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The Introduction of Smart Meters in Ireland: Privacy Implications and the Role of Privacy by Design

Introduction

The debate surrounding the introduction of water meters in Ireland has been fraught for many reasons. An interesting facet of the debate has been the concern expressed by many regarding the data protection policy of Irish Water.¹ Even though legislation was amended in order to provide Irish Water with a legal basis to request the Personal Public Service Numbers (PPS numbers) of all customers,² the opacity of Irish Water's data protection notice and the reference to possible data transfers to third parties led to data protection issues becoming a particular source of contention.³ Following widespread protest against the introduction of water meters, various conciliatory steps were taken.⁴ In addition to the well-covered government reduction in water rates, Irish Water reconsidered its data protection policy and revised its Data Protection Notice.⁵ Under the new policy, PPS numbers would no longer be required as a part of customer

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1. Aoife Carr, 'Data Commissioner Looks at Irish Water Policy after Queries' *The Irish Times* (Dublin, 10 September 2014) <www.irishtimes.com/news/ireland/irish-news/data-commissioner-looks-at-irish-water-policy-after-queries-1.1923168> accessed 12 June 2015.
 2. Social Welfare and Pensions Act 2014; Noel Whelan, 'Irish Water's PPS Demand was Pushed through after Two-minute Debate at Dáil Subcommittee' *The Irish Times* (Dublin, 31 October 2014) <www.irishtimes.com/news/politics/irish-water-s-pps-demand-was-pushed-through-after-two-minute-debate-at-dail-subcommittee-1.1982418?page=2> accessed 12 June 2015.
 3. For example, the original data protection notice stated that 'Irish Water may disclose the Customer's data to third parties in the event that it sells or buys any business or assets, in which case it may disclose Customer data to the prospective seller or buyer or such business or assets; if Irish Water or substantially all of its assets are acquired by a third party, in which case Customer data held by it about its Customer will be one of the transferred assets.' Daragh O'Brien, 'Irish Water Data Protection Notice: A Review' (*The DOBlog*, 6 September 2014) <<http://obriend.info/2014/09/06/irish-water-data-protection-notice-a-review/>> accessed 12 June 2015.
 4. Sarah Stack, 'People Power Has Won Major Concessions but Campaign Continues' *Irish Independent* (Dublin, 19 November 2014) <www.independent.ie/irish-news/water/irish-water-crisis/people-power-has-won-major-concessions-but-campaign-continues-right2water-30758318.html> accessed 12 June 2015.
 5. Sue Murphy, 'Can't Pay or Won't Pay? Irish Water will Decide which Category You're In' *Newstalk* (Dublin, 19 November 2014) <<https://www.newstalk.ie/LIVE:-Government>>

applications and PPS numbers that had already been collected by Irish Water were to be deleted 'as soon as practicable' in accordance with a protocol developed in consultation with the Office of the Data Protection Commissioner (DPC).⁶ Considering the early concerns expressed by data protection experts, it is clear that consultation with these experts and earlier consideration of privacy interests would have not only saved Irish Water criticism, but would also have saved significant time and resources.⁷ In view of the fact that another national infrastructural roll-out is planned in the shape of smart meters, it is a pertinent time to consider the approach the government and regulators should be embracing in order to avoid unnecessary breaches of personal rights. This article discusses how a full embrace of privacy by design principles could not only help avoid the type of controversy generated by the Irish Water data protection policy, but could also help achieve the goals of the smart meter roll-out while protecting individual privacy and personal data rights.

Smart Grids and Smart Meters

Due to increased energy demands, environmental imperatives, and the general aging of much of the world's electrical grid infrastructure, it is widely accepted that there is a growing need to modernise the mode of electrical supply and develop new 'smart grids'.⁸ While there are numerous definitions of the term 'smart grid', the EU Commission Task Force for Smart Grids defines the term as an electricity network that can

efficiently integrate the behaviour and actions of all users connected to it – generators, consumers and those that do both – in order to ensure economically efficient, sustainable power system with low losses and high levels of quality and security of supply and safety.⁹

-announcement-on-water-charges> accessed 12 June 2015; Irish Water, 'Data Protection Notice' (*Water.ie*) <www.water.ie/data-protection-notice/> accessed 12 June 2015.

6. Irish Water, 'Data Removal Plan' (*Water.ie*) <www.water.ie/data-protection-notice/data-removal-plan/> accessed 12 June 2015.
7. Daragh O'Brien, 'Irish Water and PPSN data' (*The DOBlog*, 30 September 2014) <obriend.info/2014/09/30/irish-water-and-ppsn-data/> accessed 12 June 2015; Daragh O'Brien, 'Irish Water – A Case Study in Data Governance and Data Protection' (*Castlebridge Associates*, 22 September 2014) <castlebridge.ie/blog/2014/09/22/irish-water-case-study-data-governance-and-data-protection> accessed 12 June 2015; TJ McIntyre, 'Watering Down Data Protection' (*IT Law in Ireland*, 2 October 2014) <www.tjmcintyre.com/2014/10/watering-down-data-protection.html> accessed 12 June 2015.
8. Costas Efthymiou and Georgios Kalogridis, 'Smart Grid Privacy via Anonymization of Smart Metering Data' in *Proceedings of First IEEE International Conference on Smart Grid Communications (SmartGridComm)* (IEEE 2010) 238.
9. Task Force for Smart Grids, *Expert Group 1: Functionalities of Smart Grids and Smart Meters* (2010) 6.

