Federal Court  Cour fédérale

Date: 20210316

Docket: T-227-17

Citation: 2021 FC 190

Ottawa, Ontario, March 16, 2021

PRESENT: The Honourable Mr. Justice Fothergill

BETWEEN:

DTECHS EPM LTD.

Plaintiff/
Defendant by Counterclaim

and

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY AND AWESENSE WIRELESS INC.

Defendants/
Plaintiffs by Counterclaim

PUBLIC JUDGMENT AND REASONS

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I. Overview

[1] Roger Morrison is a former sergeant with the Calgary Police Service [CPS], where he conducted investigations into organized crime and illegal drugs. Through his work as a police officer, Mr. Morrison became interested in the identification of marijuana grow operations [grow ops] by tracing the location of electricity theft.

[2] The police traditionally relied on tips from utility service personnel or the public to initiate investigations into electricity theft and marijuana grow ops. Once a suspect property was identified, a variety of steps could be taken to determine which of the transformers on the

secondary line was implicated, and from there which residence was the likely location of the theft or grow op. However, this approach was inefficient and, depending on the location of the transformer, could require the police to obtain a search warrant.

[3] In 2004, Mr. Morrison began developing a more efficient, less obtrusive and less costly method of tracing the location of electricity theft. This involved attaching an ammeter to the primary medium voltage [MV] supply line at electrical junctions. Each junction supplied power to an average of ten distribution transformers, and each transformer supplied power to an average of eight residences.

[4] Mr. Morrison surmised that if unusually high electrical usage was detected on the primary supply line, in comparison with common usage, then that would indicate a potential grow op somewhere in the portion of the electrical grid supplied by that primary junction. Once suspicious usage was identified, further investigative steps could be taken to identify the suspect customer.

[5] Mr. Morrison considered his idea to be novel, and a significant improvement over the traditional approach. He also considered it to be cost-effective, because a single primary line meter could be used to monitor up to a hundred customer service points for theft.

[6] In early discussions, a question that often arose was whether relatively small diversions of electricity on secondary service lines could be accurately detected by metering on primary supply lines, particularly using an ammeter as Mr. Morrison proposed. Mr. Morrison’s solution

was to procure a digital recording ammeter that could accurately measure current to a resolution of 0.1 amps.

[7] In November 2005, Mr. Morrison engaged Broy Engineering in Toronto to design and manufacture a digital recording ammeter [DRA] with 0.1A resolution. A prototype was delivered to Mr. Morrison by March 2006, and Mr. Morrison tested his method the same month. He was pleased with the results.

[8] Shortly thereafter, Mr. Morrison requested a one year leave of absence from the CPS to commercialize his invention. He never returned to his job as a police sergeant.

[9] On May 24, 2006, Mr. Morrison incorporated dTechs epm Ltd [dTechs]. On May 31, 2006, he filed an application for a patent with a priority date of February 10, 2006, based on an earlier filing.

[10] On March 12, 2008, Mr. Morrison assigned ownership of his invention to dTechs. On July 22, 2008, dTechs was granted a United States patent. The Canadian Patent was issued on January 20, 2009, listing dTechs as the owner and Mr. Morrison as the inventor.

[11] Canadian Patent 2,549,087 [087 Patent] is titled “Electrical Profile Monitoring System for Detection of Atypical Consumption”, and relates generally to “monitoring usage of utilities, such as electrical, for alterations in normal patterns of consumption of utilities, and, more

specifically, to a system of detection of patterns indicative of theft of electrical utilities, such as in the indoor cultivation of marijuana".

[12] British Columbia Hydro and Power Authority [BC Hydro] is a Crown corporation and electrical utility. It is one of the largest energy suppliers in Canada, generating and delivering electricity to 95 per cent of the population of British Columbia.

[13] Awesense Wireless Inc [Awesense] was founded in 2009. Its founder and chief executive officer is Mischa Steiner-Jovic, known professionally as Mischa Steiner. Mr. Steiner's vision for his start-up company was to use wireless technology and data analytics to optimize the electrical distribution grid. He first presented a concept for grid optimization to BC Hydro in May 2010. Thereafter, Awesense entered into a series of contracts with BC Hydro for the supply of wireless ammeters and energy meters for use on the primary supply line, together with supporting software.

[14] dTechs alleges that BC Hydro uses a system, supplied by Awesense, that relies on the methods described in the 087 Patent to detect electricity theft, and thereby infringes specified claims of the patent. While Awesense does not perform each of the steps itself, dTechs says that it is liable for inducing or procuring its customers to infringe the 087 Patent. dTechs also alleges that Awesense is liable under the legal doctrine of common design.

[15] For the reasons that follow, neither BC Hydro nor Awesense, individually or together, infringes the asserted claims of the 087 Patent. Furthermore, the asserted claims of the 087 Patent are invalid on the grounds of anticipation and obviousness.

II. Detection of Electrical Losses from a Power Distribution Grid

[16] The following summary of methods to detect electrical losses from a power distribution grid is adapted from the overview provided by Carl LaPlace in his expert report dated April 10, 2020.

[17] An electrical power grid or delivery system comprises several levels. Power delivery "flows down" through these levels or functional components as it moves from the generation plant to the customer. Generated power typically flows from the transmission level to substations, then to feeders, and finally to customers.

[18] An electrical utility grid consists of the following functional levels or components (Expert Report of Carl LaPlace dated April 10, 2020, Figure 1):

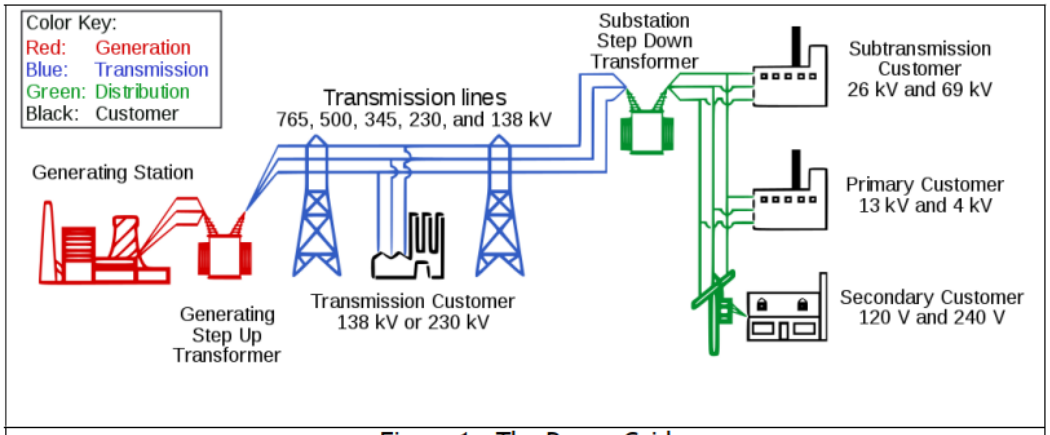


Figure 1: The Power Grid

[19] Electricity is generated from resources such as coal and natural gas. Generating stations are commonly called power plants. Electricity is generated at power plants by electromechanical rotating machines, fueled by combustion or nuclear fission or, in the case of hydroelectric power generation, by water-driven turbines.

[20] The transmission level is a network of three-phase lines operating at voltages that are usually between 115kV and 765kV. Transmission lines are designed to deliver power over long distances from generators to substations, and are interconnected to form a grid. This means that there is more than one electrical path between any two points in the system, improving reliability and operating flow: if one line fails, there is an alternate route to ensure that power flow is uninterrupted.

[21] Substations are the meeting points between the transmission grid and the distribution feeder system. One of their main functions is to convert incoming power from high voltage transmission lines to the lower primary feeder voltage required for distribution.

[22] Primary MV feeder lines are typically overhead distribution lines mounted on wooden poles or buried underground. They route power from the substation throughout its service area. Feeder lines operate at the primary distribution voltage, which is typically between 4.2kV and 34.5kV throughout North America. One substation will normally supply between two and 12 feeder lines.

