/2015/08/national_grid_plan_could_add_025_to_1_to.html) [<http://perma.cc/E997-R7QF>]. Eversource's plan proposed “an innovative opt-in [time varying rate] program that will engage customers in a meaningful manner, while achieving the majority of the benefits of an opt-out program at a fraction of the cost.” EVERSOURCE, GRID MODERNIZATION PLAN 69 (Aug. 19, 2015), [http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=15-122%2fInitial\\_Filing\\_Petition.pdf](http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=15-122%2fInitial_Filing_Petition.pdf) [<http://perma.cc/Y6JM-H4PG>]. National Grid proposed four alternative plan scenarios, reflecting a range of options, and also insisted on “investments in advanced meter technology, communications, distribution control systems, advanced distribution automation, voltage management and associated infrastructure required to support these capabilities.” NAT'L GRID, GRID MODERNIZATION PLAN 7 (Aug. 19, 2015), [http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=15-120%2fGrid\\_Mod\\_PlanFinalRedacted\\_Boo.pdf](http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=15-120%2fGrid_Mod_PlanFinalRedacted_Boo.pdf).

<sup>58</sup> D.P.U. 12-76-B, *supra* note 4, at 2.



The second order requires utilities to make two different pricing options available to customers.<sup>59</sup> The first is the default structure that will charge specific time of use (“TOU”) prices, meaning that retail electricity will be more expensive at the times during any given week when consumers typically use the most energy (also called “peak hours”).<sup>60</sup> These prices will stay in place for a given period of time—for example, six months—and will encourage customers to shift electricity use from on-peak to off-peak hours.<sup>61</sup> During times when wholesale electricity prices are extremely high—such as during a heat wave—a critical peak pricing (“CPP”) rate will apply rather than the normal TOU rate for that time period.<sup>62</sup> Before these CPP rates are applied, customers will be notified via social media, e-mail, telephone, and radio, informing them that their electricity prices will be higher than normal for as long as the CPP remains in effect.<sup>63</sup>

Customers will also be able to opt out of this variable pricing scheme and can instead choose a flat-rate option that will come with a peak time rebate.<sup>64</sup> This alternative will allow customers to still be charged a flat rate for their electricity usage in a structure similar to the status quo.<sup>65</sup> These customers can receive a rebate if they lower their electricity use during times when demand is highest.<sup>66</sup> Therefore, customers opting for this plan will still be incentivized to lower their electricity consumption during peak demand periods, but even those who neglect to do so will be protected from higher peak prices because they will be subject to a flat pricing scheme.<sup>67</sup> “However, the flat rate will likely be higher than it is now, making it unattractive to most customers.”<sup>68</sup>

In either case, time-variable pricing will be enabled only if customers have smart meters installed on their homes, as opposed to the antiquated, mechanical watt-hour meters that are currently more prevalent.<sup>69</sup> As previ-

---

<sup>59</sup> MASS. DEP’T OF PUB. UTILS., INVESTIGATION BY THE DEPARTMENT OF PUBLIC UTILITIES UPON ITS OWN MOTION INTO TIME VARYING RATES, D.P.U. 14-04-B, at 2, 8 (2014) [hereinafter D.P.U. 14-04-B], <http://www.mass.gov/eea/docs/dpu/orders/d-p-u-14-04-b-order-6-12-14.pdf> [<http://perma.cc/C78D-7UBV>].

<sup>60</sup> *Id.* at 8.

<sup>61</sup> *Id.*

<sup>62</sup> *Id.* at 9.

<sup>63</sup> *Id.*

<sup>64</sup> *Id.* at 10; Tweed, *supra* note 57.

<sup>65</sup> D.P.U. 14-04-B, *supra* note 59, at 10.

<sup>66</sup> *Id.* To be clear, while customers will have a choice regarding how they are charged for their energy use, DPU’s order 12-76-A requires the implementation of advanced metering. Jeff St. John, *Massachusetts Makes Smart Grid Mandatory*, GREENTECH MEDIA (Dec. 31, 2013), <http://www.greentechmedia.com/articles/read/massachusetts-makes-smart-grid-mandatory> [<http://perma.cc/F6DA-PP8U>].

<sup>67</sup> D.P.U. 14-04-B, *supra* note 59, at 10.

<sup>68</sup> Tweed, *supra* note 57.

<sup>69</sup> See Eisen, *supra* note 1, at 10–11.

ously mentioned, smart meters are capable of measuring real-time energy consumption, which both permits the utility to set prices depending on when there is the most demand for electricity and simultaneously allows the consumer to alter his or her usage depending on these rising rates.<sup>70</sup> DPU's plan reflects the state's belief that real-time usage data and smart meters, coupled with pricing structures that more closely resemble the actual cost of electricity generation and delivery, will promote investment in the grid, efficiency, and the integration of renewable residential energy sources (such as solar panels).<sup>71</sup> If the Commonwealth's plan is successful, it will be the first state in the country to shift from basic default pricing schemes to variable rates.<sup>72</sup>

While Massachusetts may be the first state to implement these variable rates, states such as New York and Hawaii have proposed more ambitious plans to overhaul their respective energy grids to address issues like peak demand and rising prices.<sup>73</sup> New York's Reforming the Energy Vision ("REV") initiative, announced on April 24, 2014, lays out what the state's Public Service Commission sees as critical changes to an aging infrastructure that is incapable of incorporating new electricity generating technologies or meeting demand.<sup>74</sup> The REV initiative aims to modernize the grid by transforming the state's utilities into Distributed System Platform Providers

---

<sup>70</sup> *Id.*

<sup>71</sup> Tweed, *supra* note 57.

<sup>72</sup> *Id.* On April 21, 2015, California issued a proposal to reform rate structures for residential customers of the state's investor-owned utilities, including time-of-use rates that will go into effect by the end of the decade. Proposed Decision of ALJs McKinney and Halligan, Rulemaking 12-06-013, at 2 (CAL. P.U.C., Apr. 21, 2015), <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M151/K305/151305677.PDF> [<http://perma.cc/B9AU-B4N9>]. Much of this proposal focuses on how to integrate customer-owned renewable electricity generating technology into the grid, and it has yet to resolve how time-of-use rates might incentivize customers to alter their energy use to support this structure. Jeff St. John, *California's Major Residential Rate Reform: A Mixed Bag for Solar Economics*, GREENTECH MEDIA (Apr. 24, 2015), <http://www.greentechmedia.com/articles/read/californias-major-residential-rate-reform-a-mixed-bag-for-solar-economics> [<http://perma.cc/UN99-TU9J>].

<sup>73</sup> See Tweed, *supra* note 57. Utilities in California published statutorily-mandated distribution resources plans on July 1, 2015, but these plans relate primarily to the integration of rooftop solar panels, energy storage technology, plug-in electric vehicles, and other distributed energy resources. *Distribution Resources Plan (R.14-08-013)*, CAL. PUB. UTILS. COMM'N (July 1, 2015), [<http://perma.cc/NRD6-4886>] (original hyperlink no longer active). Minnesota has also initiated proceedings relating to the smart grid and integration of renewable energy sources, but these moves are considered proactive as Minnesota is not yet feeling immediate pressure to reform their utility system. Gavin Bade, *Beyond the Substation: How 5 Proactive States Are Transforming the Grid Edge*, UTIL. DIVE (Mar. 2, 2015), <http://www.utilitydive.com/news/beyond-the-substation-how-5-proactive-states-are-transforming-the-grid-edg/369810/> [<http://perma.cc/GF3P-EAHJ>].

<sup>74</sup> See *Reforming the Energy Vision: About the Initiative*, N.Y. STATE DEP'T OF PUB. SERV., <http://www3.dps.ny.gov/W/PSCWeb.nsf/All/CC4F2EFA3A23551585257DEA007DCE2?OpenDocument> [[perma.cc/RF24-KD6A](http://perma.cc/RF24-KD6A)] (last updated Oct. 30, 2015).

(“DSPPs”).<sup>75</sup> DSPPs will upgrade the electrical grid to create a platform for new energy technologies, such as solar panels and energy storage devices, to improve overall system efficiency and to better serve customer needs.<sup>76</sup> They will enable the adoption of real-time information flow between consumers and the bulk power system, as well as establish a platform to support technological innovation.<sup>77</sup> This plan is much more ambitious than Massachusetts’, but while the REV initiative envisions New York’s long-term objectives, there are still some important questions to be answered.<sup>78</sup> For example, it is unclear how DSPPs will value the energy generated by customers and their corresponding technology.<sup>79</sup> These are critical issues that need to be addressed before this new vision can actually be implemented effectively.<sup>80</sup>

Hawaii has an over-arching, long-term vision, as well.<sup>81</sup> The state’s public utility commission has begun proceedings that will require Hawaiian Electric Company (“HECO”) to drastically change its business model to meet the stated goal of obtaining seventy percent of its energy supply from clean energy by 2030.<sup>82</sup> This seventy percent figure is comprised of thirty percent from energy efficiency and forty percent from renewable energy.<sup>83</sup> Currently, Hawaii relies on oil to generate seventy-two percent of its electricity, and such dependence is responsible for the state having the highest electricity prices in the United States, averaging thirty-four cents per kilowatt-hour (three times the national average).<sup>84</sup>

Driven by these high costs and aided by the state’s prevalence of sunshine, Hawaii has seen a boom in solar power generation: nearly ten percent

<sup>75</sup> N.Y. STATE DEP’T OF PUB. SERV., REFORMING THE ENERGY VISION 11 (2014), [http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/26be8a93967e604785257cc40066b91a/\\$FILE/ATTK0J3L.pdf/Reforming%20The%20Energy%20Vision%20\(REV\)%20REPORT%204.25.%2014.pdf](http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/26be8a93967e604785257cc40066b91a/$FILE/ATTK0J3L.pdf/Reforming%20The%20Energy%20Vision%20(REV)%20REPORT%204.25.%2014.pdf) [<http://perma.cc/79JG-XZ3S>].