Put simply, the smart grid represents 'an evolution of the existing electricity grid with added monitoring, analysis, control and communication capability to maximize the efficiency of the electricity system.'¹⁰ A key aim of smart grids is to enable energy suppliers to implement dynamic pricing in response to changes in supply and demand.¹¹

The widespread adoption of smart meters is seen as an essential element in the creation of a successful smart grid.¹² Even though smart meters represent just one aspect of a smart grid, the successful roll-out of smart meters has been described as the 'essential first step' towards the creation of that grid. The connection of smart meters to smart grids could potentially aid better management of the energy supply, particularly through enabling energy conservation and managing renewable energy sources.¹³ From a consumer perspective, smart meters will represent the most immediate and apparent aspect of the new energy infrastructure.¹⁴ While there is no universally accepted definition of 'smart meter',¹⁵ the Commission for Energy Regulation (CER) identifies the crucial feature of the device when it states that smart meters 'work by communicating with you and your energy provider giving a view of actual energy usage'. Essentially, smart meters enable the communication of data without the need for home visits or customer self-reporting; smart meters allow for two-way communication by informing

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10. Sustainable Energy Authority of Ireland, 'Renewable Energy – Case Studies: Where Is Ireland Going?' (*SEAI.ie*) <http://www.seai.ie/Schools/Post_Primary/Subjects/Home_Economics_LC/Renewable_Energy_Case_Studies/#sthash.7xsHmiec.dpuf> accessed 12 June 2015.
 11. Nancy King, 'Smart Metering Systems and Data Sharing: Why Getting a Smart Meter Should also Mean Getting Strong Information Privacy Controls to Manage Data Sharing' (2014) 22 *IJLIT* 215, 220; Office of Electricity Delivery and Energy Reliability, 'Demand Response' (*Energy.gov*) <<http://energy.gov/oe/technology-development/smart-grid/demand-response>> accessed 12 June 2015.
 12. Efthymiou and Kalogridis (n 8) 238; Arthur Rosenfeld, Douglas Bulleit, and Robert Peddie, 'Smart Meters and Spot Pricing: Experiments and Potential' 5(1) *IEEE Technology and Society Magazine* (1986) 23.
 13. King (n 11) 217 referencing Simone Pront-van Bommel, 'Smart Energy Grids within the Framework of the Third Energy Package' [2011] *EEELR* 32, 33; Paul Joskow, 'Creating a Smarter US Electricity Grid' (2012) 26 *Journal of Economic Perspectives* 29, 30; European Data Protection Supervisor, *Opinion of the European Data Protection Supervisor on the Commission Recommendation on Preparations for the Roll-out of Smart Metering Systems* (2012) 4; Russell Frisby and Jonathan Trotta, 'The Smart Grid: The Complexities and Importance of Data Privacy and Security' (2011) 19 *CommLaw Conspectus* 297, 297, 305.
 14. Sonia McNeil, 'Privacy and the Modern Grid' (2011) 25 *Harv J L & Tech* 199, 200; Ann Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (Privacy by Design 2012) 5 <www.privacybydesign.ca/content/uploads/2012/04/pbd-smartmeters-europe.pdf> accessed 12 June 2015.
 15. Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 6.

consumers of their energy use and communicating this information back to the suppliers and other relevant parties.¹⁶ While traditional meters recorded usage and could be read manually by the employees of electricity suppliers, smart meters transmit customer usage information automatically.

Through the automatic communication of energy usage to energy providers, smart meters increase efficiency by eliminating the need for in-person meter readings and increase certainty by eliminating the practice of billing customers based on estimated usage.¹⁷ By removing the need for home visits, the feasibility of increased usage reporting becomes clear. In contrast to the analogue model of energy reading and reporting, the use of smart meters allows for a huge increase in the frequency of communications between the consumer and other relevant parties.¹⁸ Smart meter technology makes almost real-time communication possible, with some smart meters reporting information in intervals of five minutes.¹⁹ Generally, the term smart meter also implies additional functionality for consumers. An oft-cited benefit of smart meters is that access to detailed information regarding consumption patterns encourages better energy management and energy savings.²⁰ Among the benefits claimed is the enablement of consumers to reduce their bills by shifting their energy use away from peak consumption times.²¹

Data Implications of Smart Metering

As smart meters increase the frequency of communication between the consumer and other parties, the use of smart meters also increases the amount of consumer data that is generated. Smart meters collect a much larger amount of data and that data can be used for many more purposes than traditional meters. One estimate puts the increase in the amount of data collected with the introduction of

16. Article 29 Data Protection Working Party, *Opinion 12/2011 on Smart Metering* (00671/11/EN, 2011) 6.

17. *ibid* 3.

18. *ibid* 6.

19. A Cavoukian, 'Privacy by Design... Take the Challenge' (Information and Privacy Commissioner of Ontario 2009) <<http://www.privacybydesign.ca/content/uploads/2010/03/PrivacybyDesignBook.pdf>>; A Molina-Markham and others, 'Private Memoirs of a Smart Meter' in *Proceedings of the 2nd ACM Workshop on Embedded Systems for Energy-Efficiency in Building Pages (Build Sys '10)* (ACM 2010) 61, 61 <<http://dl.acm.org/citation.cfm?id=1878446>> accessed 12 June 2015.