[23] Service or distribution transformers lower the voltage from the primary MV feeder voltage to customer voltage, which is normally a two-leg 120/240V service throughout North America. In overhead construction, service transformers are pole-mounted, single phase transformers. There may be several hundred service transformers along a primary MV feeder line.

[24] Secondary circuits are fed by the service or distribution transformers. They route power at 120/240V directly to end-use customers. Each transformer serves a small radial network of secondary low voltage [LV] service lines. These service lines are connected to the customers' service point meters in the immediate vicinity. The meters may be analog or digital "smart" meters.

[25] A "smart grid" is an electrical power grid that uses digital intelligent electronic devices, computers and communication data networks to control, protect and automate the power grid. This may be contrasted with older analog-based technologies dating back many decades which are capable of only localized analog data processing and control. Smart grid devices include digital-based protection and control relays, remote terminal units, supervisory and control and

data acquisition [SCADA] systems, smart appliances, digital-based renewable energy solutions, distribution automation systems, *etc*.

[26] When the 087 Patent was published in August 2007, the vast majority of meters in service used the older analog technology. This technology had two significant shortcomings: 1) the inability to provide real-time or time-synchronized consumption data (analog metering could only provide total energy consumption); and 2) the inability to export digitized data wirelessly. The latter limitation resulted in significant labour costs due to the need to read customer service point meters in person.

[27] Digital smart meters began to appear in 2007. The first generation of smart meters had limited wireless connectivity and still required a vehicle to pass by and upload the metered data. However, the new smart meters did have the ability to measure time-synchronized or real-time consumption. This was a significant technological advancement in the detection of power loss and theft.

[28] As of August 2007, typical “smart grid” methods for detecting power loss or theft were focused on the secondary end-point or customer service point. One method enabled by smart meters was to analyze real-time consumption data measured in kilowatt-hours [kWh] via the customer service point meter to identify atypical or suspicious patterns of consumption.

[29] In 2007, the use of smart meters at every customer service point was rare. Even with smart meters, monitoring at the service point had limitations because meters could be bypassed, masking the theft.

[30] Tamper detection techniques deployed within customer service point meters, such as the so-called “blink count”, were understood as of August 2007. This technique involved recording the number of times that a meter had been de-energized in comparison with neighbouring meters. An unusually high blink count could mean that a customer had removed the meter to tamper with it, or install jumpers around the base. However, this technique could not detect theft by live-tapping customer service drop wires ahead of the meter, which was fairly common at the time.

[31] Another known method of theft detection was to measure distribution transformer heat signatures fed by the primary MV feeder lines to identify excessive loading or overloading. However, this was not always practical, because the transformer had to be overloaded at the precise moment of the drive-by in order to be detected.

[32] Consumption metering at the distribution transformer was a known method of detecting electricity theft as of August 2007. This involved measuring the full energy input of a distribution transformer connected to the primary line, and comparing this to the aggregate energy output of a transformer’s secondary lines at the end points. The total energy output of the transformer should be equal to its primary energy input (minus secondary distribution line losses). Any missing energy might indicate that a customer supplied from that transformer was stealing electricity. This technique initially had limited practical application, because it required

the installation of meters on every transformer, or other means of identifying suspect transformers.

[33] With the advent of modern smart grids and smart meters, comparison of the energy input of a distribution transformer connected to the primary line with the aggregate energy output of a transformer's secondary lines at customer service points has become commonplace. BC Hydro was the first utility in North America to deploy a system-wide energy balancing capability across the distribution grid, and the method is now widely used by utilities throughout North America and beyond.

III. Pleadings and History of the Proceedings

[34] This action was commenced by dTechs by Statement of Claim dated February 16, 2017. dTechs subsequently amended its pleadings on November 20, 2017.

[35] BC Hydro filed its Statement of Defence and Counterclaim on December 15, 2017. Its pleadings were subsequently amended on July 17, 2019, February 20, 2020, August 19, 2020 and November 9, 2020.

[36] Awesense filed its Statement of Defence and Counterclaim on December 15, 2017.

IV. 087 Patent

[37] The priority date of the 087 Patent is February 10, 2006. Its filing date is May 31, 2006, and its publication date is August 10, 2007. The 087 Patent was issued on January 20, 2009.

[38] The Abstract of the 087 Patent reads as follows:

> Methods of detecting atypical patterns of usage of electricity, determined by monitoring consumption at the primary line, permit detection of grow-ops and unusual line losses due to defective service lines. A meter having a high resolution is connected to the primary line and the data collected is compared to known consumption patterns thus identifying a potential theft or a loss. Once an atypical pattern has been found, the heat signatures of transformers fed by the primary line are measured. An unusual heat signature alerts the utility to load test the secondary lines of each residence fed from the transformer and thus locate suspect residences which may be grow-ops or to locate a line loss due to defective service lines.

[39] The 087 Patent states that the Field of Invention relates to "systems for monitoring usage of utilities, such as electrical, for alterations in normal patterns of consumption of utilities and, more specifically, to a system of detection of patterns indicative of theft of electrical utilities, such as in the indoor cultivation of marijuana".

[40] According to the Background of the Invention, electrical theft results in millions of dollars of loss per year; $500 million in Ontario alone. The most significant contributor to electrical theft is said to be the indoor cultivation of marijuana. In addition to financial losses,

additional costs to the community include property damage, increased risk of fire due to faulty wiring, and electrical brown-outs and power outages due to overloaded transformers.

[41] The inventor acknowledges that there are known systems to monitor consumption at secondary lines that feed electricity from the transformer to the residence and which are capable of detecting over-usage. However, the inventor claims that, to his knowledge, no systems currently in use are capable of economically identifying atypical usage patterns at the primary level, and thereafter pinpointing specific households that may be of interest to utilities and law enforcement personnel. Over-usage due to a marijuana grow op is difficult to detect at the primary level, because it will not usually be recognized as a significant alteration in measurement with the use of conventional metering.

[42] The Background of the Invention concludes as follows:

> There is great interest in systems which can be used to identify uncommon consumption patterns, at the primary level, which may be indicative of utility theft and which do not infringe upon existing laws which protect individual rights and freedoms.

[43] According to the Summary of the Invention:

> Embodiments of the invention provide a method of detecting atypical consumption patterns which when compared to known patterns of consumption are useful in identifying electrical losses or theft, such as by marijuana grow-ops. Use of a meter having a resolution capable of detecting suspect usage patterns on the primary line permits monitoring of consumption patterns without the need to access private property and which cannot be bypassed

> which is typically the case with individual residence metering and grow-ops.

[44] The 087 Patent provides a Brief Description of the Drawings, as well as a Detailed Description of the Preferred Embodiment. This is followed by 35 claims.

V. Claims in Issue

[45] dTechs alleges infringement of claims 1, 4 to 9, 13 to 29 and 33 to 35 [asserted claims].

[46] BC Hydro counterclaims that the asserted claims of the 087 Patent are invalid. Awesense maintains that the 087 Patent is invalid in its entirety, but addressed only the asserted claims in its evidence and arguments.

[47] Claim 1 is independent. It reads as follows:

> 1. A method for detection of atypical electrical consumption patterns comprising:
>
> providing a meter for detecting consumption of electricity from a utility;
>
> connecting the meter to a primary supply line, the primary supply line supplying electricity to a plurality of transformers, each transformer feeding the electricity to a plurality of structures, the meter having a resolution for detecting variation from known consumption patterns in the primary supply line;
>
> monitoring the primary supply line at predetermined time intervals for consumption of electricity;

collecting data for determining measures indicative of patterns of consumption;

comparing the patterns of consumption to known consumption patterns for identifying suspect consumption patterns; and

when a suspect consumption pattern is identified, notifying the utility of the identified suspect consumption pattern in the primary line, the utility thereafter monitoring characteristics of the plurality of transformers for identifying a suspect transformer; and

load testing at least one of a plurality of secondary lines from the suspect transformer to each of the plurality of structures for identifying a suspect structure.

