

*Ensuring Privacy – by Design,  
in the Emerging Smart Grid*

**Ann Cavoukian, Ph.D.**

**Information and Privacy Commissioner  
Ontario**

**Energy Probe Research Foundation  
Board of Directors**

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[www.privacybydesign.ca](http://www.privacybydesign.ca)

# A Growing Conflict:

- *Will we still have privacy in the future?*

*(Yes)*

- *In an emerging era of ever-expanding surveillance, increasing connectivity, information technology, accessibility ... whither privacy?*

# Wither privacy

Expecting privacy in an online world is silly,  
but that doesn't mean you have to be reckless

[www.privacybydesign.ca](http://www.privacybydesign.ca)  
— Lawrence Cummer, Backbone Magazine, Mar 2011

# Who Owns the Information?


- *Is personal information the property of the individual to whom it relates ... or the entity that collected it?*



***Privacy = Freedom***

**(think canary in a coal mine)**

[www.privacybydesign.ca](http://www.privacybydesign.ca)



***Privacy = Control***

***Informational Self-Determination***

[www.privacybydesign.ca](http://www.privacybydesign.ca)

# The Issue:

## *Privacy and the Smart Grid*

- The creation of an entirely new “library” of personal information; (Elias Quinn, 2009)
- Increase in the granular collection, use and disclosure of personal energy information;
- The data linkage of personally identifiable information with detailed consumer energy use.

ON Q10 WEDNESDAY, MAY 12, 2010 • TORONTO STAR • A23 CANADA

### Can smart grid know too much?

Hydro meter info a boon for thieves, marketers, and must be protected, privacy czar says

**TANYA TALAGA**  
QUEEN'S PARK BUREAU

The time you jump into the shower in the morning, the time you finally flick off that TV at night — even the time you set your home security alarm.

Ontario's privacy czar wants to keep the information secret.

Personal privacy must remain paramount as the "smart grid" electricity system is built around the province, said Ann Cavoukian, Ontario's information and privacy commissioner.

As the grid collects information on power usage and smart meters are installed in Ontario homes to track consumption data, that personal information could represent a treasure trove for hackers, thieves or marketers, said Cavoukian, in her annual report released Tuesday.

"Imagine the enormous interest in this information — not only by marketers and companies but unauthorized third parties like the bad guys, thieves who'll know when you are not at home," Cavoukian said in an interview.

Now is the time to continue to install privacy safeguards around the grid as it grows, she said.

So far, Ontario is "leading the game," she said. But the modernization of the grid is in its infancy and if vigilance isn't maintained, personal habits could become everyone's business.

Energy Minister Brad Duguid said he is taking Cavoukian's advice "very seriously" and is putting measures in place by controlling who has access to the information.

"We've taken the advice of the privacy commissioner upfront before the smart grid is even put in place," he said.

Yet before the switch was flicked on the program, all bases should

have been examined and covered, said Progressive Conservative energy critic MPP John Yakabuski.

"We've talked about them having a serious rethink about smart meters from the get-go and every day we find more reasons why they should be doing that," Yakabuski said.

The infrastructure supporting the smart grid system will be soon be capable of letting consumers know their hourly and real-time energy

use, Cavoukian said. "They can develop patterns of behaviour when you are away from the home," she said. "This thing has to be protected like Fort Knox."

In the not-so-distant future, "smart" appliances will be able to send in even more gritty details on how we live our lives to companies that provide electrical power. The sharing of that data should concern consumers, Cavoukian said.

"Think about every single appliance in your house reporting in real time, your energy use. What will develop over time is a library of personal information relating to a profile of your personal energy use. When you watch TV, what time of day, when you eat, when you sleep and wake," she said.

Ontario must stay proactive on this, she said. "Right now is the ideal time to ensure no one gets this in-

formation other than the people who get it now — Toronto Hydro and Hydro One."

The privacy commissioner is working with both on how electrical companies should set standards. The companies should not give out any personal data without the consent of the consumer, she said.

"This is a treasure trove of information. We want to make sure privacy is the default."

**THEY KNOW WHEN YOU ARE SLEEPING ...**



SHUTTERSTOCK IMAGE

**THEY KNOW WHEN YOU'RE IN THE SHOWER**



SHUTTERSTOCK IMAGE

**THEY KNOW WHEN YOU'RE AWAKE ...**



RICHARD LAUTING/TORONTO STAR FILE PHOTO

# Why Are We Involved?

- As a Privacy Regulator, I need to ensure that privacy is never overlooked, especially in emerging technologies;
- We have embedded *Privacy by Design* into Smart Meters and issued multiple joint publications with our biggest utilities – Hydro One and Toronto Hydro; and have partnered with GE, IBM and Telvent;
- To date, Ontario has installed over 4 million smart meters;
- Toronto Hydro operates the largest municipal utility in Canada, while Hydro One provides electrical distribution to 75% of the province – an area *twice* the size of Texas;
- We have also partnered with San Diego Gas & Electric, a U.S. utility, and a German utility – Vattenfall.