20. Bord Gáis, 'Smart Metering Solution' (*Bord Gáis Networks*) <www.bordgaisnetworks.ie/en-ie/about-us/our-commitment/marketplace/smart-meters/> accessed 12 June 2015.

21. CER, *CER National Smart Metering Programme Smart Metering High Level Design Decision Paper* (CER/14/046, 2014) 4. See also Article 29 Data Protection Working Party, *Opinion 12/2011 on Smart Metering* (n 16) 3.

smart metering at up to eight orders of magnitude.²² With the regular collection of personal data, the creation of individual profiles is facilitated.²³ Such profiling can be particularly powerful when carried out with the benefit of data mining and supplemental customer information, such as age or sex.²⁴ The European Data Protection Supervisor's (EDPS) Opinion on Smart Meters stated:

with the sheer amount of information that is being amassed by these smart meters, ubiquitous availability of data from other sources, and advances in data mining technology, the potential for extensive data mining is very significant. Patterns can be tracked at the level of individual households but also for many households, taken together, aggregated, and sorted by area, demographics, and so on. Profiles can thus be developed, and then applied back to individual households and individual members of those households.²⁵

In addition to enabling the identification of when the person is at home, when the person sleeps, and whether the person uses a suspiciously high amount of energy, the analysis of an individual's data has surprising high profiling potential. For example, a German research group has shown the potential for such data sets to be used in order to identify what television programmes an individual watches.²⁶ It has also been pointed out that the kind of data that is collected by smart meters also has implications for sensitive legal disputes. For example, certain usage patterns may indicate that a parent occasionally leaves their child unsupervised in the home. This information would have clear pertinence in an antagonistic custody dispute.²⁷

The European Union and Smart Meters

The European Union has identified the roll-out of smart meters across the EU as an important element in its attempt to achieve a sustainable energy supply for Europe by 2020.²⁸ Article 13 of the Directive on Energy End-Use Efficiency and

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22. Accenture, 'Accenture Launches Smart Grid Data Management Solution to Reduce Risks and Costs of Smart Grid Deployments' (*Accenture Newsroom*, 18 March 2010) <http://newsroom.accenture.com/article_display.cfm?article_id=4971> accessed 12 June 2015; Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 7.
23. K Doran, 'Climate Change and the Future of Energy: Privacy and Smart Grid: When Progress and Privacy Collide' (2010) 41 *Toledo L Rev* 909, 910.
24. King (n 11) 227; L Costa and Y Poullet, 'Privacy and Regulation of 2012' (2012) 28(3) *CLS Rev* 254.
25. European Data Protection Supervisor (n 13) 5; King (n 11) 228.
26. Ulrich Greveler, B Justus, and D Loehr, 'Multimedia Content Identification Through Smart Meter Power Usage Profiles' (Computer Security Lab Münster University of Applied Sciences 2012) <https://epic.org/privacy/smartgrid/smart_meter.pdf> accessed 12 June 2015.
27. Ian Brown, 'Britain's Smart Meter Programme: A Case Study in Privacy by Design' (2014) 28 *IRLCT* 172, 174.
28. Article 29 Data Protection Working Party, *Opinion 12/2011 on Smart Metering* (n 16) 1–2. It is important to note, however, that due to privacy concerns about mandatory

Energy Services obliges Member States to provide consumers with meters that 'accurately reflect their energy consumption and provide information on actual time of use'.²⁹ In fact, the European Union aims for smart metering to be used by 80 per cent of customers by 2020.³⁰ The implications of this target figure are even more striking when you consider the fact that practically every individual requires access to electricity. Along with the increase in the amount of personal data that is generated and collected, the use of smart meters also introduces additional data controllers to the process than were involved under the analogue model of monitoring electricity use.³¹ The vast increase in the amount of data being collected, stored, and used as a result of the replacement of traditional meters with smart meters calls for an assessment of the data protection and privacy implications of the technology.

The Article 29 Working Party³² was conscious of this need and produced a report on smart meters in 2011.³³ Crucially, the Working Party made it clear that the use of smart meters involves the processing of personal data under

smart meters, the EDPS has recommended that consumers should have the option to either retain their traditional meter or to disable the additional functionalities offered by the smart meter European Data Protection Supervisor (n 13) 11. In response to a public outcry, the Dutch government has guaranteed the right of Dutch customers to refuse the installation of smart meters: Ariel Bleicher, 'Privacy on the Smart Grid' (*IEEE Spectrum*, 5 October 2010) <spectrum.ieee.org/energy/the-smarter-grid/privacy-on-the-smart-grid> accessed 12 June 2015.

29. Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC [2006] OJ L114/64. See also Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC [2012] OJ L315/1.
30. Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC [2009] OJ L211/91.
31. With the introduction of smart meters, third-party service providers, energy regulators, and communications providers may also have to manage personal information generated by smart meters. Article 29 Data Protection Working Party, *Opinion 12/2011 on Smart Metering* (n 16) 8–10. Additional parties who may be interested in gaining access to this new data source include the police, revenue investigators, insurance companies, landlords, and marketers. King points out that the 'the extent of third party requests for smart meter data and potential secondary uses of smart meter data cannot yet be fully anticipated' (n 11) 229; Angelique Carson, 'Consumer Data Privacy Concerns Persist in Smart Grid Plans' (*The Privacy Advisor*, 21 November 2011) <<https://privacyassociation.org/news/a/smart-grid-v2-0-now-with-more-privacy/>> accessed 12 June 2015.
32. The Article 29 Working Party is comprised of representatives from the data protection authority of each Member State, the European Data Protection Supervisor, and the European Commission.
33. Article 29 Data Protection Working Party, *Opinion 12/2011 on Smart Metering* (n 16).