[48] Claim 4 depends from claim 1, 2 or 3. It reads as follows:

4. The method of claim 1, 2 or 3 further having a smart meter connected to secondary lines at each structure for determining consumption at each of the structures, the method further comprising:

Comparing electrical supply at the primary supply line to a sum of consumption at all of the secondary lines for reconciling consumption to the supply.

[49] Claim 5 depends from any of claims 1 to 4. It reads as follows:

5. The method of any one of claims 1 to 4 wherein the characteristics of the plurality of transforms monitored is a heat signature.

[50] Claim 6 depends from claim 5. It reads as follows:

6. The method of claim 5 wherein the heat signature is monitored using an infrared laser.

[51] Claim 7 depends on any one of claims 1 to 6. It reads as follows:

> 7. The method of any one of claims 1 to 6 wherein the meter has a resolution for detecting electrical consumption in a range of less than 1 amp.

[52] Claim 8 depends from any one of claims 1 to 7. It reads as follows:

> 8. The method of any one of claims 1 to 7 wherein the meter has a resolution for detecting electrical consumption in a range of about 0.01 to about 0.1 amp.

[53] Claim 9 depends from any one of claims 1 to 8. It reads as follows:

> 9. The method of any one of claims 1 to 8 wherein the suspect consumption pattern is greater than a known consumption pattern over a predetermined period of time.

[54] Claims 13 depends from claims 1 to 12. It reads as follows:

> 13. The method of any one of claims 1 to 12 wherein the meter is a digital recording ammeter.

[55] Claim 14 depends from claim 13. It describes a method as follows:

> 14. The method of claim 13 wherein the digital recording ammeter has a resolution for detecting electrical consumption in a range of less than 1 amp.

[56] Claim 15 depends from claim 13. It reads as follows:

> 15. The method of claim 13 wherein the digital recording ammeter has a resolution for detecting electrical consumption in a range of about 0.01 to about 0.1 amp.

[57] Claim 16 depends from claims 13, 14 or 15. It describes a method as follows:

> 16. The method of claims 13, 14 or 15 wherein the digital recording ammeter is programmed to actuate at the predetermined time intervals for measuring electrical consumption.

[58] Claim 17 depends from claims 13 to 16. It reads as follows:

> 17. The method of any one of claims 13 to 16 wherein the digital recording ammeter further comprises a buffer for storage of data obtained at the predetermined intervals.

[59] Claim 18 depends from claim 17. It reads as follows:

> 18. The method of claim 17 further comprising:
>
> Processing the stored data for determining measures indicative of electrical consumption patterns; and transmitting the measures indicative of electrical consumption patterns to the utility.

[60] Claim 19 depends from claim 17 or 18. It describes a method as follows:

> 19. The method of claim 17 or 18 further comprising:

> Transmitting the stored data to a processor for determining measures indicative of electrical consumption patterns.

[61] Claim 20 depends from claim 19. It reads as follows:

> 20. The method of claim 19 wherein the transmitting of stored data is by wireless technology.

[62] Claim 21 is another independent claim. It reads as follows:

> 21. A method for detection of atypical electrical consumption patterns in an electrical system having a primary supply line supplying electricity to a plurality of transformers and wherein each transformer supplies electricity to a plurality of consumers through a plurality of secondary lines, the method comprising:
>
> metering the primary supply line at predetermined time intervals for establishing data indicative of patterns of consumption;
>
> comparing the patterns of consumption to known consumption patterns for identifying suspect consumption patterns, and when a suspect consumption pattern is identified, monitoring characteristics of the plurality of transformers for identifying a suspect transformer from the plurality of transformers; and
>
> load testing at least one of the plurality of secondary lines form the suspect transformer to each of the plurality of consumers.

[63] Claim 22 depends from claim 21. It reads as follows:

> 22. The method of claim 21 wherein the monitoring characteristics of the plurality of transformers further comprises:
>
> Notifying a monitoring agency of the suspect consumption pattern in the primary line, wherein the monitoring agency then monitors the characteristics of the plurality of transformers.

[64] Claim 23 depends from claim 21 or 22. It reads as follows:

> 23. The method of claim 21 or 22 wherein the load testing at least one of the plurality of secondary lines from the suspect transformer is for identifying a suspect consumer.

[65] Claim 24 depends from claim 21, 22 or 23. It reads as follows:

> 24. The method of claim 21, 22 or 23 wherein the metering of the primary supply line is performed at a resolution for detecting variation from known consumption patterns in the primary supply line in response to suspect consumption patterns generated by the activities of a consumer.

[66] Claim 25 depends from claims 21 to 24. It reads as follows:

> 25. The method of any one of claims 21 to 24 wherein the characteristics of the plurality of transforms [*sic*] monitored is a heat signature.

[67] Claim 26 depends from claim 25. It reads as follows:

> 26. The method of claim 25 wherein the heat signature is monitored using an infrared laser.

[68] Claims 27 and 28 depend from claim 24. They read as follows:

> 27. The method of claim 24 wherein the metering is performed at a resolution for detecting electrical consumption is a range of less than 1 amp.

> 28. The method of claim 24 wherein the metering is performed at a resolution for detecting electrical consumption in a range of about 0.01 to about 0.1 amp.

[69] Claim 29 depends from any one of claims 21 to 28. It reads as follows:

> 29. The method of any one of claims 21 to 28 wherein the suspect consumption pattern is greater than a known consumption pattern over a predetermined period of time.

[70] Claim 33 depends from claims 21 to 32. It reads as follows:

> 33. The method of any one of claims 21 to 32 wherein the metering is performed using a digital recording ammeter.

[71] Claims 34 to 35 depend from claim 33. They read as follows:

> 34. The method of claim 33 wherein the digital recording ammeter has a resolution for detecting electrical consumption in a range of less than 1 amp.
>
> 35. The method of claim 33 wherein the digital recording ammeter has a resolution for detecting electrical consumption in a range of about 0.01 to about 0.1 amp.

VI. Issues

[72] The issues raised in these proceedings are whether the asserted claims of the 087 Patent are infringed by BC Hydro, Awesense, or both; and whether the asserted claims of the 087 Patent are valid.

VII. Evidence

A. *Fact and Expert Witnesses*

(1) dTech's Witnesses

[73] **Mr. Roger Morrison** is the named inventor of the 087 Patent. He is the founder of dTechs, a company to which he assigned ownership of the 087 Patent shortly before this litigation was commenced. Mr. Morrison is a former sergeant with the CPS, with a speciality in the investigation of organized crime and illegal drugs. Mr. Morrison testified as a fact witness.

[74] **Mr. Peter Roy** is a professional engineer. He is the president and owner of Broy Engineering in Toronto. Mr. Roy was called as a fact witness.

[75] **Mr. Carl LaPlace** is an electrical engineer with more than 35 years of experience. He has held a variety of technical and engineering leadership roles in several global smart grid companies, including Siemens, ABB, Elster-Honeywell, Sensus and GE. He was qualified as an expert in electrical engineering, in particular regarding electricity distribution systems and related technologies, including technologies and methods for monitoring electricity distribution, and identifying technical and non-technical losses.

(2) BC Hydro's Witnesses

[76] **Mr. John Millard** is the manager of customer analytics, revenue, and risk management at BC Hydro. Mr. Millard was called as a fact witness.

[77] **Mr. Wayne Cross** is a former manager of revenue metering at BC Hydro. Mr. Cross was called as a fact witness.

[78] **Mr. Brent Hughes** is a former manager of revenue metering at BC Hydro. Mr. Hughes was called as a fact witness.

[79] **Mr. Paul Trustham** is a field inspection advisor at BC Hydro. Mr. Trustham was called as a fact witness.

[80] **Mr. J. Bradley Shepherd** is a professional engineer who has practised for more than fifty years as an electrical engineer and manager in the industry. Before becoming a professional engineer, for ten years he worked as an electrician, electronics technician and electrical project cost estimator in commercial, residential, aerospace and marine environments. He was qualified as an expert in electricity distribution and related engineering and utility practices, including methods, processes, equipment and techniques related to identifying and addressing losses in electricity distribution systems including, in particular, losses due to theft and/or energy diversions, including marijuana grow op-related energy diversions.