<sup>76</sup> *See id.* at 11–12.

<sup>77</sup> *Id.* at 12; Claire Cameron, *How New York Is Reinventing the Electric Utility*, UTIL. DIVE (May 16, 2014), <http://www.utilitydive.com/news/how-new-york-is-reinventing-the-electric-utility/262727/> [<http://perma.cc/FRT8-AKRC>].

<sup>78</sup> Cameron, *supra* note 57.

<sup>79</sup> Cameron, *supra* note 77.

<sup>80</sup> *See id.*

<sup>81</sup> *See* ENERGY & ENVTL. ECON., INC., EVALUATION OF HAWAII’S RENEWABLE ENERGY POLICY AND PROCUREMENT 1 (2014), <http://puc.hawaii.gov/wp-content/uploads/2013/04/HIPUC-Final-Report-January-2014-Revision.pdf> [<http://perma.cc/RV7X-3J4B>].

<sup>82</sup> Tweed, *supra* note 57.

<sup>83</sup> Bentham Paulos, *Postcard from the Grid’s Future: Hawaii as a Solar Laboratory*, GREENTECH MEDIA (Feb. 13, 2014), <http://www.greentechmedia.com/articles/read/postcard-from-the-grids-future-hawaii-as-a-solar-laboratory> [<http://perma.cc/APY4-TP54>].

<sup>84</sup> *Id.*

of HECO's customers now have rooftop solar panels.<sup>85</sup> This "abundance of daytime solar power is driving down wholesale prices and shifting peak demand . . . changing the operations and revenues of generators."<sup>86</sup> The state's energy office says Hawaii could one day have the capability to generate enough renewable energy to amount to more than one hundred and forty percent of current demand.<sup>87</sup> Geothermal energy, produced by the volcanoes on Hawaii's Big Island, would produce the most power, and additional electricity could be supplied by wind, solar, and biomass plants across all the islands.<sup>88</sup> "To integrate the system, Hawaii has begun planning for an inter-island undersea power cable, the first to link the islands."<sup>89</sup>

Though Massachusetts' proposal is far less radical than those of New York or Hawaii,<sup>90</sup> the installation of smart meters and the institution of variable-rate pricing signals an important period of change for electricity distribution in the Commonwealth.<sup>91</sup> As DPU sees it, "The modern electric system that we envision will be cleaner, more efficient and reliable, and will empower customers to manage and reduce their energy costs," thus creating "a new energy future for Massachusetts."<sup>92</sup> Though DPU's plan is not as far-reaching as these other examples, it is perhaps the most easily implemented.<sup>93</sup> Additionally, Massachusetts, unlike New York or Hawaii, empha-

---

<sup>85</sup> Davide Savenije & Claire Cameron, *Hawaii's Overhaul of the Utility Business Model*, UTIL. DIVE (May 7, 2014), <http://www.utilitydive.com/news/hawaiis-overhaul-of-the-utility-business-model/259923/> [<http://perma.cc/2GFF-H84A>].

<sup>86</sup> Paulos, *supra* note 83. Hawaii has an abundance of electricity storage devices, as well, which are designed to stabilize electricity production from solar power plants. Peter Fairley, *Hawaii's Solar Push Strains the Grid*, MIT TECH. REV. (Jan. 20, 2015), <http://www.technologyreview.com/news/534266/hawaiis-solar-push-strains-the-grid/> [<http://perma.cc/295J-M27A>]. A solar plant's output is diminished by as much as seventy to eighty percent when clouds pass over it. *Id.* To mitigate this problem, batteries are used to store solar electricity when there is ample sunshine and release it during cloudy periods, thus maintaining a steady output. *Id.*

<sup>87</sup> Paulos, *supra* note 83.

<sup>88</sup> *Id.* Geothermal energy is produced by bringing steam up through underground wells and directing it to a turbine generator that produces electricity. *Puna Geothermal Venture (PGV)*, HAWAIIAN ELEC., MAUI ELEC. & HAW. ELEC. LIGHT, [http://www.hawaiianelectric.com/heco/\\_hidden\\_hidden/Renewable-Energy/Puna-Geothermal-Venture-\(PGV\)?cpsextcurrchannel=1](http://www.hawaiianelectric.com/heco/_hidden_hidden/Renewable-Energy/Puna-Geothermal-Venture-(PGV)?cpsextcurrchannel=1) [<http://perma.cc/Y5F8-SQVF>] ("The exhaust steam from this turbine is used to vaporize (heat) an organic working fluid, which drives a second turbine, generating additional electricity. The condensed steam from the organic fluid heat exchanger is re-injected into the ground through reinjection wells along with the brine.").

<sup>89</sup> Paulos, *supra* note 83.

<sup>90</sup> See Tweed, *supra* note 57.

<sup>91</sup> See D.P.U. 12-76-B, *supra* note 4, at 1, 9.

<sup>92</sup> *Id.* at 1.

<sup>93</sup> See *id.*; ENERGY & ENVTL. ECON., INC., *supra* note 81; N.Y. STATE DEP'T OF PUB. SERV., *supra* note 75.

sizes placing significant market pressure on individuals to reduce consumption.<sup>94</sup>

## II. DATA PRIVACY CONCERNS PRESENTED BY SMART GRID TECHNOLOGIES

Massachusetts' plan to initiate a regime that provides for a more efficient and reliable grid does not come without concerns.<sup>95</sup> In particular, the smart grid presents privacy issues for electricity consumers.<sup>96</sup> Because the grid modernization plan relies on the aggregation of consumer energy use information to set pricing, strict regulations must be in place to ensure that this information is not released in a manner that would enable specific residences to be identified based on their use; the information should remain nearly anonymous.<sup>97</sup> "The voluminous literature on Internet privacy shows how modern network technologies present an ongoing threat to personal autonomy."<sup>98</sup> In the same way, smart meters and associated technology will generate incredible amounts of data that have never before been available.<sup>99</sup> Generally speaking, utilities are not equipped to face the challenges of sending and receiving real-time usage data over a network.<sup>100</sup> The introduction of third parties—such as energy management systems ("EMS") manufacturers—into the conversation presents an additional wrinkle as far as privacy is concerned, because once the data reaches the third party's servers, the third party typically has control over how it uses and shares that data.<sup>101</sup>

---

<sup>94</sup> See D.P.U. 12-76-B, *supra* note 4, at 1; ENERGY & ENVTL. ECON., INC., *supra* note 81; N.Y. STATE DEP'T OF PUB. SERV., *supra* note 75.

<sup>95</sup> See D.P.U. 12-76-B, *supra* note 4, at 34.

<sup>96</sup> *Id.*

<sup>97</sup> *Id.* at 34–36.

<sup>98</sup> Eisen, *supra* note 1, at 16; see also DIONYSIOS POLITIS, ET AL., SOCIOECONOMIC AND LEGAL IMPLICATIONS OF ELECTRONIC INTRUSION 126 (Kristin Klinger et al. eds., 2009) ("Surveillance and disclosure of private facts or personal information threaten the freedom and the autonomy of the individuals, [and] their right to be self defined to preserve their personal integrity."); Daniel Dimov, *Privacy Implications of the Internet of Things*, INFOSEC INST. (Nov. 14, 2013), <http://resources.infosecinstitute.com/privacy-implications-internet-things/> [<http://perma.cc/7ZG3-95VB>] ("Internet-connected modules may be used not only for passive monitoring, but also for an active intrusion in the private life of people. Moreover, the targeted advertising based on information collected through Internet-connected modules may drastically infringe on personal autonomy.").

<sup>99</sup> Eisen, *supra* note 1, at 16.

<sup>100</sup> *Id.*

<sup>101</sup> Cheryl Dancy Balough, *Privacy Implications of Smart Meters*, 86 CHI. KENT L. REV. 161, 169–70 (2011); Andreas S.V. Wokutch, Note, *The Role of Non-Utility Service Providers in Smart Grid Development: Should They Be Regulated, and If So, Who Can Regulate Them?*, 9 J. TELECOMM. & HIGH TECH. L. 531, 540–41 (2011) ("[M]any of these services increase vulnerability to malicious software and the potential for service disruption because they allow consumers to utilize the Internet to perform [energy efficiency analysis], which creates an additional access point for malicious software to exploit.").

Smart grid data can be so finely detailed as to detect the use of household appliances, water heaters, or showers.<sup>102</sup> If this data is left unprotected, various entities could gain access to it—including law enforcement officials, commercial entities, and criminals.<sup>103</sup> This would allow these parties to establish a snapshot of that homeowner’s daily routines and activities, including when the home is typically unoccupied.<sup>104</sup> The data generated by the smart grid will also be very valuable for marketing and research purposes and could easily be misused.<sup>105</sup>

### *A. Third Party Service Providers’ Interactions with Customers and Utilities*

The energy information coming to and from one’s home through a smart meter can be run through a home EMS, which allows customers to track their energy use in detail to better save energy.<sup>106</sup> An EMS also allows the customer to monitor real-time information and enables them to respond to price signals from the utility.<sup>107</sup> Customers could be able to choose settings on certain appliances to turn them off automatically during those few times per year when demand threatens to cause an outage.<sup>108</sup> This would help the customer to avoid paying peak rates, balancing the energy load in their area, and preventing blackouts.<sup>109</sup> One company describes its EMS product as “the interface between the utility-controlled smart grid and energy-consuming in-house objects.”<sup>110</sup> In other words, it acts as a central con-

<sup>102</sup> Frisby & Trotta, *supra* note 3, at 304.