# *The Decade of Privacy by Design*



[www.privacybydesign.ca](http://www.privacybydesign.ca)

# *Privacy by Design:* *The 7 Foundational Principles*

1. ***Proactive*** not ***Reactive***:  
Preventative, not Remedial;
2. Privacy as the ***Default*** setting;
3. Privacy ***Embedded*** into Design;
4. ***Full*** Functionality:  
Positive-Sum, not Zero-Sum;
5. End-to-End ***Security***:  
***Full*** Lifecycle Protection;
6. Visibility **and** Transparency:  
Keep it ***Open***;
7. Respect for User Privacy:  
Keep it ***User-Centric***.



## Privacy by Design

### *The 7 Foundational Principles*

Ann Cavoukian, Ph.D.  
Information & Privacy Commissioner  
Ontario, Canada

*Privacy by Design* is a concept I developed back in the 90's, to address the ever-growing and systemic effects of Information and Communication Technologies, and of large-scale networked data systems.

*Privacy by Design* advances the view that the future of privacy cannot be assured solely by compliance with regulatory frameworks; rather, privacy assurance must ideally become an organization's default mode of operation.

Initially, deploying Privacy-Enhancing Technologies (PETs) was seen as the solution. Today, we realize that a more substantial approach is required — extending the use of PETs to *PETS Plus* — taking a positive-sum (full functionality) approach, not zero-sum. That's the "*Plus*" in *PETS Plus*: positive-sum, not the either/or of zero-sum (a false dichotomy).

*Privacy by Design* extends to a "Trilogy" of encompassing applications: 1) IT systems; 2) accountable business practices; and 3) physical design and networked infrastructure.

Principles of *Privacy by Design* may be applied to all types of personal information, but should be applied with special vigour to sensitive data such as medical information and financial data. The strength of privacy measures tends to be commensurate with the sensitivity of the data.

The objectives of *Privacy by Design* — ensuring privacy and gaining personal control over one's information and, for organizations, gaining a sustainable competitive advantage — may be accomplished by practicing the following 7 Foundational Principles (*see over page*):

# SmartPrivacy for the Smart Grid

*“... the focus has been so singular on controlling energy use that I think the privacy issue is a sleeper – it is certainly not top-of-mind.”*

— Commissioner Cavoukian,  
Toronto Star,  
*Smart Grid saves power, but can it thwart hackers?*, August 3, 2009

## SmartPrivacy for the Smart Grid: Embedding Privacy into the Design of Electricity Conservation



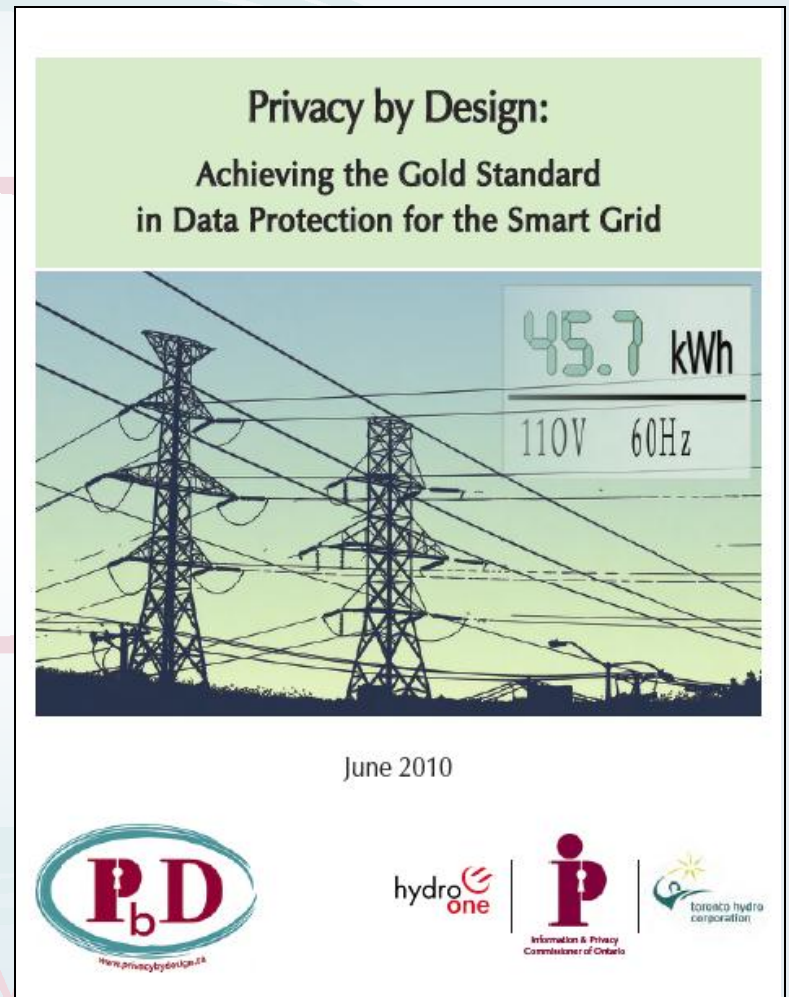
November 2009

THE FUTURE OF PRIVACY FORUM  
WWW.FUTUREOFPRIVACY.ORG



# *Privacy by Design: Achieving the Gold Standard in Data Protection for the Smart Grid*

- The Smart Grid in Ontario
- Personal Information on the Smart Grid
- *Privacy by Design: The Gold Standard*
- *Best Practices for the Smart Grid: Think Privacy by Design*
- Smart Grid *Privacy by Design* Use Case Scenarios