(3) Awesense's Witnesses

[81] **Mr. Greg Shaigec** is a contractor to Fortis BC, a major electrical utility in British Columbia. Mr. Shaigec was called as a fact witness.

[82] **Mr. Mischa Steiner-Jovic** is the founder and chief executive officer at Awesense Wireless Inc. Mr. Steiner was called as a fact witness.

[83] **Mr. William Bennett** is a retired professional engineer with more than 35 years of experience in the electricity and distribution industry. He is familiar with all aspects of grid operations and management. He was qualified as an expert in electricity grid management, utility operations and maintenance, grid technology, distribution planning and engineering, overhead and underground distribution systems design and constructions, system office control and operations, including SCADA systems, metering operation, investigation support and wholesale billing.

B. *Observations Regarding the Evidence*

[84] The parties acknowledged the expertise of the expert witnesses who were called to testify in these proceedings, reserving any questions they might have regarding the quality of their evidence for cross-examination and argument.

[85] dTechs says that the evidence of Mr. LaPlace should be preferred over that of the experts called on behalf of the Defendants. dTechs maintains that Mr. Shepherd was not well positioned to comment on the common general knowledge of the person of ordinary skill in the art at the relevant times, because he stopped working in the field of electricity distribution engineering in 1994. He then changed his focus to insurance and litigation support. Since 2006, his business has consisted almost entirely of investigating and testifying in litigation arising from electrocution, electrical fire, property damage and expropriation.

[86] dTechs argues that Mr. Bennett was neither independent nor objective. dTechs says that the opinions expressed in Mr. Bennett's report were not the product of his own judgment, but were heavily influenced by the expert reports of witnesses retained by BC Hydro. Throughout his report, Mr. Bennett used marketing language to describe the capabilities of Awesense's system, and unduly restrictive language to describe the 087 Patent, in an apparent effort to emphasize the differences between the two.

[87] BC Hydro notes that Mr. LaPlace was never employed by a utility, and never responsible for operating or managing an electrical distribution system. He never worked as a lineman or alongside linemen for a utility, never worked as an electrician, and never investigated an electrical theft or instance of unknown loss in a distribution system.

[88] Awesense adds that Mr. LaPlace has made his career in product development and sales with equipment manufacturers specializing in power and automation technology. Awesense argues that, given his long history with smart grid technologies, Mr. LaPlace approached the 087

Patent through the lens of digital and communication technologies, even though the 087 Patent does not offer any teachings in this field. Awesense maintains that Mr. LaPlace's lack of direct involvement in power theft investigations caused him to minimize the critically important practical aspects of the 087 Patent.

[89] Some of the criticisms made by the parties respecting the qualifications or approaches of the expert witnesses who testified in these proceedings are valid. However, none of them is sufficient to undermine any of the witnesses' evidence in its entirety. My reasons for preferring some witnesses' evidence over others are explained below.

VIII. Factual Background

A. *Mr. Morrison's Invention*

[90] Mr. Morrison was a police officer with the CPS between 1986 and 2006. In the early 2000s, he was promoted to the rank of sergeant in the drug unit, and was given responsibility for the investigation of marijuana grow ops.

[91] Mr. Morrison had no formal training in electricity distribution, and no experience using DRAs. The police would enlist the cooperation of electrical utilities to conduct their investigations, and would ask a utility to connect a DRA to an electrical line supplying a suspect property in the hope of finding evidence to confirm the presence of a grow op.

[92] In the early 2000s, police investigators understood that DRA measurements could be used to: (a) identify unusually high electrical consumption; (b) reconcile DRA data with metered consumption; and (c) identify cyclical patterns of consumption (resembling "skyscrapers" when plotted on a graph), typical of the growing cycle of marijuana plants.

[93] Mr. Morrison became interested in improving the efficiency and cost-effectiveness of methods to identify atypical levels of electrical consumption that might be indicative of a marijuana grow op. In October 2004, he described his ideas in a document titled "Operation Lights Out". He developed the document while employed as a police officer, and he considered it to be an official and confidential operational plan of the CPS.

[94] Operation Lights Out included a proposal to detect marijuana grow ops in the following manner:

> The strategy is to place an electrical profiling device to monitor the primary electrical junctions, which in turn feeds electricity to residential transformers. The device will monitor the electrical load from the residential area and if extreme high electrical usage is detected over an [*sic*] six (6) hour time span the device will notify a central computer.

[95] Pursuant to Operation Lights Out, once the electrical profiling device identified suspiciously high primary line consumption, the utility would identify a suspect downstream transformer by measuring each transformer's temperature, and would then identify a suspect structure by examining a plurality of secondary loads from any suspect (*i.e.*, overheated) transformer.

[96] Mr. Morrison disclosed Operation Lights Out to his direct supervisor at the CPS on October 7, 2004, who in turn shared the document with employees and directors of ENMAX, a Calgary utility. Mr. Morrison continued to refine his proposal based on the feedback he received.

[97] On August 22, 2005, Mr. Morrison contacted Wayne Cross, a senior engineer with BC Hydro, though a family connection. He described his invention to Mr. Cross, and also sent him some written information regarding his proposed method and test results. Mr. Cross questioned whether attaching an ammeter to the primary MV line would provide sufficient accuracy to assess whether theft was occurring downstream at one of the many associated LV secondary service lines. He advised Mr. Morrison that BC Hydro was focusing its theft detection research on deploying energy meters at transformers.

[98] On February 10, 2006, Mr. Morrison filed Canadian Patent Application 2,535,848. The application did not refer to DRA measurements at the primary supply line, nor to the use of smart meters. The application was ultimately abandoned.

[99] Mr. Morrison engaged Broy Engineering in Toronto to design and manufacture a DRA with 0.1A resolution, so that he could test his method. A prototype was delivered to Mr. Morrison by March 2006, and the method was tested the same month. Mr. Morrison considered the test to be successful.

[100] In April 2006, Mr. Morrison requested a leave of absence from the CPS. He filed the application for the 087 Patent on May 31, 2006.

B. *Awesense's TGI System*

[101] In the spring of 2008, BC Hydro formed a working group to assess the optimal implementation of an automated electricity theft detection system. Mr. Cross was part of that working group. He asked the group: "Can we use current on feeders?"

[102] The BC Hydro working group conducted some testing using primary line ammeters, but cautioned that it "shouldn't have too high expectations for ammeter data" given concerns about accuracy. A member of the group noted that there was only one high resolution ammeter on the market, but the data needed to be downloaded manually.

[103] In the summer and fall of 2009, Mr. Steiner met regularly with Paul Chernikowsky, Engineering Director at the electrical utility Fortis BC. Mr. Steiner learned that utilities were suffering significant energy losses in the distribution grid, and there were serious gaps in monitoring, particularly in segments downstream of distribution substations and upstream of customers.

[104] Mr. Steiner conceived of a wireless sensor unit that could be deployed on MV lines throughout the grid. In February 2010, he met with Fortis BC's Revenue Protection and Special Projects team to discuss his idea.

[105] In the summer of 2010, Awesense conducted a first pilot project with Fortis BC, and tested a prototype of its sensor unit, named the Raptor 1, on the utility's MV feeder lines.

[106] Mr. Steiner then approached BC Hydro and met with John Millard, BC Hydro's project manager of the Revenue Assurance Group. Awesense subsequently conducted tests on BC Hydro's MV feeder lines, and developed a new version of its sensor unit, which it named the Raptor 2.

[107] On January 24, 2011, BC Hydro and Awesense entered into an agreement for the supply of ten Raptor 2 units and communication software for the purposes of a pilot project.

[108] On December 19, 2011, Awesense responded to BC Hydro's Request for Proposals [RFP] No 1054 for the supply of "Portable check meters to measure energy and load flowing through a target distribution section either at primary or secondary voltage overhead or underground for a short term field investigation and energy inventory with downstream customer meters". Awesense proposed a complete platform capable of assessing all aspects of revenue protection and theft prevention using big data analytics. This included the first version of Awesense's web-based software, which was then called "SenseNet".