<sup>103</sup> *Id.*

<sup>104</sup> *Id.*

<sup>105</sup> *Id.*

<sup>106</sup> *What Is the Smart Grid?: The Smart Home*, *supra* note 48. The development of appliances that can connect to and react to signals from the smart grid is viewed as a huge potential market. NAT’L SCI. & TECH. COUNCIL, EXEC. OFFICE OF THE PRESIDENT OF THE U.S., A POLICY FRAMEWORK FOR THE 21ST CENTURY GRID: ENABLING OUR SECURE ENERGY FUTURE 37 (2011), <https://www.whitehouse.gov/sites/default/files/microsites/ostp/nstc-smart-grid-june2011.pdf> [<http://perma.cc/3NWL-QW78>] (“A smart refrigerator, for example, can delay a defrost cycle until it can draw the necessary power at the day’s lowest rate . . . ; a smart dryer can shut down its heating element during brownouts . . . ; [or] a smart water heater can ‘learn’ to schedule its heating in a way that supplies adequate hot water but only draws off-peak or renewable electricity.”).

<sup>107</sup> *What Is the Smart Grid?: The Smart Home*, *supra* note 48.

<sup>108</sup> See Eisen, *supra* note 1, at 11 (“[A] properly-equipped washing machine could be programmed to run at lower-cost times, or the consumer could even allow the utility to control it, in return for financial incentives.”).

<sup>109</sup> *What Is the Smart Grid?: The Smart Home*, *supra* note 48.

<sup>110</sup> *Home Energy Management Systems*, FREESCALE SEMICONDUCTOR, INC., [<http://perma.cc/6P7C-YAJP>] (original hyperlink no longer active).

trol that manages smart appliances within the home to “enabl[e] power efficiency and energy optimization.”<sup>111</sup>

Companies that provide EMS systems will very often be outside of and separate from the consumer-utility relationship.<sup>112</sup> At times, it will be useful for consumers to release their energy consumption information to these entities, which can analyze the data and provide valuable feedback.<sup>113</sup> For example, some services can enable energy efficiency analysis by identifying which appliances use too much energy, providing consumers with the information necessary to correct these problems by replacing the appliance or simply by turning it off, thereby lowering electricity bills.<sup>114</sup> Consumer consultation could also be offered to help users manage appliances in ways that would not sacrifice quality of life.<sup>115</sup> If these third parties were permitted to acquire consumer usage information directly from the utilities, it might create an avenue through which commercial efficiency operations could identify potential customers and market their services accordingly.<sup>116</sup> This may mean that in the coming years, large corporate energy service companies will begin seeking out advanced meter data to fine-tune their marketing strategies.<sup>117</sup>

### B. Criminal Activity and Law Enforcement

The most visible and immediate concern is that energy use information could be used for the nefarious purpose of determining when a homeowner has left his or her premises.<sup>118</sup> Detailed information gathered by smart meters may give rise to targeted home invasions, since it may be possible to

---

<sup>111</sup> *Id.*; see also Frisby Jr. & Trotta, *supra* note 3, at 302–03 (“Facilitated by broadband networks and the Internet, consumers can access [EMS] applications through their smart phones or computers, permitting the automation of electric consumption decisions through control of energy-consuming devices, as well as demand response . . . [S]mart meters allow consumers and third party service providers to monitor not only historical energy consumption data, but also near real-time data (including price and demand data), and to make economic decisions regarding energy usage. This is particularly true in jurisdictions where electric utilities are permitted to implement time-based or dynamic pricing.”).

<sup>112</sup> See Wokutch, *supra* note 101, at 535.

<sup>113</sup> See *id.*

<sup>114</sup> *Id.* at 535–36 (“[Energy efficiency analysis] is a non-utility service that provides consumers with an analysis of their electricity usage, and in turn allows consumers to identify and eliminate energy sinks. In effect, EEA provides consumers with the information necessary to correct electrical inefficiencies and lower electric bills.”).

<sup>115</sup> ELIAS LEAKE QUINN, SMART METERING & PRIVACY: EXISTING LAW AND COMPETING POLICIES: A REPORT FOR THE COLORADO PUBLIC UTILITIES COMMISSION, at B-2 (2009), [http://www.dora.state.co.us/puc/docketsdecisions/DocketFilings/09I-593EG/09I-593EG\\_Spring2009Report-SmartGridPrivacy.pdf](http://www.dora.state.co.us/puc/docketsdecisions/DocketFilings/09I-593EG/09I-593EG_Spring2009Report-SmartGridPrivacy.pdf) [<http://perma.cc/W7B7-ADUA>].

<sup>116</sup> *Id.*

<sup>117</sup> *Id.*

<sup>118</sup> *Id.* at 11.

determine from the meter data when residents are away from home, and possibly even whether or not they have an electronic security system.<sup>119</sup> Law enforcement personnel, however, could also benefit from access to real-time data usage.<sup>120</sup> Investigators could exploit information about electricity draw to pinpoint the location of various illegal activities.<sup>121</sup> Electricity consumption information is already used by law enforcement to investigate marijuana growing operations and illicit drug manufacturing.<sup>122</sup> This information will only become more valuable to such law enforcement activities as the level of detail involved in electricity consumption information increases.<sup>123</sup>

### C. Environmental Impact and Customer Ridicule

Though the introduction of advanced metering will likely benefit the environment as consumers become more aware of their actual energy use and renewable energy sources become more easily integrated into the grid,<sup>124</sup> this information could also be used against adopters of the technology who consume more than their share of electricity.<sup>125</sup> Smart meters could also yield information capable of identifying environmental behavioral patterns that regulators might want to limit.<sup>126</sup> These regulators might attempt to manipulate usage data to achieve environmental goals, at the expense of consumer privacy.<sup>127</sup> This same information could expose a consumer to ridicule by neighbors or members of the general public.<sup>128</sup> By way of an

---

<sup>119</sup> *Id.* (“High-resolution electricity usage profiles can expose individual behavior patterns through the identification of each specific appliance event within the household. Not just when a consumer is at home and when she is away, but further when she cooks dinner, watches TV, takes a shower.”).

<sup>120</sup> *Id.* at 5.

<sup>121</sup> *Id.*

<sup>122</sup> *Id.* at 24. For example, in *United States v. Kyllo*, a state law enforcement officer “subpoenaed Kyllo’s utility records[,] compared the records to a spreadsheet for estimating average electrical use and concluded that Kyllo’s electrical usage was abnormally high, indicating a possible indoor marijuana grow operation.” 190 F.3d 1041, 1043 (9th Cir. 1999) *rev’d*, 533 U.S. 27 (2001) (reversing denial of motion to suppress evidence because use of thermal imaging technology to gather information regarding interior of home constituted a warrantless “search” in violation of the Fourth Amendment).

<sup>123</sup> QUINN, *supra* note 115, at 24.

<sup>124</sup> See Ryan Hledik, *How Green Is the Smart Grid?*, 22 ELEC. J. 29, 29, 33 (2009) (“A simulation of the U.S. power system suggests that both conservative and more technologically aggressive implementations of a smart grid would produce a significant reduction in power sector carbon emissions at the national level. A conservative approach could reduce annual CO<sub>2</sub> emissions by 5 percent by 2030, while the more aggressive approach could lead to a reduction of nearly 16 percent by 2030.”).

<sup>125</sup> See QUINN, *supra* note 115, at 10.

<sup>126</sup> Eisen, *supra* note 1, at 16.

<sup>127</sup> *Id.*

<sup>128</sup> QUINN, *supra* note 115, at 10.



example, one commentator points out that the day after Al Gore received an Oscar for his production *An Inconvenient Truth*, the Tennessee Center for Policy Research reported that his home consumed twenty times more electricity than the national average.<sup>129</sup> The increased adoption of smart meters across the country and the move toward “finer interval data” means that more of this information will be available about more of the population.<sup>130</sup>

#### D. Intrusive Marketing Techniques

Data released by utilities without the consent of consumers could also result in increased, intrusive marketing techniques directed at those households which could be using energy more efficiently.<sup>131</sup> While some consumers might appreciate the services that are offered to them, others may consider this advertising invasive—especially when they did not opt-in to receive such marketing.<sup>132</sup> Advertisements could also be tailored to specific domestic activities, and could even be delivered at times when the marketing agency knew—by using real-time usage information—that customers were home.<sup>133</sup> Additionally, energy usage data could potentially become valuable to the insurance industry.<sup>134</sup> To gather information for premium-setting, insurance companies may want to assess the quality of a policyholder’s lifestyle by analyzing the relationship between certain appliance uses and health risks.<sup>135</sup>

---

<sup>129</sup> *Id.*

<sup>130</sup> *Id.* at 9.

<sup>131</sup> See Balough, *supra* note 101, at 170. For a list of companies already offering energy management services, see Lynne Kiesling, *Intelligent End-Use Devices Make a Transactive Smart Grid Valuable (Part 3 of 5)*, KNOWLEDGE PROBLEM (Mar. 4, 2009), <http://knowledgeproblem.com/2009/03/04/intelligent-end-use-devices-make-a-transactive-smart-grid-valuable-part-3-of-5/> [<http://perma.cc/EMR2-HE8S>].