# Operationalizing *Privacy by Design*

## Ontario Smart Grid Case Study:

- Methodology for Operationalization;
- Operationalizing *Privacy by Design* across Smart Grid Domains;
- Working with partners – Hydro One, GE, IBM, Telvent.

The image shows the cover of a report titled "Operationalizing Privacy by Design: The Ontario Smart Grid Case Study". The cover features a green header with the title, a central illustration of a smart grid with a transformer, power lines, and houses, and a logo for "P<sub>b</sub>D" (Privacy by Design). Below the illustration are logos for Hydro One, the Information & Privacy Commissioner of Ontario, GE, IBM, and Telvent. The text "An initiative supported by:" is placed between the GE and Telvent logos. The date "February 2011" is at the bottom.

Operationalizing *Privacy by Design*:  
The Ontario Smart Grid Case Study

hydro one

Information & Privacy Commissioner,  
Ontario, Canada

GE

An initiative supported by:

IBM

TELVENT

February 2011

# *Applying Privacy by Design to SDG&E Smart Pricing Program*

- California's Privacy Vision;
- Smart Grid Deployment Plan;
- Privacy Governance;
- Privacy Framework;
- Smart Pricing Program;
- *Privacy by Design* and Smart Pricing.

## **Applying *Privacy by Design* Best Practices to SDG&E's Smart Pricing Program**



March 2012



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# Consumer Energy Usage Data (CEUD)

## California Public Utility Commission

- CPUC issued its decision adopting rules to protect the privacy and security of CEUD – Consumer Energy Usage Data – (Rulemaking 08-12-009, Decision 11-07-056, July 28, 2011);
- Based on *Fair Information Practice* Principles;
- “...*the Privacy by Design methodology offers a promising approach to ensuring that data practices promote privacy, not just in the FIP of data minimization, but in all aspects of privacy planning.*” (p. 73)
- Rules apply to utilities, utility third-party contractors and third parties accessing customer information directly from the utility;
- Customer consent not required for *primary purposes* such as utility operations, energy efficiency, demand response or energy management programs – all other purposes are considered *secondary purposes* and require positive customer authorization.

# Our Next Joint *PbD*/Smart Grid Venture

- **Sacramento Municipal Utility District (SMUD)**
- SMUD is taking steps to meet ambitious goals by dramatically reducing greenhouse gas emissions;
- One way they are doing this is through technology that will put consumers in greater control of their energy choices – Smart Meter/Smart Grid;
- A big first step toward that future is the installation of smart meters across their entire service area;
- *Stay tuned* – DistribuTECH Conference,  
San Diego , January 2013.



# SmartData International Symposium

May 14-16, 2012

University of Toronto, Canada

- Speakers will represent a broad range of international expertise, including the “father of evolutionary robotics,” **Dr. Inman Harvey** of the University of Sussex, and the leading expert on *Dynamical Systems*, **Professor Enrique Pujals**, of Brazil’s National Institute for Pure and Applied Mathematics and **Dr. George Tomko**, Expert-in-Residence at the University of Toronto, and creator of *SmartData*.
- Student poster sessions will take place throughout the Symposium, as selected through an open, international *call for papers*;
- Funded by the *Connaught Global Challenge*;
- More information available at [www.ipsi.utoronto.ca/sdis/](http://www.ipsi.utoronto.ca/sdis/)

# Conclusions

- Privacy = freedom of choice/personal control;
- Lead with *Privacy by Design*, featuring control over customer energy usage data – maintaining consumer confidence and trust will be essential;
- Enable both the Smart Grid *and* Privacy to grow in tandem – not one at the expense of the other – prevent the data breach ... enable the service;
- Get smart about privacy by making it a priority – embed privacy into your technical specifications, architecture, systems, devices and business practices.
- If you don't lead with *Privacy by Design*, you may end up with privacy by chance – or worse, Privacy by Disaster!

# How to Contact Us

**Ann Cavoukian, Ph.D.**

**Information & Privacy Commissioner of Ontario**

**2 Bloor Street East, Suite 1400**

**Toronto, Ontario, Canada**

**M4W 1A8**

**Phone: (416) 326-3948 / 1-800-387-0073**

**Web: [www.ipc.on.ca](http://www.ipc.on.ca)**

**E-mail: [info@ipc.on.ca](mailto:info@ipc.on.ca)**

**For more information on *Privacy by Design*,  
please visit: [www.privacybydesign.ca](http://www.privacybydesign.ca)**