[109] BC Hydro accepted Awesense's proposal, and on June 6, 2012 Awesense entered into a contract with BC Hydro for the supply of 200 Raptor 2 meters, as well as software to transfer measurement data onto a laptop computer. This could then be uploaded to Awesense's cloud-based software application. Awesense's support was limited to providing a technical helpdesk. In May 2014, BC Hydro leased an additional 100 Raptor 2 units from Awesense, bringing the total number of units under BC Hydro's control to 300.

[110] On July 14, 2014, Awesense responded to BC Hydro's RFP No 1850 for the supply of portable check meters. Awesense took the opportunity to outline its vision for new data analytics software that it had under development and hoped to commercialize. This included an energy balance module in the software, and a new Raptor 3 prototype.

[111] On November 19, 2014, Awesense was awarded a contract with BC Hydro for the supply of 5,000 Raptor 3 units between 2015 and 2017. Awesense continued to develop the energy balancing functionality of its software, which was now named True Grid Intelligence [TGI]. This was eventually made available to BC Hydro, together with a plan to ensure interoperability between TGI and BC Hydro's existing system architecture.

IX. Claim Construction

A. *Legal Principles and Relevant Dates*

[112] The first step in a patent suit is to construe the claims to ascertain their meaning and determine their scope (*Whirlpool Corp v Camco Inc*, 2000 SCC 67 [*Whirlpool*] at para 43). The Court must examine a patent's claims to identify what the inventor considered to be their "essential elements". This process may be aided by expert evidence regarding the meaning of specific terms (*Whirlpool* at paras 45, 57). The relevant date for claim construction is the date of publication of the patent application: August 10, 2007 (*Whirlpool* at paras 54-55).

[113] The canons of claim construction are found in the Supreme Court of Canada's decisions in *Consolboard Inc v MacMillan Bloedel (Saskatchewan) Limited*, [1981] 1 SCR 504 at 520, *Whirlpool* at paragraphs 49 to 55, and *Free World Trust v Électro Santé Inc*, 2000 SCC 66 [*Free World Trust*] at paragraphs 44 to 54. They are the following:

(a) the words of the claims must be read in an informed and purposive way with a mind willing to understand, viewed through the eyes of the person of ordinary skill in the art [PSA] as of the date of publication having regard to the PSA's common general knowledge;

(b) the *Patent Act* promotes adherence to the language of the claims. This allows the claims to be read in the manner the inventor is presumed to have intended, and in a way that is sympathetic to accomplishing the inventor's purpose, which promotes both fairness and predictability;

(c) the whole of the patent's specification should be considered to ascertain the nature of the invention, and the claim construction must be neither benevolent nor harsh, but should instead be reasonable and fair to both the patentee and the public. The focus of the analysis is on the claims; specifications will be relevant only where there is ambiguity in the claims (*AstraZeneca Canada Inc v Apotex Inc*, 2017 SCC 36 at para 31); and

(d) claim construction must be the same for the purpose of validity and for the purpose of infringement.

B. *Person of Ordinary Skill in the Art (PSA)*

[114] In order to construe the claims in issue, the Court must define the PSA. This is "the person to whom the patent is said to be addressed, through whose eyes the Court is to read the patent, and who stands as the criterion for determination of obviousness" (*Amgen Canada Inc v Apotex Inc*, 2015 FC 1261 at para 42).

[115] The PSA is unimaginative and uninventive, but reasonably diligent in keeping up with advances (*Pfizer Canada Inc v Teva Canada Ltd*, 2017 FC 777 at para 185). The PSA is not incompetent, and brings background knowledge and experience to the workbench (*AstraZeneca Canada Inc v Apotex Inc*, 2015 FC 322 at para 276). The PSA is not stripped of the ability to pursue reasonable and logical enquiries, and can make deductions based on the information available (*Jay-Lor International Inc v Penta Farms Systems Ltd*, 2007 FC 358 at para 75, citing *Beloit Canada Ltd v Valmet Oy* (1986), 8 CPR (3d) 289 at 294 (FCA)).

[116] Mr. LaPlace defined the PSA as:

> […] someone that has the technical understanding of how the electrical power grid functions and has experience with smart grid technologies. This would typically be a degreed electrical engineer who has at least (3) years specific experience within the electrical power industry.

[117] Mr. Shepherd's view, shared by Mr. Bennett, is that the PSA is a team comprising:

> (i) at least one electrical engineer with 5-10 years of experience in distribution engineering generally, as well as approximately 5 years of experience in metering/monitoring of electrical loads, including computer-implemented systems and processes that support such metering/monitoring; and
>
> (ii) at least one electrical worker, such as a lineman, meter test specialist, electrician, other utility worker, and/or an electrical or other sub-contractor to a utility, with 5-10 years of experience in troubleshooting problems in the distribution system, including loss identification and current diversion-related problems.

[118] The primary difference between the parties' description of the PSA is that Mr. LaPlace considered an experienced electrical engineer or an experienced electrical worker to each embody the criteria of the PSA, while Messrs. Shepherd and Bennett considered a team to be necessary. I agree with dTechs that construction of the asserted claims is not affected by this distinction. The PSA is someone who possesses a technical understanding of electrical power grids, and is either an electrical engineer with at least five years' experience or a similarly knowledgeable electrical worker.

C. *Common General Knowledge of the PSA*

[119] The patent must be construed taking into account the "common general knowledge" shared by persons skilled in the art (*Free World Trust* at para 44; *Whirlpool* at para 53). This is the knowledge possessed by the PSA at the relevant time, and includes what the PSA would reasonably have been expected to know (*Whirlpool* at para 74). The common general knowledge of the PSA must be established with evidence on a balance of probabilities, and cannot be

assumed (*Uponor AB v Heatlink Group Inc*, 2016 FC 320 [*Uponor*] at para 47). Common general knowledge may include the information presented as background knowledge in the patent itself (*Newco Tank Corp v Canada (Attorney General)*, 2015 FCA 47 at para 10).

[120] The assessment of common general knowledge is governed by the principles found in *Eli Lilly & Co v Apotex Inc*, 2009 FC 991 at paragraph 97 (aff'd, 2010 FCA 240), citing *General Tire & Rubber Co v Firestone Tyre & Rubber Co*, [1972] RPC 457 (UKHL) at pages 482 to 483:

(a) the common general knowledge imputed to the PSA must be carefully distinguished from what in patent law is regarded as public knowledge;

(b) common general knowledge is a different concept derived from a common sense approach to the practical question of what would in fact be known to an appropriately skilled addressee—the sort of person, good at his or her job, who could be found in real life;

(c) individual patent specifications and their contents do not normally form part of the relevant common general knowledge, although there may be specifications which are so well known that they do form part of the common general knowledge, particularly in certain industries; and

(d) scientific papers only become general knowledge when they are generally known and accepted without question by the bulk of those who are engaged in the

particular art; in other words, when they become part of their common stock of knowledge relating to the art.

[121] Where patent language can bear more than one equally plausible meaning, the Court must adopt a reasonable view of patent language to afford the inventor protection for that which he or she has in good faith actually invented; however, this does not mean that in all cases the Court must adopt any arguable interpretation that would uphold the patent (*ABB Technology AG v Hyundai Heavy Industries Co, Ltd*, 2015 FCA 181 at para 45). There is no general presumption of interpretation in favour of the inventor, but a patent should not be invalidated on a technicality (*Seedlings Life Science Ventures, LLC v Pfizer Canada ULC*, 2020 FC 1 at para 59).