the Data Protection Directive.³⁴ According to the Working Party, personal data that may be processed as a result of smart meter operation includes the unique smart meter ID, meta-data referring to the configuration of the smart meter, and meter readings.³⁵ As this information will often be associated with unique identifiers, the use of smart meters raises questions about how the personal data should be processed.³⁶ Article 7 of the Data Protection Directive provides six possible grounds on which the processing of personal data can be deemed lawful and the Working Party has, in its 2011 Opinion, identified five possible grounds for lawful processing in the specific context of smart metering. The grounds identified by the Working Party include consent, contract, performance of a task carried out in the public interest or in the exercise of official authority, legal obligation, and legitimate interests.³⁷

On the ground of consent, the Working Party was quick to point out that consent will only be valid where the consent is fully informed.³⁸ A particularly important aspect of consent in the smart metering context is the importance of granular consent. Where a service offers a number of different functionalities, one exercise of consent should not be used to legitimise unrelated purposes.³⁹ An equally important aspect of consent is the importance of revocability. In order to ensure that consent is genuine, it should be reasonably convenient to revoke consent where desired. The Working Party has suggested that the design of the household control panel could address this issue by enabling 'push button' consent for consumers in a readily accessible manner.⁴⁰ With the continued development of technologies like smart meters and the wider Internet of Things, it is clear that the act of obtaining true fully informed consent will require businesses to engage in continued dialogue with consumers.⁴¹ This dialogue should keep consumers informed on how their data is being used

34. *ibid* 7.

35. *ibid*.

36. Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data [1995] OJ L281/31, art 6.

37. Article 29 Data Protection Working Party, *Opinion 12/2011 on Smart Metering* (n 16) 11–15.

38. *ibid* 12. The European Data Protection Supervisor has recommended that 'freely given, specific, informed and explicit consent be required for all processing that goes beyond processing required for (i) the provision of energy, (ii) the billing thereof, (iii) detection of fraud consisting of unpaid use of the energy provided, and (iv) preparation of aggregated data necessary for the energy-efficient maintenance of the grid (forecasting and settlement)' European Data Protection Supervisor (n 13) 11.

39. Article 29 Data Protection Working Party, *Opinion 12/2011 on Smart Metering* (n 16) 12.

40. *ibid*.

41. *ibid*; Article 29 Data Protection Working Party, *Opinion 8/2014 on the Recent Developments on the Internet of Things* (14/EN, 2014) 7.

and should notify consumers when technological advances enable their data to be used in new ways.

Privacy by Design

Privacy by design has been described as a 'systematic approach to designing any technology that embeds privacy into the underlying specifications or architecture'.⁴² Privacy by design is more than 'a single principle or concept' and is actually comprised of seven foundational principles that represent a comprehensive and proactive privacy solution.⁴³ In practice, application of the privacy by design approach requires:

1. Recognition that privacy interests and concerns must be addressed proactively;
2. Application of core principles expressing universal spheres of privacy protection;
3. Early mitigation of privacy concerns when developing information technologies and systems, throughout the entire information life cycle – end to end;
4. Need for qualified privacy leadership and/or professional input;
5. Adoption and integration of privacy-enhancing technologies (PETs);
6. Embedding privacy in a positive-sum (not zero-sum) manner so as to enhance both privacy and system functionality; and
7. Respect for users' privacy.⁴⁴

While privacy by design originated from the Office of the Information and Privacy Commissioner of Ontario, Canada, the principle has subsequently been recognised as 'an essential component of fundamental privacy protection' by the International Data Protection and Privacy Commissioners' conference.⁴⁵ Accordingly, it is now a 'global standard' that is seen as particularly important

42. Ira Rubinstein, 'Regulating Privacy by Design' (2011) 26 Berkeley Tech LJ 1410, 1411–1412; Ann Cavoukian, *Privacy by Design* (Information and Privacy Commissioner 2009) 1 <<http://www.ipc.on.ca/images/Resources/privacybydesign.pdf> > accessed 12 June 2015.

43. Letter from Ann Cavoukian to European Commission (13 January 2011) <ec.europa.eu/justice/news/consulting_public/0006/contributions/public_authorities/ipc_info_and_privacy_comm_ca_en.pdf> accessed 12 June 2015.

44. Cavoukian, *Privacy by Design* (n 42) 1.

45. Data Protection Commissioners of the Federation and of the Länder, *Resolution of the 80th Conference of the Data Protection Commissioners of the Federation and of the Länder: Data Protection in Connection with Digital Metering and Control of Energy Consumption* (2010) <http://www.datenschutz-berlin.de/attachments/823/Appendix_2.pdf> accessed 12 June 2015; Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 2.