<sup>132</sup> Balough, *supra* note 101, at 170.

<sup>133</sup> QUINN, *supra* note 115, at B-7.

<sup>134</sup> *Id.* at 5.

<sup>135</sup> *Id.*; Balough, *supra* note 101, at 171; see also Leslie Scism & Mark Maremont, *Insurers Test Data Profiles to Identify Risky Clients*, WALL ST. J. (Nov. 19, 2010, 12:01 AM), <http://www.wsj.com/articles/SB10001424052748704648604575620750998072986> (“Life insurers are testing an intensely personal new use for the vast dossiers of data being amassed about Americans: predicting people’s longevity.”); Anthony O’Donnell, *Will Data Proliferation Foster Insurer/Customer Collaboration on Underwriting?*, INFORMATIONWEEK: INS. & TECH. (Nov. 19, 2010, 9:17 AM), <http://www.insurancetech.com/data-and-analytics/will-data-proliferation-foster-insurer-customer-collaboration-on-underwriting-/a/d-id/1312535?> [<http://perma.cc/T67L-K9M4>] (“Perhaps life and health insurance customers may similarly be motivated to enter into a kind of information transparency partnership whereby they enjoy better rates for demonstrating less risky behavior.”).

### III. PRIVACY LAWS: WHEN EXISTING LAWS MAY APPLY AND WHY SMART GRID-SPECIFIC RULES ARE NEEDED

#### A. Federal Privacy Laws: Potentially Applicable, But Likely Insufficient

Whether federal privacy laws will apply to the smart grid remains unclear “but regulatory efforts will likely increase as deployment of smart grid technology continues.”<sup>136</sup> During the preliminary stages of the development and deployment of smart grid technology, the federal government is likely to let individual states experiment with data privacy protection policies in a manner they see fit.<sup>137</sup> The Department of Energy (“DOE”) has recognized that states will continue to play their traditional leading roles in regulating the deployment of smart grid technologies, in addition to maintaining their responsibilities of regulating electric utilities and consumer privacy.<sup>138</sup> The following is an introduction to the federal statutes, regulations, or policies that could apply to the smart grid and an analysis of the reasons why they may be inadequate.<sup>139</sup>

#### 1. The Federal Privacy Act of 1974

The Federal Privacy Act of 1974 (“FPA”) provides general privacy safeguards under federal law and would protect smart meter data held by federal agencies, including federally-owned electric utilities.<sup>140</sup> The FPA states, in pertinent part, “No agency shall disclose any record which is contained in a system of records by any means of communication to any person, or to another agency, except pursuant to a written request by, or with

---

<sup>136</sup> David Munkittrick, *Smart Grid Technology Implicates New Privacy Concerns*, PROSKAUER ROSE LLP: PRIVACY L. BLOG (Mar. 30, 2012), <http://privacylaw.proskauer.com/2012/03/articles/data-privacy-laws/smart-grid-technology-implicates-new-privacy-concerns/> [<http://perma.cc/U2XW-VZTJ>].

<sup>137</sup> See U.S. DEP’T OF ENERGY, DATA ACCESS AND PRIVACY ISSUES RELATED TO SMART GRID TECHNOLOGIES 5–6 (2010) [hereinafter DOE PRIVACY REPORT], [http://energy.gov/sites/prod/files/gcprod/documents/Broadband\\_Report\\_Data\\_Privacy\\_10\\_5.pdf](http://energy.gov/sites/prod/files/gcprod/documents/Broadband_Report_Data_Privacy_10_5.pdf) [<http://perma.cc/5TVY-UGHR>]. FERC declined to explicitly adopt standards set by the National Institute of Standards and Technology relating to the smart grid, thereby leaving “the distribution of jurisdiction over the electric grid unchanged and postpone[ing] perhaps forever the threat of a federal/state power struggle over the Smart Grid’s foundation.” Eisen, *supra* note 1, at 54. “The Smart Grid will grow and evolve, without mandatory standards. FERC can limit its role to resolving conflicts between states if the states adopt incompatible technologies and standards.” *Id.* at 55.

<sup>138</sup> DOE PRIVACY REPORT, *supra* note 137, at 5–6 (“Our federal system of state and local governments was intended to provide opportunities to experiment so debates about the relative merits of differing approaches can be assessed by practical experience.”).

<sup>139</sup> See *infra* notes 140–175 and accompanying text.

<sup>140</sup> See Privacy Act of 1974, 5 U.S.C. § 552a (2012); BRANDON J. MURRILL ET AL., CONG. RESEARCH SERV., SMART METER DATA: PRIVACY AND CYBERSECURITY 3 (2012), <https://www.fas.org/sgp/crs/misc/R42338.pdf> [<https://perma.cc/XN5H-Z5SD>].

the prior written consent of, the individual to whom the record pertains.”<sup>141</sup> The FPA would only apply to federal agencies or federally-owned utilities, which primarily sell electricity to nonprofit electric utilities on the wholesale market rather than distribute electricity directly to consumers.<sup>142</sup> Because these utilities provide only about one percent of total sales of electricity to consumers, they may be unlikely to obtain significant amounts of consumer usage data, which is typically transmitted to distribution utilities.<sup>143</sup>

The Department of Homeland Security (“DHS”) has promulgated a list of Fair Information Practice Principles<sup>144</sup> based on the FPA, which is mirrored in a number of state privacy laws.<sup>145</sup> The principles, which govern the use of personally identifiable information, include: “Transparency, Individual Participation, Purpose Specification, Data Minimization, Use Limitation, Data Quality and Integrity, Security, and Accountability and Auditing.”<sup>146</sup> These tenets of privacy form the foundation of DHS’s policy for when a program or activity raises privacy concerns or involves the collection of personally identifiable information,<sup>147</sup> but as described in further detail below, they also serve as a reliable framework for future development of privacy policies relating to smart grid data.<sup>148</sup>

## 2. The Electronic Communications Privacy Act

If transmission of consumer usage data over the smart grid is considered an “electronic communication,” the Electronic Communications Privacy Act (“ECPA”) will be able to limit government interception.<sup>149</sup> But be-

<sup>141</sup> 5 U.S.C. § 552a(b).

<sup>142</sup> MURRILL ET AL., *supra* note 140, at 43 n.363.

<sup>143</sup> *Id.*

<sup>144</sup> See DOE PRIVACY REPORT, *supra* note 137, at 30–31 (discussing how other agencies, including the Federal Trade Commission, also have well-established privacy principles based on the FPA).

<sup>145</sup> Privacy Policy Guidance Memorandum from Hugo Teufel III, Chief Privacy Officer, U.S. Dep’t of Homeland Sec. 2 (Dec. 29, 2008) [hereinafter Teufel Memorandum], [http://www.dhs.gov/xlibrary/assets/privacy/privacy\\_policyguide\\_2008-01.pdf](http://www.dhs.gov/xlibrary/assets/privacy/privacy_policyguide_2008-01.pdf) [<http://perma.cc/ZZ9T-WPTZ>].

<sup>146</sup> *Id.* at 1.

<sup>147</sup> *Id.*

<sup>148</sup> See Chris King, *Smart Meter Privacy: Minnesota, California Regulators Watching Out for Consumers*, SIEMENS: SMART GRID WATCH (Jan. 18, 2013), <https://blogs.siemens.com/smartgridwatch/stories/696/> [<https://perma.cc/Y58S-4TXJ>] (“In this decision the CPUC relied mainly on existing privacy law, using the Fair Information Practice Principles which the U.S. Department of Homeland Security developed as its privacy framework.”).

<sup>149</sup> See 18 U.S.C. §§ 2510(12), 2511 (2012); MURRILL ET AL., *supra* note 140, at 23. “Electronic communication” under the ECPA is defined as: “[A]ny transfer of signs, signals, writing, images, sounds, data, or intelligence of any nature transmitted in whole or in part by a wire, radio, electromagnetic, photoelectronic or photooptical system that affects interstate or foreign commerce.” § 2510(12).

cause the ECPA permits interception of an electronic communication where *any* party to the communication has consented to such interception, for this information to be lawfully released to the government only the utility (as a party to the communication) needs to consent.<sup>150</sup> Because consumers do not necessarily have to approve this type of release, protections provided by the EPCA are likely to be insufficient to safeguard the identity of end users and their electricity use.<sup>151</sup>

### 3. The Stored Communications Act

The Stored Communications Act (“SCA”) would prevent unauthorized persons from accessing stored electronic communications,<sup>152</sup> but it would only apply if the electric utilities’ deployment of smart grid technology is considered analogous to providing an electronic communication service or a remote computing service.<sup>153</sup> An electronic communication service is defined by the SCA as any service that provides users “the ability to send or receive wire or electronic communications.”<sup>154</sup> It is not clear whether smart meters are accurately described as providing customers with “the ability to send or receive” communications.<sup>155</sup> The categorization of particular smart meter networks as electronic communication services may depend on a fact-specific inquiry as to the manner in which they are marketed, or the intended purposes of the transmissions.<sup>156</sup>

Whether a smart meter network could accurately be classified as a remote computing service would similarly be “fact-dependent.”<sup>157</sup> The SCA defines a remote computing service as computer storage or processing services that are provided to the public by means of an electronic communication system.<sup>158</sup> Therefore, “[I]f one of the features of a particular smart meter deployment is to give customers the ability to store or process their usage data, then it would appear to qualify as [a remote computing service].”<sup>159</sup>

---

<sup>150</sup> MURRILL ET AL., *supra* note 140, at 23.