[122] There appears to be little disagreement between the parties regarding the common general knowledge of the PSA. In addition to a broad understanding of how electricity grids functioned at the relevant times, BC Hydro says that the PSA's common general knowledge would include the following:

(a) the relationship between current on the secondary side of a transformer and current on the primary side;

(b) the concept of energy balancing, *i.e.*, determining whether there is any difference in electrical consumption as between what is measured upstream versus what is measured downstream – utilities have performed energy balances for as long as they have existed;

(c) how to investigate an energy imbalance, *i.e.*, "follow the current";

(d) monitoring transformers for high loads or overloading, including by using handheld infrared and laser devices, and in the context of theft investigations;

(e) performing a transformer level energy balance for theft detection;

(f) comparing transformer loads to identify a suspect transformer;

(g) "load testing" by checking the current or energy on a secondary service line, and comparing load tests with what is measured at an end point meter to confirm diversions;

(h) "smart meters", including digital customer meters that have remote reading capabilities; and

(i) the necessary accuracy and resolution of a meter based on what is being measured.

[123] BC Hydro also maintains that the common general knowledge would include commercial DRAs and other meters that could be used on the primary line, such as SensorLink's Amcorder and VARcorder. Mr. LaPlace agreed that the PSA would have known of high-resolution meters that could be deployed on the primary line, such as the SensorLink VARcorder, but the PSA would also have known that these devices were not readily available. There is no question that

measuring current on MV primary lines, typically with the use of an energy meter, would form a part of the common general knowledge.

[124] I therefore conclude that the PSA's common general knowledge is as described in the preceding two paragraphs.

D. *Claim Terms Needing Construction*

[125] Claim construction is a matter of law for the judge. Expert evidence is necessary only where the meaning of a term is not apparent based on a reading of the patent specification (*Johnson & Johnson Inc v Boston Scientific Ltd*, 2008 FC 552 at para 92).

[126] Construction of the following terms is disputed:

- "Connecting the meter to a primary supply line"
- "Known consumption patterns"
- "Notifying the utility"

[127] The construction of "known consumption patterns" in claim 1 also requires the Court to construe the term "further comprising" in claim 4.

[128] The construction of “notifying the utility” also requires the Court to determine whether a non-utility must perform each of the steps that precede “notifying the utility” in claim 1.

(1) “Connecting the meter to a primary supply line”

[129] Independent claims 1 and 21 require as an initial step that a meter be connected or used to meter a “primary supply line” for consumption of electricity. It is clear that the “primary supply line” is the MV line that carries electricity from a distribution substation to distribution transformers downstream. It is less clear where along the “primary supply line” the meter must be attached.

[130] Mr. Shepherd noted in his first report that the claims do not “specify or require any particular location” on the primary line, while Mr. Bennett asserted that the PSA would understand the location of attachment to be on the “single phase distribution circuit” downstream of the substation.

[131] According to Mr. LaPlace, “accuracy to detect unmetered load decreases when metering is done at or close to the substation”. Attaching a single meter at the substation would make it “impractical to narrow down a suspect transformer”, as it is “not uncommon for a substation feeder to supply power to 100+ transformers”.

[132] The PSA would understand that attaching the meter at or close to the substation would detract from, and possibly undermine, the accuracy of any measurements obtained. Applying a

purposive interpretation to claim construction, the 087 Patent contemplates attaching the meter somewhere downstream of the substation.

(2) "Known consumption patterns"

[133] Independent claims 1 and 21 require "comparing the patterns of consumption to known consumption patterns for identifying suspect consumption patterns". It is common ground that "patterns of consumption" refers to the data collected by the meter that is connected to the primary supply line. It is also common ground that "known consumption patterns" includes historical or predicted consumption patterns.

[134] The dispute concerns whether the PSA would understand "known consumption patterns" to include same-time consumption patterns measured on secondary lines; what Mr. LaPlace described as energy balancing "where the patterns measured at the primary supply line would be reconciled with the aggregate of the associated same-time secondary load consumption patterns". According to Mr. LaPlace, same-time consumption patterns are, in fact, "known" consumption patterns at the time the comparison is performed.

[135] dTechs concedes that the wide deployment of smart meters at customer service points was necessary before same-time consumption patterns would be available for comparison. Smart meter data were not generally available in 2006, because the technology was just emerging. However, dTechs also notes that the "preferred embodiment" of the 087 Patent describes same-time comparison as a "significant improvement in the collection of data for reconciliation and

identification of losses" once "new smart meter technology" is introduced at customer service points.

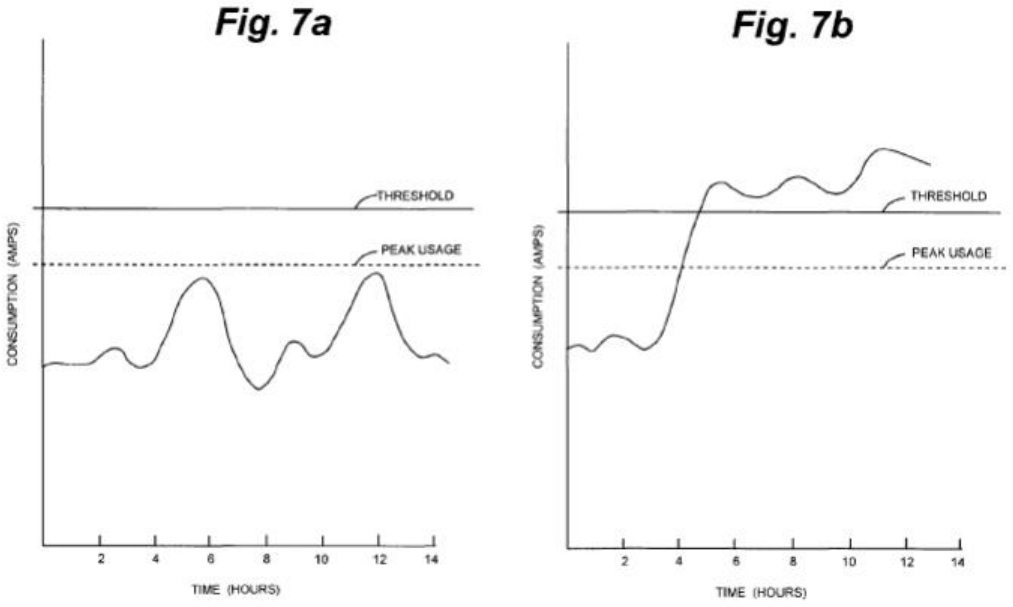
[136] BC Hydro says that all claims of the 087 Patent relate to a method "for detection of atypical electrical consumption patterns". This is not limited to theft or other loss. The focus is on detection of "atypical … patterns" which may be "indicative of theft". Atypical or high consumption may be caused by customers who do not pay for electricity, but also by those who do, *i.e.*, the high consumption may be theft, or it may be fully accounted and paid for.

[137] According to BC Hydro, the purpose of the invention is to identify marijuana grow ops based on high, or atypical, levels of consumption, regardless of whether or not the electricity is stolen or paid for. Same-time energy balancing is inconsistent with that overarching purpose, as it would fail to detect paying grow ops.

[138] The 087 Patent provides the following description of an embodiment of the invention:

> As shown in Fig. 6, in an embodiment of the invention, a system for detection of line losses or utility theft comprises a meter 10, such as shown in Fig. 10, connected to the primary electrical line 1 which feeds each transformer 2 connected thereto to monitor for fluctuations in consumption (Figs. 7a and 7b) relative to **a known mean or average consumption which has been determined** for a particular area. Depending upon the type of transformer 2 and the voltage provided through the primary line 1, **the average consumption can generally be predicted and can be verified using historical consumption records by the utility provider**.
>
> [Emphasis added]

[139] Figures 7a and 7b illustrate the preferred embodiment of the invention:



[140] Figure 7a represents known peak usages based on historical consumption records. A "buffer" is then added to guard against false readings of atypical patterns of consumption. Figure 7b represents a hypothetical example of unusually high consumption levels relative to historical records. Figures 7a and 7b do not illustrate same-time energy balancing.

[141] An energy balance (or "reconciliation") is contemplated as a further step in claim 4:

> 4. The method of claim 1, 2 or 3 further having a smart meter connected to secondary lines at each structure for determining consumption at each of the structures, the method further comprising:
>
> Comparing electrical supply at the primary supply line to a sum of the consumption at all of the secondary lines for reconciling consumption to the supply.