in the climate of continued technological innovation.⁴⁶ From the European perspective, the Article 29 Working Party has stated that the implementation of smart metering 'should take place with privacy built in at the start, not just in terms of security measures, but also in terms of minimising the amount of personal data processed'.⁴⁷ Similarly, the EDPS supports the implementation of 'data protection by design' in the smart meter context.⁴⁸ Furthermore, the proposed Data Protection Regulation requires the adoption of privacy by design and by default.⁴⁹ Under Article 23 of the proposed regulation, data controllers will be required to consider privacy and data protection at the design level and 'implement appropriate technical and organisational measures and procedures in order to protect the rights of the data subject'.⁵⁰ Regardless of impending reforms, Brown points out that a privacy by design requirement is already implied by Article 17 of the current Data Protection Directive, which requires data controllers to 'implement appropriate technical and organisational measures to protect personal data against accidental or unlawful destruction or accidental loss, alteration, unauthorized disclosure or access'.⁵¹ The application of privacy by design is particularly valuable when devising basic infrastructure programmes – like smart grids – as the replacement, retrofitting, or revision of such programmes has the potential to be extremely and perhaps, prohibitively, costly.⁵²

Irish Implementation of Smart Meter Roll-out

CER is the body with primary responsibility for implementing the national roll-out of smart meters in Ireland.⁵³ In conjunction with the Department of Communications, Energy and Natural Resources, CER set up the National Smart

46. Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 2.

47. Article 29 Data Protection Working Party, *Opinion 12/2011 on Smart Metering* (n 16).

48. European Data Protection Supervisor (n 13) 6.

49. Commission, 'Proposal for a Regulation of the European Parliament and of the Council on the Protection of Individuals with Regard to the Processing of Personal Data and on the Free Movement of such Data (General Data Protection Regulation)' COM (2012) 11 final.

50. *ibid* art 23. Crucially, in a sector so defined by continuous technological and societal change, the proposed regulation would also empower the Commission to lay down technical standards and specify additional criteria and requirements through the adoption of delegated Acts. COM (2012) 11, art 23(3)(4).

51. Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data [1995] OJ L281/31; Brown (n 27) 176.

52. Brown (n 27) 176.

53. European Union (Energy Efficiency) Regulations 2014, SI 2014/426 gives effect to Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC [2012] OJ L315/1.

Metering Programme (NSMP) in late 2007.⁵⁴ Due to the complexity and scale of the programme, it is unsurprising that the roll-out of smart meters in Ireland is a phased process. During the first phase of the roll-out, a cost–benefit trial was carried out and in 2012 a decision was made to introduce smart meters to all residential and business consumers. The second phase of the roll-out began in January 2013 and has been described as the ‘high level design and procurement phase.’⁵⁵ The NSMP has recently entered the third phase of ‘detailed design and procurement’⁵⁶ and the fourth ‘build and test’ phase is due to begin before 2018.⁵⁷ In line with EU goals, the CER timeline currently plans for the fifth and final phase of deployment to be completed by 2020.⁵⁸

The basic premise of privacy by design is that data protection and privacy questions are considered from the earliest stages in the design process and post hoc consideration of important details will not be faithful to this principle. It is important to note that the DPC praised the approach adopted by CER in a 2011 statement that assessed the smart metering consultation process as being ‘very comprehensive.’⁵⁹ The DPC commended CER for recognising that the ‘consumer is the ultimate owner of their energy data and that data protection should be paramount in smart metering.’⁶⁰ In spite of this endorsement, it seems that CER was slow to appreciate the importance of privacy by design in the early stages of the smart metering programme. In a consultation paper published in July 2013, CER outlined five key design principles that were to guide the smart meter design process.⁶¹ The principle of privacy by design was strikingly absent from this list.⁶² Following criticism, CER acknowledged the need to incorporate the principles of ‘privacy by design’ and ‘security by design.’⁶³ In spite of this,

54. CER, *CER National Smart Metering Programme Smart Metering High Level Design Decision Paper* (n 21) 4.

55. *ibid.*

56. *ibid.* 5.

57. *ibid.*

58. *ibid.*

59. Office of the Data Protection Commission, *Smart Metering Consultation: Comments of the Office of the Data Protection Commissioner* (2011) 1 <[http://www.cer.ie/docs/000142/cer12004\(ii\).pdf](http://www.cer.ie/docs/000142/cer12004(ii).pdf)> accessed 12 June 2015.

60. *ibid.*

61. CER, *National Smart Metering Programme Steady State Model Consultation Paper* (CER/13/151, 2013) 19–20; CER, *National Smart Metering Programme High Level Design – Appendix A (Core Design) Decision Paper* (CER/14/046A, 2014) 6.

62. The five design principles listed were ‘consumer focussed’, ‘consistent and integrated design’, ‘scalable and future proofed’, ‘cost efficient’, and ‘Irish market context’, *ibid.*

63. In comments submitted in response to the SSM Consultation Paper, Opower stated that ‘[e]mbedding “privacy by design” principles is critical to managing risks when rolling out a system that handles personally identifiable data. Such principles seek to protect data ex-ante before breaches occur, rather than responding to them after the fact.’ Opower, ‘Opower Comments on the CER National Smart Metering Programme, Steady State Model Consultation Paper’ (CER.ie, 27 August 2013) <<http://www.cer>

the latest decision paper calls into question whether an integrative approach has actually been taken in the interim. For example, while an appendix to CER's 2014 decision paper⁶⁴ asserted that privacy was an 'inherent consideration', the design principles of privacy and security were, once again, omitted from the evaluation criteria.⁶⁵