<sup>151</sup> *See id.*

<sup>152</sup> 18 U.S.C. § 2701(a); MURRILL ET AL., *supra* note 140, at 24–25.

<sup>153</sup> MURRILL ET AL., *supra* note 140, at 25.

<sup>154</sup> 18 U.S.C. § 2510(15).

<sup>155</sup> MURRILL ET AL., *supra* note 140, at 25.

<sup>156</sup> *Id.*

<sup>157</sup> *Id.* at 27.

<sup>158</sup> 18 U.S.C. § 2711(2).

<sup>159</sup> MURRILL ET AL., *supra* note 140, at 27.

#### 4. The Computer Fraud and Abuse Act

Alternatively, the Computer Fraud and Abuse Act (“CFAA”) might apply to the smart grid by prohibiting the unlawful access of information from a computer used in interstate commerce.<sup>160</sup> A utility’s servers would likely be considered “computers” for the purposes of the CFAA,<sup>161</sup> as would advanced meters installed in homes,<sup>162</sup> and the smart grid would likely have an impact on interstate commerce.<sup>163</sup> Therefore, unauthorized access of data stored at the utility or accessed directly from smart meters would appear to be a violation of the CFAA.<sup>164</sup>

#### 5. Voluntary Code of Conduct for Smart Grid Customer Data Privacy

The DOE and the Federal Smart Grid Task Force<sup>165</sup> released a Voluntary Code of Conduct (“VCC”) in January 2015 to protect electricity customer data, including energy usage information collected via the smart grid.<sup>166</sup> As its name suggests, the VCC is not a law, but is intended to be voluntarily adopted by electricity distributors and third-party service providers.<sup>167</sup> Its purposes include: (1) To “encourage innovation while appropriately protecting the privacy and confidentiality of Customer Data,” (2) to “provide customers with appropriate access to their own Customer Data,” and (3) to ensure that utilities and third parties “do not infringe on or super-

<sup>160</sup> 18 U.S.C. § 1030(a); Munkittrick, *supra* note 136.

<sup>161</sup> 18 U.S.C. § 1030(e)(1). A computer for the purposes of the CFAA is “an electronic, magnetic, optical, electrochemical, or other high speed data processing device performing logical, arithmetic, or storage functions, and includes any data storage facility or communications facility directly related to or operating in conjunction with such device.” *Id.*

<sup>162</sup> *See id.*

<sup>163</sup> MURRILL ET AL., *supra* note 140, at 28 (“[I]n light of the significant role that energy utilities play in the modern economy, the smart meter network would also likely be considered to have an effect on interstate commerce, even if they operate entirely within one state.”).

<sup>164</sup> *See* 18 U.S.C. § 1030(a), (e); MURRILL ET AL., *supra* note 140, at 28.

<sup>165</sup> Energy Independence and Security Act of 2007 § 1301, 42 U.S.C. § 17381 (2012); *Federal Smart Grid Task Force*, OFFICE OF ELEC. DELIVERY & ENERGY RELIABILITY, <http://energy.gov/oe/technology-development/smart-grid/federal-smart-grid-task-force> [<http://perma.cc/729V-CUD2>]. The Federal Smart Grid Task Force was established under Title XIII of the Energy Independence and Security Act of 2007 and includes experts from eleven federal agencies, including the Department of Energy, the Department of Commerce, the Federal Energy Regulatory Commission, the Environmental Protection Agency, and the Department of State, among others. *Federal Smart Grid Task Force*, *supra*.

<sup>166</sup> *See* U.S. DEP’T OF ENERGY, VOLUNTARY CODE OF CONDUCT (VCC): FINAL CONCEPTS AND PRINCIPLES 1 (2015) [hereinafter VCC], [https://www.smartgrid.gov/files/VCC\\_Concepts\\_and\\_Principles\\_2015\\_01\\_08\\_FINAL\\_1.pdf](https://www.smartgrid.gov/files/VCC_Concepts_and_Principles_2015_01_08_FINAL_1.pdf) [<https://perma.cc/S78S-Y9P5>]; Press Release, White House Office of the Press Sec’y, Fact Sheet: Safeguarding American Consumers & Families (Jan. 12, 2015), <https://www.whitehouse.gov/the-press-office/2015/01/12/fact-sheet-safeguarding-american-consumers-families> [<http://perma.cc/YM6K-F56X>].

<sup>167</sup> VCC, *supra* note 166, at 1.

sede any law, regulation, or governance by any applicable federal, state, or local regulatory authority.”<sup>168</sup>

Although not binding, the VCC carefully balances concerns relating to customer data privacy, the release of this data to third parties to foster innovation, and its use by utilities:

In order to balance between utilities’ need to collect and use data and the privacy interests of customers, the VCC includes a customer consent structure based on: (i) Primary Purposes, for which no customer consent is necessary; and (ii) Secondary Purposes, which require customer consent before customer data can be used or disclosed.<sup>169</sup>

A primary purpose is one that is “reasonably expected by the customer,” such as using the aggregate data to set prices.<sup>170</sup> A secondary purpose is a use of customer data that is “materially different from the primary purpose and is not reasonably expected by the customer relative to the transactions or ongoing services provided to the customer.”<sup>171</sup> This includes providing the information to third parties, who can request access to customer data from service providers for secondary purposes.<sup>172</sup>

## 6. Federal Law Conclusion

Though the federal government will likely defer to the states’ regulatory authority, at least at the onset, there are numerous grounds that may establish federal jurisdiction.<sup>173</sup> But broad and consistent definitions of privacy-affecting information with respect to the smart grid are not generally in place at the federal level or within the utility industry.<sup>174</sup> Because current federal privacy laws may not explicitly reference the smart grid or statistics

---

<sup>168</sup> *Id.*

<sup>169</sup> Shelton L. Abramson, *Department of Energy, Federal Smart Grid Task Force Release Smart Grid Voluntary Code of Conduct to Address Data Privacy Concerns*, NAT’L L. REV. (Jan. 15, 2015), <http://www.natlawreview.com/article/department-energy-federal-smart-grid-task-force-release-smart-grid-voluntary-code-co> [<http://perma.cc/B3UV-J3WM>]; see VCC, *supra* note 166, at 1.

<sup>170</sup> See VCC, *supra* note 166, at 4.

<sup>171</sup> *Id.*

<sup>172</sup> *Id.*

<sup>173</sup> See DOE PRIVACY REPORT, *supra* note 137; Munkittrick, *supra* note 136.

<sup>174</sup> SMART GRID INTEROPERABILITY PANEL, SMART GRID CYBERSEC. COMM., GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 1—SMART GRID CYBERSECURITY STRATEGY, ARCHITECTURE, AND HIGH-LEVEL REQUIREMENTS 21 (2014) [hereinafter GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 1], <http://nvlpubs.nist.gov/nistpubs/ir/2014/nist.ir.7628r1.pdf> [<http://perma.cc/69FX-35TP>].

that come from it, some states have begun to develop laws focused expressly on this data.<sup>175</sup>

### *B. State Privacy Laws and Applicability to the Smart Grid*

Some states have begun to attack the issue of privacy on the smart grid, but where no laws expressly apply to this context, existing privacy laws may be pertinent.<sup>176</sup> California was one of the first states to pass a law directly applicable to data tracked by smart meters.<sup>177</sup> The state's model was guided in part by the Department of Homeland Security's Fair Information Practice Principles, discussed above.<sup>178</sup> Utilities that are owned by their investors in California "are prohibited from selling usage data for any purpose and from sharing the usage data without the customer's consent."<sup>179</sup> The state's Public Utilities Commission ("PUC") will have jurisdiction over third parties who obtain data, whether received when providing services to utilities or when authorized by consumers.<sup>180</sup> The PUC's decision asserts its belief that it has jurisdiction over at least some of these third parties to enforce compliance with the privacy and data security regulations it has promulgated.<sup>181</sup>

Some of these third parties that receive usage data automatically from a consumer's smart meter must be registered with the PUC.<sup>182</sup> As a prerequisite of the regulations, they must show that customers have consented to the use of their information and that the third party is in compliance with the PUC's requirements for protecting consumer data.<sup>183</sup> Other third parties that do not automatically receive data directly from smart meters are not subject to the PUC's jurisdiction, but the commission held that utilities must provide customers with information about the potential dangers and privacy

<sup>175</sup> *Id.*

<sup>176</sup> SMART GRID INTEROPERABILITY PANEL, CYBER SEC. WORKING GRP., GUIDELINES FOR SMART GRID CYBER SECURITY: VOL. 2, PRIVACY AND THE SMART GRID 7 (2010) [hereinafter GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2], [http://www.boeing.com/assets/pdf/defense-space/support/energy/docs/nistir-7628\\_vol2.pdf](http://www.boeing.com/assets/pdf/defense-space/support/energy/docs/nistir-7628_vol2.pdf) [<http://perma.cc/8EEU-W5CZ>].

<sup>177</sup> Munkittrick, *supra* note 136.

<sup>178</sup> King, *supra* note 148.

<sup>179</sup> Munkittrick, *supra* note 136.

<sup>180</sup> King, *supra* note 148.