[142] dTechs argues that claim 4 narrows claim 1 by the use of a smart meter to perform same-time energy balancing in order to permit a comparison between the patterns of consumption recorded by the ammeter on the primary supply line and known consumption patterns, *i.e.*, same-time smart meter data. However, Mr. LaPlace acknowledged that claim 4 is where the inventor intended to address technical losses, not electricity theft.

[143] Mr. Shepherd expressed the following view in his first expert report (Expert Report of J. Bradley Shepherd dated June 9, 2020 at para 66):

> The further reconciliation step of claim 4, which the inventor suggests is useful for identifying technical losses, is separate and distinct from all of the other steps in claim 1. Indeed, claim 1 already provides for a method for detection of atypical electrical consumption patterns (including patterns indicative of energy diversion associated with marijuana grow operations) that results in identification of a suspect structure. Thus, the Skilled Person would understand that the purpose of the additional reconciliation step of claim 4 is not for "identifying a suspect structure", but rather for electrical system reconciliation more broadly.

[144] Mr. Bennett agreed, writing the following in his expert report (Expert Report of William Bennett dated August 26, 2020 at para 73):

> In my opinion, claim 4 claims an additional step to the methods claimed in claims 1-3, which the inventor believed would provide an additional source of data. As Mr. Shepherd states in the Shepherd Report at page 39, the Skilled Person would understand that the further advantage claimed in claim 4 relates to grid reconciliation more broadly, which is separate from the method for detection of atypical consumption patterns disclosed in claim 1.
>
> In my view, if the inventor had intended "known consumption data" in claim 1 to include smart meter data, claim 4 would have

> been drafted to state that "known consumption data includes smart meter data". By contrast, claim 4 identifies smart meter data as being in addition to the known consumption data claimed in claim 1 – hence the repeated use of the term "further". Claim 4 confirms my construction of the term "known consumption data" in claim 1.

[145] The dependent claims of the 087 Patent either broaden the independent claims ("further comprising"), or narrow them with specified refinements ("wherein"). Claim 4 is in the former category. The language of claim 4 ("further comprising") demonstrates that the use of a smart meter is an additional step to those described in claim 1. The smart meter in claim 4 is not intended to be an alternative means of identifying "known consumption patterns" in claim 1.

[146] dTechs notes that the terms "further comprises" or "further comprising" appear in dependent claims 17 and 18 in a manner that does not suggest a broadening of claim language, but rather a narrowing or refinement:

> a) as pointed out by Mr. LaPlace, the words "further comprises" in the phrase "the digital recording ammeter further comprises a buffer for storage" in claim 17 do not operate to add anything new to the "digital recording ammeter" specified in claim 13, as most digital recording ammeters have buffers for storage; and
>
> b) the words "further comprising: [the meter] transmitting the stored data to a processor for determining measures indicative of electrical consumption patterns" in claim 18 do not add anything new to the claim 1 concept of "collecting data for determining measures indicative of patterns of consumption", but merely provide specificity as to where the processing is performed.

[147] However, the terms "further comprises" or "further comprising" in dependent claims 17 and 18 do not purport to narrow preceding claims, whether dependent or independent.

[148] A more useful interpretative guide to the construction of claim 4 is the Detailed Description of the Preferred Embodiment:

> **An additional advantage** of the system to the utility is the ability to accumulate usage data to **reconcile** with retailer usage data from metered sites. Further, line losses can be identified and rectified, where reconciliation data illustrates **a loss which is not necessarily related to a grow-op**.
>
> **New smart meter technology** is rapidly being introduced to the industry to facilitate time-of-use metering at each residence, permitting utilities to charge for electrical usage dependent upon the time of use and for consumers to take advantage of times at which a lower cost is assessed to the use of electricity. The combination of smart metering at each residence and metering at the primary line, using a system according to embodiments of the invention disclosed herein, **provides significant improvement in the collection of data for reconciliation and identification of losses, including the detection of line loss such as through faulty overhead or underground wires** etc. Simply, the load provided at the primary line should be equal to the sum of all the consumptions measured at each residence, having consideration for known factors of line loss. A discrepancy signals a problem with some part of the line which can be located using the present invention **or other means**.
>
> [Emphasis added]

[149] What emerges from this description is that smart meters offer an additional advantage over the invention described in claim 1, namely energy balancing to identify losses that are not necessarily related to a grow op. The technology is new, and potentially provides significant improvement in the collection of data for reconciliation. A discrepancy may be located using the claimed invention, or by other means.

[150] The use of smart meters for energy balancing, as described in dependent claim 4, is unrelated to the detection of atypical patterns of consumption in comparison with “known consumption patters” in claim 1. There is no equivalent to claim 4 among the dependent claims of independent claim 21, which is otherwise very similar to independent claim 1 (lacking only a specified role for the utility in performing the steps of the method).

[151] Moreover, energy balancing will not identify consumption that is suspicious, but only a difference or discrepancy between energy inputs and outputs. This does not assist in the detection of atypical consumption patterns. Claims 1 and 21 require measuring on the primary line “at predetermined time intervals”. The inventor’s intention was to plot measurements over time to generate patterns in order to compare them with known patterns. This is not the same thing as same-time energy balancing.

[152] A construction of “known consumption patterns” that excludes same-time energy balancing is consistent with the inventor’s approach to solving one of the identified problems, *i.e*., the inability of conventional meters to measure minor discrepancies in electrical consumption on the primary line. This problem does not arise with energy balancing, which is concerned only with reconciling energy inputs and outputs, rather than identifying atypical, excessive, or suspicious consumption.

[153] I therefore conclude that “known consumption patterns” in claims 1 and 21 is limited to historical or predicted patterns of consumption, and does not encompass same-time energy balancing using data from smart meters.

(3) "Notifying the utility"

[154] dTechs asserts that the requirement of "notifying the utility" in claim 1 is not essential, because it can be omitted or substituted without changing the way in which the claimed process works. According to Mr. LaPlace, "instead of the utility receiving an active notification, the utility could passively monitor the results of the comparisons". The key is that the utility identifies the suspect consumption pattern in some way. Once that is done, it can "go to the next step" without there being any express "notification".

[155] BC Hydro contrasts the language of claim 1 with that of claim 21. "Notifying the utility of the identified suspect consumption pattern in the primary line" does not appear in claim 21. Nor does claim 21 contemplate "the utility thereafter monitoring characteristics of the plurality of transformers". Mr. Shepherd expressed the view that this demonstrates a difference in the purposes and intentions of the two claims. Reading the 087 Patent as a whole, the purpose and intent of claim 1 is for an entity that is not a utility (a police officer, for example) to perform some of the steps described in the claim, and for a utility to perform other steps.

[156] Awesense notes that, if the role of the utility is read out of claim 1, then claims 1 and 21 have a virtually identical scope, contrary to the legal principle of claim differentiation. There is a presumption that claims are written so as not to be redundant (*Tetra Tech EBA Inc v Georgetown Rail Equipment Company*, 2019 FCA 203 at para 113).

[157] In *Free World Trust*, the Supreme Court of Canada stated at paragraph 55 that it would be unfair to allow a patent monopoly to be breached with impunity by a copycat device that simply switched bells and whistles, to escape the literal claims of the patent. Thus the elements of the invention are identified as either essential (where substitution of another element or omission takes the device outside the monopoly), or non-essential (where substitution or omission is not necessarily fatal to an allegation of infringement).

[158] The Supreme Court of Canada continued:

> For an element to be considered non-essential and thus substitutable, it must be shown either (i) that on a purposive construction of the words of the claim it was clearly *not* intended to be essential, or (ii) that at the date of publication of the patent, the skilled addressees would have appreciated that a particular element could be substituted without affecting the working of the invention, *i.e.*, had the skilled worker at that time been told of both the element specified in the claim and the variant and "asked whether the variant would obviously work in the same way", the answer would be yes: *Improver Corp. v. Remmington*, *supra*, at p. 192. In this context, I think "work in the same way" should be taken for our purposes as meaning that the variant (or component) would perform substantially the same function in substantially the same way to obtain substantially the same result. […]

[159] Applying the test endorsed in *Free World Trust*, it is clear that "notifying the utility" is not an essential element of claim 1. At the date of publication of the 087 Patent, the PSA would have appreciated that "notifying the utility" could be substituted without affecting the working of the invention. If asked whether the invention would obviously work in the same way without the step of notifying a utility, the answer would be yes.