Part of the problem appears to be a failure on behalf of CER to truly appreciate the function of privacy by design. A project cannot be deemed in accordance with privacy by design principles on the basis of a box-ticking approach to compliance.⁶⁶ The approach of CER suggests that future application of privacy by design principles will be sufficient. This reactive approach – that relies on the formulation of privacy solutions once a significant proportion of design decisions have already been made – indicates some misunderstanding of the proactive nature of privacy by design. The decision made by CER to postpone in-depth consideration of privacy by design principles to a later stage in the design process might be explained by a disconnect between those who design systems and privacy professionals. For example, it has been suggested that engineers are sometimes hesitant to engage with lawyers on privacy issues as some engineers 'have the perception that lawyers only say no'.⁶⁷ In order to ensure the appropriate technical implementation of privacy by design principles, such issues need to be considered at the high level design stage where 'architectural decisions around data processing, transfer, and storage can still be made'.⁶⁸

The assertion by CER that 'the data protection work stream is actively engaged in the design process balancing the legitimate privacy concerns of

ie/docs/000117/cer13151(2).pdf> accessed 12 June 2015. Following a review of the responses to the SSM Consultation paper, CER recognised the need to include privacy by design as a design principle. CER, *National Smart Metering Programme High Level Design – Appendix A (Core Design) Proposed Decision Paper* (CER/13/286A, 2013) 8.

64. This appendix dealt with the PAYG Customer Experiences. CER, *National Smart Metering Programme High Level Design – Appendix D (Pay As You Go) Decision Paper* (CER/14/046D, 2014).

65. The appendix only details how the five design criteria identified in July 2013 were used to evaluate the customer experience scenario, CER, *National Smart Metering Programme High Level Design – Appendix D (Pay As You Go) Decision Paper* (CER/14/046D, 2014) 8–9.

66. As pointed out by Gurses, Troncoso, and Diaz, if a checklist approach to privacy by design is popularised 'privacy by design is likely to become fuzzy and elastic enough to be applied to any system'. Seda Gurses, Carmela Troncoso, and Claudia Diaz, 'Engineering Privacy by Design' (Conference on Computers, Privacy & Data Protection, Brussels, 2011) <<https://www.cosic.esat.kuleuven.be/publications/article-1542.pdf>> accessed 12 June 2015.

67. Michelle Finneran Denny, Jonathan Fox, and Thomas Finneran, *The Privacy Engineer's Manifesto: Getting from Policy to Code to QA to Value* (Apress 2014) 108.

68. Sarah Spiekermann, 'The Challenges of Privacy by Design' (2012) 55(7) *Communications of the ACM* 38, 39.

consumers with the provision of data amongst stakeholders to achieve the goals of the NSMP' is not as reassuring as it might first appear. For one thing, framing the question as one of 'balance' suggests a weighing of competing interests in a manner that contradicts a core tenet of privacy by design. Privacy by design was formulated as a 'positive-sum' solution that would not rely on trade-offs between privacy rights and other goals. Instead the goal is to seek a solution that maximises the goals of both.⁶⁹ Privacy by design rejects the 'zero-sum paradigm' which characterises privacy as an 'impediment standing in the way of innovation and desired goals.'⁷⁰ Basic features of the privacy by design approach include the minimisation of unnecessary collection and use of personal data, the strengthening of data security, and the empowerment of individuals to control their own information. None of these features should result in the hindrance of any legitimate goals of innovation and if full cognisance of privacy by design is taken from the outset, a 'win-win' outcome can be achieved.⁷¹

In October 2014, CER released a decision paper detailing decisions made regarding the high level design of the smart metering programme.⁷² Issues discussed in the decision paper include the smart metering architecture and information flow between the energy provider and consumer, the design of the high-level regulatory framework to support the introduction of time-of-use charging, and the provision of energy information to customers.⁷³ An important output of the October decision paper was the provision by CER of a 'core design' model, which CER has determined best delivers the objectives of smart metering.⁷⁴ A key design choice detailed in the October document is the decision to support the 'collection and provision of half hourly interval consumption data by networks to suppliers on a daily basis.'⁷⁵ The core design also facilitates the provision of consumption data to third parties⁷⁶ and supports the provision of real-time data to consumers over the Utility Home Network Area, where it is feasible.⁷⁷ From the perspective of consumer empowerment, the minimum

69. Ann Cavoukian, 'Privacy and Radical Pragmatism: Change the Paradigm' (Information and Privacy Commissioner 2008) 16 <http://www.ipc.on.ca/images/Resources/radicalpragmatism_1.pdf> accessed 12 June 2015.

70. *ibid.*

71. *ibid.*

72. As this decision paper has been held to represent the core conclusions of the high level design phase and will provide the basis for the smart meter procurement process, analysis of the paper from a data protection and privacy standpoint is essential. CER, *CER National Smart Metering Programme Smart Metering High Level Design Decision Paper* (n 21) 2, 6.

73. *ibid.*

74. CER, *CER National Smart Metering Programme Smart Metering High Level Design Decision Paper* (n 21) 10.

75. *ibid.*

76. CER, *National Smart Metering Programme High Level Design – Appendix A* (n 61) 11.

77. *ibid.*

information requirements owed to consumers are considerable under the core design model.⁷⁸ In addition to requiring the provision of a regular 'smart bill' detailing energy use, customers will also be entitled to an in-home display providing real-time access to information related to their energy consumption as well as access to an Internet-based interface providing non-real time information, which could be used for longer-term analysis purposes or shared with third parties.⁷⁹