<sup>181</sup> *Future of Privacy Summary of California Public Utilities Commission Proposed Decision on Smart Grid Privacy and Security*, FUTURE OF PRIVACY FORUM (May 9, 2011), <http://www.futureofprivacy.org/2011/05/09/future-of-privacy-summary-of-california-public-utilities-commission-proposed-decision-on-smart-grid-privacy-and-security> [<http://perma.cc/4XK4-P29S>]. These rules were subsequently passed. Press Release, Cal. Pub. Utils. Comm'n, CPUC Adopts Rules to Protect the Privacy and Security of Customer Electricity Usage Data (July 28, 2011), [http://docs.epuc.ca.gov/PUBLISHED/NEWS\\_RELEASE/140316.htm](http://docs.epuc.ca.gov/PUBLISHED/NEWS_RELEASE/140316.htm) [<http://perma.cc/T7TS-4VK6>].

<sup>182</sup> Press Release, Cal. Pub. Utils. Comm'n, *supra* note 181.

<sup>183</sup> *Id.*

issues inherent in sharing energy usage data with third parties.<sup>184</sup> This framework also would not involve the PUC in monitoring what consumers choose to do with their own data.<sup>185</sup>

Illinois may also adopt an “Open Data Access Framework,” which would determine ownership of collected energy usage data.<sup>186</sup> If passed into law, the framework would prescribe that customers are the principal owners of electric consumption data, whereas the utility serves as the guardian of the data.<sup>187</sup> Customers would have the ability to authorize third parties to access this data, or to revoke that access, and the utility must allow access to third parties where the customer has authorized it.<sup>188</sup> The framework “sets a minimum state regulatory standard to ensure customers can quickly obtain smart-meter data in convenient, user-friendly formats, either directly from the electric meter itself or through the internet, a web portal, or mobile applications.”<sup>189</sup>

In contrast, a law passed in Oklahoma stipulates that the usage data generated by the smart grid may be used for an electric utility’s own internal business purposes, such as marketing energy-related products or services, promoting environmental initiatives, or simply providing services in an effective and efficient manner.<sup>190</sup> As a basic service, the electric utility must provide customers access to their data.<sup>191</sup> Although the utility must protect the consumer’s confidentiality, it may disclose identifiable usage data to third parties without the customer’s consent if the third parties assist the utility in providing services and carrying out business objectives.<sup>192</sup>

Massachusetts’ state privacy law will be paramount as the state deploys its grid modernization plan.<sup>193</sup> The Massachusetts Department of Public Utilities (“DPU”) notes in its June 2014 order that “grid modernization activities are beginning in other states and, therefore . . . companies in Massachusetts will likely not be the first to address cybersecurity measures re-

<sup>184</sup> *Id.*

<sup>185</sup> *Id.*

<sup>186</sup> ENVTL. DEF. FUND & CITIZENS UTIL. BD., OPEN DATA ACCESS FRAMEWORK 1 (n.d.), [http://blogs.edf.org/energyexchange/files/2014/08/14-\\_\\_\\_\\_-CUB-EDF-Exhibit-1-1-Open-Data-Access-Framework-FINAL.pdf](http://blogs.edf.org/energyexchange/files/2014/08/14-____-CUB-EDF-Exhibit-1-1-Open-Data-Access-Framework-FINAL.pdf) [<http://perma.cc/LVU5-PAXP>]; see Mica Odom & Jim Chilsen, *New Standard Would Give IL Customers the Right to Easily Access Their Energy Data*, ENVTL. DEF. FUND (Aug. 18, 2014), <https://www.edf.org/media/new-standard-would-give-il-customers-right-easily-access-their-energy-data> [<http://perma.cc/2ASL-DMP5>].

<sup>187</sup> ENVTL. DEF. FUND & CITIZENS UTIL. BD., *supra* note 186, at 1.

<sup>188</sup> *Id.*

<sup>189</sup> Odom & Chilsen, *supra* note 186.

<sup>190</sup> OKLA. STAT. tit. 17, § 710.4 (2015).

<sup>191</sup> *Id.*

<sup>192</sup> *Oklahoma State House Passes Smart Grid Privacy Bill*, INFO. LAW GRP. (Mar. 23, 2011), <http://www.infolawgroup.com/2011/03/articles/privacy-law/oklahoma-state-house-passes-smart-grid-privacy-bill/> [<http://perma.cc/6L3H-JK7Q>].

<sup>193</sup> See GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2, *supra* note 176, at 7.



lated to these activities and should learn from other states' experience."<sup>194</sup> The Commonwealth will have some preexisting models to emulate or alter, as necessary, to conform to particular circumstances, but in large part Massachusetts has the opportunity to be at the forefront of smart grid privacy law.<sup>195</sup>

The state's existing data security law may serve as a foundation for laws associated with smart grid data, but it requires added consumer protection in the smart grid context.<sup>196</sup> Massachusetts' data privacy regulations became effective in March 2010, and are among the most protective in the country.<sup>197</sup> The Office of Consumer Affairs and Business Regulation ("OCABR") promulgated a regulation setting standards for the protection of personal information of Massachusetts residents.<sup>198</sup> This regulation states that "[e]very person that owns or licenses personal information about a resident of the Commonwealth" acquired in connection with employment or with the provision of goods or services to a Massachusetts resident has a duty to protect that information.<sup>199</sup> Any service provider that acquires this type of sensitive information is required to establish "physical, administrative and technical security measures" to protect the information, in addition to developing a written security program that outlines those measures.<sup>200</sup> Businesses must also take reasonable steps to ensure that third-party service providers are in compliance with the regulations and must require—by contract—that such service providers implement security measures.<sup>201</sup> Title 93H, section 3 of the Massachusetts General Laws was subsequently passed to compel businesses who handle personal information to inform Massa-

<sup>194</sup> D.P.U. 12-76-B, *supra* note 4, at 35.

<sup>195</sup> *See id.*

<sup>196</sup> GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2, *supra* note 176, at 7 ("However, even though Federal or State laws may not definitively reference the Smart Grid at this time, it is possible that existing laws may be amended to explicitly apply to the Smart Grid as . . . it is more widely implemented and touches more individuals.").

<sup>197</sup> *See* 201 MASS. CODE REGS. § 17.03 (2015); David Governo & Corey Dennis, *Businesses Nationwide Continue to Grapple with Massachusetts Data Privacy Laws*, THE INT'L ASS'N OF PRIVACY PROF'LS (Nov. 1, 2012), <https://iapp.org/news/a/2012-11-01-businesses-nationwide-continue-to-grapple-with-massachusetts> [<https://perma.cc/RH4X-EMXW>].

<sup>198</sup> *See* 201 MASS. CODE REGS. § 17.03; Electronic Letter from George K. Weber, Dir., Div. of Prof'l Licensure, to Those Who Receive, Store, Maintain, Process or Have Access to Personal Information About Any Resident of the Commonwealth (Feb. 2, 2010), <http://www.mass.gov/ocabr/government/oca-agencies/dpl-lp/re-compliance-with-201-cmr-1700-standards.html> [<http://perma.cc/288H-4LU2>] (regarding compliance with 201 MASS. CODE REGS. § 17:00).

<sup>199</sup> 201 MASS. CODE REGS. §§ 17.02–.03.

<sup>200</sup> Governo & Dennis, *supra* note 197.

<sup>201</sup> *Id.*

chusetts residents in the event of a data security breach, in addition to informing the Attorney General's office and OCABR.<sup>202</sup>

Massachusetts' definition of personal information, however, is limited to a person's first and last name in combination with any of the following: "(a) Social Security number; (b) driver's license number or state-issued identification card number; or (c) financial account number, or credit or debit card number . . . ." <sup>203</sup> It is unlikely that electricity consumption information would fall within any one of these categories, even if it is released in conjunction with identifying information.<sup>204</sup> By the express language of the statute, identifying information such as energy usage data coupled with a specific residential address would not be covered.<sup>205</sup> But protection of this kind of information will be essential to encouraging the development of smart grid technology.<sup>206</sup> It would appear, then, that the existing data privacy law in Massachusetts may be too narrow to protect consumer data in the smart grid context.<sup>207</sup> It will be necessary to strike a proper balance between zealously protecting sensitive consumer data on the one hand and enabling its use on the other, both when consumers consent to its release and when utilities employ it for primary purposes, such as ratemaking.<sup>208</sup>

DPU notes in its order that in an effort to promote the competitive electricity market, the Department of Telecommunications and Energy ("DTE") previously mandated certain practices concerning the protection

<sup>202</sup> MASS. GEN. LAWS ch. 93H, § 3 (2015) ("A person or agency that maintains or stores, but does not own or license data that includes personal information about a resident of the commonwealth, shall provide notice . . . when such person or agency (1) knows or has reason to know of a breach of security . . . to the owner or licensor in accordance with this chapter."); Governo & Dennis, *supra* note 197.

<sup>203</sup> 201 MASS. CODE REGS. § 17.02. Massachusetts' Data Protection Regulation was passed "on the heels of the most significant data breach in history at the time." *Massachusetts Data Protection Regulation*, INTRONIS, <http://www.intronis.com/cloud-backup-resources/ebooks-whitepapers/massachusetts-data-protection-regulation/> [<http://perma.cc/68QN-D2SL>]. "In 2007, TJX Companies, based in Framingham, Mass., announced a data breach in which hackers exposed at least 45.7 million credit and debit card holders to identity fraud." *Id.* Though the regulation is a powerful one for this purpose, its scope may be too narrow to handle smart grid privacy. *See id.*

<sup>204</sup> *See* 201 MASS. CODE REGS. § 17.02.

<sup>205</sup> *See id.*

<sup>206</sup> Adam James, *Hottest Issues in Smart Grid, Part 1: Data Access Versus Security*, CLIMATEPROGRESS (Dec. 6, 2011, 7:48 AM), <http://thinkprogress.org/climate/2011/12/06/382603/smart-grid-data-access-security/> [<http://perma.cc/QU25-MH5G>].