CER has expressed clear intent to incorporate data protection considerations into the smart meter design process. In spite of this laudable intention, the fact that CER is characterising the privacy question as one of balance between the interests of privacy concerned consumers and the goals of the smart metering programme suggests that CER has not fully embraced the principle of privacy by design. Accordingly, it is necessary to offer some suggestion as to how the principle of privacy by design can be realised in the smart meter design process. As the documents published by CER do not clearly indicate how the privacy implications of data collected at half-hourly intervals will be managed,⁸⁰ it is an opportune time to consider what best practice entails. In the aforementioned comments made by the DPC in 2011,⁸¹ the DPC expressed concern at the provision of half-hourly interval data and stated that the Office was not 'aware of the basis for the acceptance of this interval'.⁸²

In order to correctly implement privacy by design, CER must engage in a 'fundamental requirements analysis' in order to determine what information collection is necessary and not merely 'beneficial'.⁸³ It is important to note that one of the most vaunted benefits of smart meters – the empowerment of consumers to better manage their electricity use – can be provided without any communication of consumption data beyond the walls of a consumer's home.⁸⁴

78. *ibid* 13.

79. *ibid*.

80. The Core Design assumes that the interval consumption data will be accessible to networks, suppliers, and third parties on a nightly basis. CER asserts that the full definition of the legitimate uses of the granular data and the mechanisms through which suppliers can access the data will be defined in the next phase. CER, *National Smart Metering Programme High Level Design – Appendix A* (n 61) 11.

81. Office of the Data Protection Commission (n 58).

82. *ibid*.

83. Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 6. Cavoukian references the five-step process for privacy by design that is described by Gürses, Troncoso and Diaz: 1) Functional Requirements Analysis; 2) Data Minimisation; 3) Modelling Attackers, Threats and Risks; 4) Multilateral Security Requirements Analysis; 5) Implementation and Testing of Design. S Gürses, C Troncoso, and C Diaz, 'Engineering Privacy by Design' in *Proceedings of Computers, Privacy & Data Protection (CPDP) Conference* (Brussels, 2011) <<https://www.cosic.esat.kuleuven.be/publications/article-1542.pdf>> accessed 12 June 2015.

84. CER, *CER National Smart Metering Programme Smart Metering High Level Design Decision Paper* (n 21) 13.

In fact, this functionality could be provided by a stand-alone device that reports usage to the consumer through a digital screen.⁸⁵ Accordingly, the external transmission of individualised consumption information is really only necessary for billing purposes. This statement does not ignore the benefits that interval data offers for energy management and the smart grid and does not dismiss the commonly held industry position that the 'use of interval data by all industry participants is essential to the delivery of the objectives and benefits of smart metering'.⁸⁶

A useful model for how the benefits of smart metering can be achieved, without excessive collection of individualised data, is provided in the work of Kursawe, Danezis, and Kohlweiss.⁸⁷ These researchers concluded that the primary benefits of a smart metering system do not require the external communication of individual consumption data and the provision of aggregate consumption data for a specified area is sufficient.⁸⁸ In line with this reasoning, the researchers developed a solution that would enable the collection of useful consumption data that could be aggregated in such a way that avoided unnecessary interference with individual privacy.⁸⁹ A benefit of aggregating consumer data is that data can be collected at a higher level of granularity without raising additional privacy concerns. The adoption of such a system provides an example of how CER should be considering approaches that meet the fundamental goals of smart meters, but also pay due heed to the principle of minimisation. More broadly, this example serves as an illustration of why CER should consider further integrating the principles of privacy by design into its design process in an effort to identify positive-sum solutions for different interests.⁹⁰ It is vitally important that such consideration is carried out at the earliest stages in the design process as any delay may require the revision of technical specifications and result in unnecessary expenditure of resources. Furthermore, the earlier in the design process that privacy issues are factored

85. Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 16.

86. This statement was made by ESB Networks, which is a subsidiary of ESB Group and operates the electricity-distribution system in Ireland. CER, *National Smart Metering Programme High Level Design – Appendix A* (n 61) 11.

87. Klaus Kursawe, George Danezis, and Markulf Kohlweiss, 'Privacy-Friendly Aggregation for the Smart-Grid' in Simone Fischer-Hübner and Nicholas Hopper (eds), *Proceedings of the 11th Privacy Enhancing Technologies Symposium* (Waterloo, July 2011) <<http://research.microsoft.com/pubs/146092/main.pdf>> accessed 12 June 2015. For further discussion of their work see Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 19.

88. Kursawe, Danezis, and Johlweiss (n 87); Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 17.

89. Kursawe, Danezis, and Johlweiss (n 87); Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 17.

90. Kursawe, Danezis, and Johlweiss (n 87); Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 21.

in, the more effective the solution can be as a much broader range of options are available to the designers.⁹¹

Conclusion

Data protection considerations are introduced on page 21 of the October 2014 Decision Paper and are discussed for less than 200 words.⁹² The decision paper expresses CER's commitment to data protection and its intention to 'protect consumer privacy and confidentiality'. CER also plans to develop 'a coherent data access and privacy framework to underpin the arrangements for access to data, with simple rules for suppliers, networks and third parties'.⁹³ Instead of describing the existing work on the issue, however, CER simply concludes that it will continue to consult in the next phase of the programme.⁹⁴ Similarly, while CER acknowledges that end-to-end security of the smart metering system is of 'paramount importance', the assertion that CER will work with industry stakeholders to ensure security is unsatisfying.⁹⁵ While industry consultation is important, at this stage in the process CER should have a clear plan to ensure that security is at the forefront of design considerations.⁹⁶ Even though security requirements may evolve as the programme progresses, best practice would invite broader consultation on these issues now. This is especially the case as the next phase of the process includes procurement. The danger with postponing more open engagement is that key, yet sub-optimal, security decisions may already have been made. Due to legitimate considerations of cost and practicality, the further along CER gets in the design process, certain solutions will be ruled out without due consideration.