<sup>207</sup> *See* 201 MASS. CODE REGS. § 17.02; *see also* GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 1, *supra* note 174, at 21 (noting that Massachusetts' data breach notice law protects specific personal information, but not that created by smart grid data: "For all organizations that handle energy usage data, the sharing and storage capabilities that the smart grid network brings to bear creates the need to protect not only the items specifically named within existing laws, but in addition to protect new types of personal information that are created using smart grid data.").

<sup>208</sup> *See* VCC, *supra* note 166, at 4; *see also* James, *supra* note 206.

and release of customer electricity usage data.<sup>209</sup> These procedures were designed to ensure customer privacy, to allow customers to request the collection of their interval usage data, and to monitor the release of this information to competitive electricity suppliers.<sup>210</sup> In this earlier order, DTE decided to institute an “opt out” program.<sup>211</sup> Customers could request that their interval usage data not be released automatically to competitive electricity suppliers or electricity brokers, but otherwise it would be transmitted to these parties.<sup>212</sup> At the time, DTE was addressing concerns that were similar to those currently raised by smart meters: “For a small number of commercial and industrial customers, information regarding their electricity usage may reveal information about the customers’ business practices and operations that they consider proprietary. Other customers may consider the information to be private.”<sup>213</sup> Although it considered an “opt in” program that would require customer authorization prior to the release of their usage information, the department ultimately chose the “opt out” program due to the burden it believed an alternative system would place on the market: “An opt-out program will minimize the affirmative actions a customer must take, thereby increasing the likelihood these customers will be able to benefit from an active competitive market.”<sup>214</sup>

DPU recognizes that these practices and procedures from the 2001 order must be adapted to ensure that, with the modernization of the grid, customer information remains private.<sup>215</sup> The smart grid presents privacy issues substantially dissimilar from those posed by the grid as it existed in 2001, and although this previous regulation may form a basis on which future policies can be built, it will likely be insufficient to adequately protect consumer information moving forward.<sup>216</sup>

#### IV. PROPOSALS FOR MASSACHUSETTS’ SMART GRID PRIVACY POLICY MOVING FORWARD

In its 2014 order, the Massachusetts Department of Public Utilities (“DPU”) directed electric distribution companies to address: (1) how cus-

<sup>209</sup> D.P.U. 12-76-B, *supra* note 4, at 34–35; MASS. DEP’T OF TELECOMMS. & ENERGY, INVESTIGATION BY THE DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY ON ITS OWN MOTION INTO COMPETITIVE MARKET INITIATIVES, D.T.E. 01-54-A, at 9–13 (2001) [hereinafter D.T.E. 01-54-A], [http://www.energymarketers.com/Documents/Order\\_on\\_Phase\\_I\\_Competitive\\_Markets.PDF](http://www.energymarketers.com/Documents/Order_on_Phase_I_Competitive_Markets.PDF) [<http://perma.cc/SQ69-NAMF>].

<sup>210</sup> D.P.U. 12-76-B, *supra* note 4, at 35; D.T.E. 01-54-A, *supra* note 209, at 10.

<sup>211</sup> D.T.E. 01-54-A, *supra* note 209, at 10–12.

<sup>212</sup> *Id.*

<sup>213</sup> *Id.* at 11–12.

<sup>214</sup> *Id.* at 12.

<sup>215</sup> See D.P.U. 12-76-B, *supra* note 4, at 35.

<sup>216</sup> See *id.*; GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2, *supra* note 176, at 7.

tomers will be provided access to their consumption data in a way that can be easily understood; (2) the procedures for allowing an authorized third party to access customer usage data with the customer's permission; and (3) procedures for making aggregate usage data available to third parties and ensuring that it cannot be linked to any individual customer.<sup>217</sup> In proposing a potential privacy policy that adequately addresses these concerns, it will be helpful to analyze each of these requirements in light of other existing policies and Massachusetts' own laws.<sup>218</sup> Because Massachusetts' data privacy laws are so comprehensive,<sup>219</sup> new laws directed at data gleaned from smart meters should be very protective of consumer information, as well.<sup>220</sup>

### A. Smart Grid Data Should Belong to the Customer, Not the Utility

To provide customers with access to data relating to their energy consumption in an understandable format, Massachusetts would be well served to take the advice disclosed in Illinois' proposed Open Data Access Framework.<sup>221</sup> As previously mentioned, the framework advocates a policy that would make data of this sort belong to the customer, with the utility acting as a guardian of the data.<sup>222</sup> This construction would allow customers to become more involved in their own energy use and would ideally lead to greater conservation because customers, seeking to save money, would enhance their efficiency.<sup>223</sup> This proposal also suggests that the data should be available in as short intervals as possible, and real-time if accessed directly from the smart meter.<sup>224</sup> When customers are enabled to control their own energy usage and are given access to this data quickly and easily, "[T]hey are also empowered to use less electricity and save money on their utility bills—which, in turn, reduces harmful carbon pollution."<sup>225</sup> Massachusetts' privacy policy should make it explicit that this information belongs to the

---

<sup>217</sup> GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2, *supra* note 176, at 36.

<sup>218</sup> *See id.* at 7.

<sup>219</sup> GINA STEVENS, CONG. RESEARCH SERV., DATA SECURITY BREACH NOTIFICATION LAWS 4 (2012), <https://www.fas.org/sgp/crs/misc/R42475.pdf> [<https://perma.cc/4US2-WXWW>] ("The Massachusetts security breach and data destruction law and security regulations are considered to 'constitute one of the most comprehensive sets of general security regulations yet seen at the state level.'").

<sup>220</sup> *See* 201 MASS. CODE REGS. § 17.03 (2015); STEVENS, *supra* note 219, at 4; Governo & Dennis, *supra* note 197.

<sup>221</sup> *See* ENVTL. DEF. FUND & CITIZENS UTIL. BD., *supra* note 186, at 1.

<sup>222</sup> *Id.*; *see supra* note 187 and accompanying text.

<sup>223</sup> Odom & Chilsen, *supra* note 186.

<sup>224</sup> ENVTL. DEF. FUND & CITIZENS UTIL. BD., *supra* note 186, at 1, 3.

<sup>225</sup> Odom & Chilsen, *supra* note 186.

customer and not the utility to provide the safeguards necessary to engender public trust in this technology.<sup>226</sup>

Of course, aggregated data must be freely used by the utility and/or competitive electricity supplier selected by the consumer to set prices, but this data would not be put to use to identify the specific habits of any one electric customer or household.<sup>227</sup> Third parties could then negotiate with utilities for access to aggregated data to develop their technologies, while also providing services to individuals who seek out the specific functions of these technologies.<sup>228</sup> Whereas certain types of personally identifiable information are very sensitive and should never be released—like bank account information—consumers must understand that their usage data will in actuality be viewed by the utility in the aggregate.<sup>229</sup> Only the consumers will have the ability to release their specific data to third parties.<sup>230</sup> Appropriately striking the balance between who will have access to this information and how difficult it will be for each party to acquire it will be essential to a properly functioning smart grid network.<sup>231</sup>

### *B. Third Party Use of Data Must Be Strictly Regulated to Protect Consumers*

The procedures for allowing a third party to access customer usage data with the customer's permission should similarly take into consideration California's approach to smart grid privacy.<sup>232</sup> Just as the California Public Utilities Commission asserts its jurisdiction over third parties when they receive information directly from a consumer's smart meter, Massachusetts should impose its privacy regulations on third parties whenever possible to protect customers from improper usage.<sup>233</sup> Some issues with jurisdiction may arise if the third parties receive usage information from the consumer instead of automatically receiving it from the smart meter.<sup>234</sup> In those situations, the Commonwealth may decide to allow customers to exercise their

<sup>226</sup> See NAT'L SCI. & TECH. COUNCIL, *supra* note 106 ("Consumer trust is essential to the success of smart grid technologies, and protecting the privacy of smart grid related data is one crucial component of strengthening this trust.").

<sup>227</sup> See James, *supra* note 206.

<sup>228</sup> *Id.*

<sup>229</sup> D.P.U. 12-76-B, *supra* note 4, at 36 ("Customer aggregate data may be shared but only after Department-approved procedures are in place to ensure that such data cannot be linked to specific customers."); see James, *supra* note 206.

<sup>230</sup> James, *supra* note 206.

<sup>231</sup> *Id.*

<sup>232</sup> See *Future of Privacy Summary of California Public Utilities Commission Proposed Decision on Smart Grid Privacy and Security*, *supra* note 181.

<sup>233</sup> See *id.*

<sup>234</sup> See *id.*

discretion in releasing their data, since the utilities could likely not extend the privacy policy to cover the third party, as well.<sup>235</sup> But just as the Massachusetts data security law says that businesses must take reasonable steps to ensure that third-party service providers are in compliance with regulations, similarly strict guidelines should be imposed if utilities contract with third parties to analyze data.<sup>236</sup> Utilities as well as third parties must be subject to stringent regulations in the smart grid context, just like any other business dealing with sensitive consumer information in Massachusetts.<sup>237</sup>

By allowing usage data to be available to third-party service providers, DPU likely intends to increase interest and investment by these companies, encouraging further growth of the smart grid and enhancing its effectiveness.<sup>238</sup> Third-party energy information management service providers, for example, could obtain the information necessary for the provision of their respective services without paying rents to the utility simply to act as an intermediary between the third party and the consumer.<sup>239</sup> As a general rule, personal information should be aggregated or anonymized wherever possible to limit the potential for inadvertent release of this information.<sup>240</sup> Though this consumer usage data will be available in the aggregate, however, DPU still notes the necessity of protecting individual consumers' identities and preventing any attempt to identify an individual through the use of this aggregated data.<sup>241</sup>

### *C. Fair Information Practice Principles Should Be Explicitly Adopted to Promote Uniformity*

A plan that intends to protect consumer data of this type should be guided by, or at least take into consideration, the Department of Homeland Security's Fair Information Practice Principles ("FIPPs").<sup>242</sup> Although smart

<sup>235</sup> *See id.*

<sup>236</sup> *See* 201 MASS. CODE REGS. § 17.03(f) (2015); Governo & Dennis, *supra* note 197.

<sup>237</sup> *See* 201 MASS. CODE REGS. § 17.03.

<sup>238</sup> D.P.U. 12-76-B, *supra* note 4, at 5, 36 ("Access to data will allow third parties, whether competitive electricity suppliers, demand response aggregators, or other service providers, to develop and market innovative products to offer to consumers and allow ISO-NE to evaluate and manage the regional electric system more effectively."); *see* MASS. DEP'T OF PUB. UTILS., INVESTIGATION BY THE DEPARTMENT OF PUBLIC UTILITIES ON ITS OWN MOTION INTO MODERNIZATION OF THE ELECTRIC GRID, D.P.U. 12-76-A, at 37 (2013) [hereinafter D.P.U. 12-76-A], <http://www.mass.gov/eea/docs/dpu/electric/12-76-a-order.pdf> [<http://perma.cc/7D2W-NLSH>].

<sup>239</sup> *See* QUINN, *supra* note 115, at 14.

<sup>240</sup> *See* GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2, *supra* note 176, at 41.

<sup>241</sup> D.P.U. 12-76-A, *supra* note 238, at 37; D.P.U. 12-76-B, *supra* note 4, at 36.

<sup>242</sup> *See* Teufel Memorandum, *supra* note 145, at 2; *see also* NAT'L SCI. & TECH. COUNCIL, *supra* note 106, at 46 ("State and Federal regulators should consider, as a starting point, methods to ensure that consumers' detailed energy usage data are protected in a manner consistent with

grid data is different from personally identifiable information protected by the FIPPs, data of this type typically raises the same concerns.<sup>243</sup> An approach that aims to integrate comprehensive FIPPs would protect consumers' privacy in a manner that is compatible with broader energy management policies, and would also likely make Massachusetts' privacy policy more consistent with those of other states.<sup>244</sup> The Obama administration has also stated that it supports legislation that would make FIPPs the baseline for protecting personal data in commercial sectors that "are not currently subject to sector-specific [f]ederal privacy statutes, which could include energy usage data."<sup>245</sup>

As stated previously, FIPPs include: Transparency, Individual Participation, Purpose Specification, Data Minimization, Use Limitation, Data Quality and Integrity, Security, and Accountability and Auditing.<sup>246</sup> The transparency requirement as it pertains to smart meter data would mainly direct the electric distribution company to inform consumers regarding collection, use, dissemination, and maintenance of energy usage information, whenever it is necessary for any of those measures to be taken.<sup>247</sup> Individual participation refers to the process of requesting consumer consent prior to any release of usage data, in addition to providing means for the consumer to access and correct any personal information the utility keeps on file, should it be erroneous.<sup>248</sup>

Consumers should also understand the choices available to them, and have the "option to forgo data collection and services that are not related to the core services provided by" the distribution company.<sup>249</sup> Although consumers "may not have a choice about collection necessary for load balancing, electricity customers should have the option to prohibit utilities from collecting information about their appliances for marketing uses."<sup>250</sup>

---

Fair Information Practice Principles and develop, as appropriate, approaches to address particular issues unique to energy usage.").

<sup>243</sup> See DOE PRIVACY REPORT, *supra* note 137, at 31 ("Though the DHS FIPPs pertain only to [personally-identifiable information], they . . . consist of several core principles pertaining to the collection and use of the data collected."); Letter from Tracey B. Steiner, Senior Corp. Counsel, Nat'l Rural Elec. Coop. Ass'n, to U.S. Dep't of Energy 9 (July 12, 2010), [http://energy.gov/sites/prod/files/gcprod/documents/RuralElectricCoop\\_Comments\\_DataAccess.pdf](http://energy.gov/sites/prod/files/gcprod/documents/RuralElectricCoop_Comments_DataAccess.pdf) [<http://perma.cc/T5TV-7JXW>].

<sup>244</sup> NAT'L SCI. & TECH. COUNCIL, *supra* note 106, at 47.

<sup>245</sup> *Id.* at 46.

<sup>246</sup> See Teufel Memorandum, *supra* note 145, at 1; *supra* note 146 and accompanying text.

<sup>247</sup> See Teufel Memorandum, *supra* note 145, at 3.

<sup>248</sup> *See id.*

<sup>249</sup> GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2, *supra* note 176, at 41.

<sup>250</sup> *Id.* at 41 n.86.

The distribution company should also specify its purpose in collecting usage data.<sup>251</sup> In accomplishing the goals of collecting data to set prices and evaluate peak load, the distribution company should use the minimum amount of data required and only store that data for as long as is necessary.<sup>252</sup> The concept of “use limitation” is similar, meaning that the data should only be used for purposes previously stipulated to by the distribution company.<sup>253</sup> To preserve the quality and integrity of this data, the distribution company must ensure that it is “accurate, relevant, timely, and complete.”<sup>254</sup> The distribution company must impose the necessary security guidelines to protect “against risks such as loss, unauthorized access or use, destruction, modification, or unintended or inappropriate disclosure.”<sup>255</sup>

Finally, accountability and auditing will make the distribution company more accountable for complying with the FIPPs by providing training to all employees and to third parties who use consumer usage data, and by auditing the actual use of this data to demonstrate compliance with the FIPPs and all other applicable privacy requirements.<sup>256</sup>

#### *D. Breach Notification Requirements Must Be Instituted to Keep the Public Informed*

A hallmark of Massachusetts’ smart grid privacy policy should be open and honest communication between the public, utilities, and distribution companies to ensure transparency and predictability with the use of electricity usage information.<sup>257</sup> This should include educating the public about the privacy risks within the smart grid and what they as consumers can do to mitigate them.<sup>258</sup> The utilities must also disclose what type of information is being collected, how often, how the customer can access this information, and when the data may be released to an outside party.<sup>259</sup> This structure must be founded on informing customers and ensuring that they have fully consented to the collection and use of their sensitive information.<sup>260</sup>

In furtherance of this goal, strict breach notification laws should be instituted that mirror those of Massachusetts data security law.<sup>261</sup> Whenever security breaks down, or information is leaked for whatever reason, the public has

<sup>251</sup> See Teufel Memorandum, *supra* note 145, at 3.

<sup>252</sup> See *id.* at 4; Cameron, *supra* note 57.

<sup>253</sup> See Teufel Memorandum, *supra* note 145, at 3.

<sup>254</sup> See *id.*

<sup>255</sup> See *id.*

<sup>256</sup> *Id.*

<sup>257</sup> See GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2, *supra* note 176, at 42.

<sup>258</sup> *Id.*

<sup>259</sup> See VCC, *supra* note 166, at 5–6.

<sup>260</sup> See *id.* at 7.

<sup>261</sup> See MASS. GEN. LAWS ch. 93H, § 3 (2015); VCC, *supra* note 166, at 11.



a right to know of such a failure.<sup>262</sup> These laws should require that the electricity distributor provide “complete, accurate, and timely notice to customers” when their data has been compromised, and also lay out the remedies to rectify those conditions which led to the breach.<sup>263</sup>

### CONCLUSION

The arrival of the smart grid in Massachusetts presents exciting opportunities for conservationists, electricity distribution companies, and consumers alike, as well as difficult decisions regarding the use and circulation of information generated by this new technology. Data regarding a residence’s daily electricity use, possibly available in real-time, would allow anyone with access to this information to comprehend the minute details of individuals’ routines and whereabouts. At the same time, advanced metering systems would enable consumers of electricity to gain a better understanding of their own habits, hopefully leading to a greater awareness of consumption and a push toward enhanced efficiency. It would also unburden utilities, which currently struggle to sustain electricity when demand reaches its peak. The smart grid, along with the information that comes from the requisite advanced meters, could lead to a more sustainable energy grid that benefits various segments of society.

Perhaps now, more than in any point in the history of the United States, citizens are concerned and distrustful of the manner in which the government is allowed to access sensitive personal information. The new data available through the onset of the smart grid would no doubt be tempting to law enforcement and policymakers. This data may present new opportunities never before available to track illegal activity and curb irresponsible electricity use.

Massachusetts must ensure that prior to the full realization of its grid modernization project, adequate privacy safeguards are in place to mollify critics of this new system. This new privacy policy should take into consideration Massachusetts’ existing data privacy laws and prior regulations aimed at protecting electricity customers’ personal information. It should also evaluate the merits of other states’ efforts to address privacy concerns presented by the smart grid, while striving to develop a policy that closely aligns with previously successful tenets of privacy law, such as the Department of Homeland Security’s Fair Information Practice Principles. The foundations of this policy should ultimately be transparency and open communication with the public to safeguard against malicious uses of this new data and to protect against public rejection of the smart grid.

---

<sup>262</sup> See GUIDELINES FOR SMART GRID CYBERSECURITY: VOL. 2, *supra* note 176, at 24.

<sup>263</sup> See VCC, *supra* note 166, at 11.