When implementing such a large scheme that will impact every individual, it is important that the approach taken is holistic and forward-looking and not one of mere compliance. While the CER team may be engaging in a good-faith effort to factor in privacy by design principles, the reality is that with such limited transparency, the public cannot be so confident. Before Irish Water revised its data protection policy, the body repeatedly asserted that it was fully compliant with data protection law.⁹⁷ In the face of public scrutiny, Irish Water was forced to backtrack, re-evaluate, alter its policy, and delete a significant amount

91. Brown (n 27) 176.

92. CER, *CER National Smart Metering Programme Smart Metering High Level Design Decision Paper* (n 21) 21.

93. *ibid.*

94. *ibid.*

95. *ibid.*

96. *ibid.*

97. Órla Ryan, 'Here's what Irish Water Say They'll Do with your PPS Number' *The Journal.ie* (Dublin, 7 October 2014) <www.thejournal.ie/irish-water-pps-numbers-2-1711561-Oct2014/> accessed 12 June 2015; D O'Brien, 'Irish Water - A Case Study in Data Governance and Data Protection' (n 7).

of information.⁹⁸ This is precisely the type of situation that privacy by design principles are intended to prevent. While the heated political environment surrounding water charges might make the relative opacity of the smart meter design stages understandable, the opposite position might also be argued. The poor quality communication between Irish Water and its customers merely increased dissatisfaction with PPS number collection, and it is suggested that CER would be wise to learn from that misstep.⁹⁹

Brown has discussed how the most significant gap between the design of the UK smart metering programme and the principles of privacy by design was the 'lateness of serious consideration of privacy issues in the process'.¹⁰⁰ Notably, several key design decisions regarding the system architecture for smart meters in the UK had been 'provisionally made' before serious consideration of privacy issues had occurred.¹⁰¹ While the engagement by CER with the DPC is to be praised, it is vital that CER does not rest its legitimacy on consultation with a regulatory authority with limited resources and technical expertise in the specific field of smart metering. Once again, it is notable that Irish Water also touted its 'ongoing engagement' with the DPC in defence of its data protection policy.¹⁰²

While it has been argued that it is never too late to build in privacy, it is clear that best practice calls for privacy to be built in at the earliest possible point.¹⁰³ Complacency is a real risk in this area. New technologies, with many claimed benefits, may seem unthreatening and a general force for good. As society become more accustomed to personal monitoring – whether through the tracking of location through GPS enabled mobile phones or the tracking of daily steps through *FitBit* bands – smart meters have an immediate familiarity and the appeal of the new. When considering how to regulate for any new technology, however, it is important to take a forward-looking view, and acknowledge that technology has the potential to develop in many new and surprising ways.¹⁰⁴

98. Irish Water, 'Data Removal Plan' (n 5); D O'Brien, 'Irish Water – A Case Study in Data Governance and Data Protection' (n 7).

99. *ibid.*

100. Brown (n 27) 180.

101. *ibid.*

102. Rónán Duffy, 'Irish Water Will Be Asking for your PPS Number and They'll Be Doing So "Within Weeks"' *The Journal.ie* (Dublin, 15 July 2014) <www.thejournal.ie/irish-water-pps-numbers-1571854-Jul2014/> accessed 12 June 2015; Elaine Edwards and Kitty Holland, 'Data Commissioner to Review Details Sought by Irish Water' *The Irish Times* (Dublin, 14 July 2014) <www.irishtimes.com/news/consumer/data-commissioner-to-review-details-sought-by-irish-water-1.1865800> accessed 12 June 2015.

103. Cavoukian, 'Smart Meters in Europe: Privacy by Design at its Best?' (n 14) 2.

104. King (n 11) 241.

Inadequate consideration of privacy issues by the Dutch Government led to the first chamber of the Dutch parliament twice rejecting two smart meter bills in 2009.¹⁰⁵ In a lesson to governments everywhere, the Dutch administration was compelled to make significant privacy-enhancing revisions before the Bill was eventually made law in 2011.¹⁰⁶ Now is the time for CER to fully – and openly – embrace the principle of privacy by design. While commitment to data protection compliance and engagement with the DPC are positive indications of intent, the case of Irish Water illustrates how increased involvement of the wider privacy community offers significant benefits that should not be shunned.

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105. Collette Cuijpers and Bert Jaap Koops, 'Smart Metering and Privacy in Europe: Lessons from the Dutch Case' in Serge Gutwirth and others (eds), *European Data Protection: Coming of Age* (Springer 2012) 281. A key point of contention in the initial proposals was the compulsory introduction of smart meters in every household, subject to a fine if contravened. Concern was also expressed at the plans to collect data at quarter-hourly/hourly and daily intervals, *ibid* 279, 281.

106. David Hess and Jonathan Coley, 'Wireless Smart Meters and Public Acceptance: The Environment, Limited Choices, and Precautionary Politics' (2012) 23(6) *Public Understanding of Science* 688, 692; C Cuijpers and B Koops, 'Smart Metering and Privacy in Europe: Lessons from the Dutch Case' (n 105) 282.

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