[160] This does not amount to "reading out" the requirement of "notifying the utility" from claim 1. It is merely the acknowledgment that the invention works in precisely the same way regardless of whether this step is included. Nor does this construction render claim 21 redundant. A harmonious interpretation of claims 1 and 21 is that the former is directed, in part, to an external investigator, such as a police officer, while the latter is directed to another entity, *e.g.*, a utility that performs the investigation in-house, or (as suggested by counsel for dTechs in closing submissions), an end user or customer.

[161] In light of this conclusion, it follows that "notifying the utility" in claim 1 does not require that a non-utility perform each of the preceding steps described in that claim.

X. Infringement

A. *Legal Principles*

[162] Section 42 of the *Patent Act* grants the patent holder the exclusive right, privilege and liberty of making, constructing and using the invention and selling it to others to be used. A patent is infringed by any act that interferes with the patentee's full enjoyment of the monopoly granted (*Monsanto Canada Inc v Schmeiser*, 2004 SCC 34 [*Monsanto*] at para 34).

[163] Pursuant to s 55(1) of the *Patent Act*, any person who infringes a patent is liable for all damages sustained by the patentee after the grant of the patent by reason of infringement. The

burden of proving infringement rests with the party that alleges it (*Monsanto* at para 29). The burden therefore falls upon dTechs.

B. *Analysis*

[164] The parties agree that the 087 Patent describes a method or process. The asserted claims are infringed only if the Defendants perform each of the steps described in the claims in the prescribed order.

[165] Mr. LaPlace based his opinion that the Defendants infringe the asserted claims of the 087 Patent on a series of assumptions provided to him by counsel for dTechs regarding the "BC Hydro System" and the "Awesense System". These assumptions included the following:

> 5. The BC Hydro System involves:
>
> a. monitoring primary supply line consumption with a meter that:
>
> i. measures electrical consumption in amps;
>
> ii. measures electrical consumption at predetermined intervals;
>
> iii. has a resolution of 0.1 amps;
>
> iv. is digital;
>
> v. stores the readings it takes; and
>
> vi. wirelessly transmits stored readings;
>
> b. collecting the measurements taken from the primary supply line over a period of time;

c. comparing the measurements collected from the primary supply line with the sum of all consumption across associated secondary supply lines:

i. as measured by smart meters connected to the secondary supply lines at end point structures; and

ii. as aggregated on a per-transformer basis;

d. using that comparison to identify discrepancies between measured supply on the primary line versus measured consumption on the associated secondary lines;

e. in particular, identifying discrepancies where supply measured on the primary line is greater than consumption as measured for the associated secondary lines;

f. where a discrepancy is identified, investigating applicable transformers to identify a suspect transformer using multiple techniques, including:

i. through the use of infrared cameras to identify hot transformers;

ii. visual clues; or

iii. hanging meters to isolate a suspect transformer;

g. once a suspect transformer has been identified, load testing at least one of a plurality of secondary lines from the suspect transformer to each of the plurality of structures to identify a potential instance of theft.

[…]

8. The Awesense System involves:

a. removable meters capable of monitoring primary supply line consumption that have the characteristics identified in 5(a)(i) to (vi), above;

b. software that collects the measurements taken from those meters over a period of time;

c. software that allows for comparison of the measurements collected from those meters attached to the primary supply line with the sum of all consumption across associated

> secondary supply lines, where the secondary supply line measurements are based on:
>
> > i. measurements taken by smart meters connected to the secondary supply lines at end point structures;
> >
> > ii. measurements of secondary consumption aggregated on a per-transformer basis; and / or
> >
> > iii. historical billing data;
>
> d. software capable of performing a "balance" to identify discrepancies between measured supply on the primary line supply versus measured or historical consumption on the associated secondary lines;
>
> e. where a discrepancy is identified, a method for:
>
> > i. investigating applicable transformers to identify a suspect transformer that involves deploying further meters of the type described in 8(a) to segment the primary line and isolate the suspect transformer; and
> >
> > ii. once a suspect transformer has been identified, load testing at least one of a plurality of secondary lines from the suspect transformer to each of the plurality of structures to identify a potential instance of theft.

[166] dTechs has sought to provide a factual basis for these and other assumptions underlying Mr. LaPlace's opinions through the testimony of witnesses at trial, documents entered as exhibits, and read-ins from examinations for discovery of the Defendants' representatives.

[167] In closing submissions, dTechs divided its allegations of infringement into two distinct time periods:

> First, between 2012 and 2015, BC Hydro infringed through its use of approximately 300 Raptor meters and software purchased and leased from Awesense under the June 6, 2012 and May 27, 2014

> agreements. This use is referred to as the "Initial BC Hydro System".
>
> Second, from 2015 to present, BC Hydro infringed and continues to infringe, through its use of approximately 5,000 Raptor meters and software purchased from Awesense under the November 19, 2014 agreement. The use is referred to as the "EAS BC Hydro System".

[168] BC Hydro objects that the idea of two distinct BC Hydro "systems" was raised for the first time in dTechs' closing argument. The alleged distinction is nowhere to be found in dTechs' pleadings, and Mr. LaPlace drew no distinction between different BC Hydro "systems" in his infringement report.

[169] More fundamentally, BC Hydro says that if the Court accepts its proposed construction of "known consumption patterns" in claims 1 and 21, then neither BC Hydro nor Awesence can be said to infringe the 087 Patent.

[170] BC Hydro does not dispute that it performs each of the steps of placing meters on primary lines, investigating transformers, including by visual inspection and heat assessment, and load-testing secondary lines and service lines to residences. However, BC Hydro maintains that it uses multiple techniques to identify energy imbalances in its electrical network as part of its overall approach to theft detection. These include meter-level analytics, transformer-level analytics (which are derived from smart meter data), other analytical tools, and review of BC Hydro's extensive database of prior investigations and case histories.

[171] BC Hydro acknowledges that the method it uses to detect theft or technical losses of electricity may, in some instances, involve the comparison of a reading on the primary line with the sum of all secondary end-point readings at the same time. However, BC Hydro asserts that this is not a comparison to historical or predicted consumption patterns. BC Hydro therefore says that the assumptions relied upon by Mr. LaPlace do not support the conclusion that BC Hydro has performed the step of comparing primary line readings to "known consumption patterns".

[172] According to BC Hydro, if "comparing … to known consumption patterns" is construed in any manner other than the one proposed by dTechs, then Mr. LaPlace has offered no opinion on infringement of the claims as construed, and there is no evidence of infringement at all.

[173] Awesense makes the same point in a slightly different way. Awesense says that dTechs has staked its entire case on the construction of "known consumption patterns" in independent claims 1 and 21 to encompass known electrical consumption derived from same-time smart meter data. Mr. LaPlace did not consider any other claim construction, and he has therefore not examined whether BC Hydro or Awesense carry out the step of comparing metered consumption on a primary supply line with historical or estimated consumption. According to Awesense, if Mr. LaPlace is incorrect in his construction of "known consumption pattern", then dTechs has failed to demonstrate that either of the Defendants has infringed any of the asserted claims, and dTechs' action must be dismissed.

[174] I have construed "known consumption patterns" to mean historical or predicted patterns, and to exclude same-time data derived from smart meters. I therefore agree with BC Hydro and

Awesense that dTechs has not established infringement of the 087 Patent. There is no evidence that BC Hydro or Awesense compare any primary line readings to “known consumption patterns”, as that element of independent claims 1 and 21 is properly construed.

[175] BC Hydro also distinguishes its methods from the one described in the 087 Patent on the grounds that it does not systematically monitor all transformers for theft detection, and it uses energy meters, rather than ammeters, to monitor on the primary line. An energy meter measures both volts and amps, while an ammeter measures only the latter. In light of my conclusion that BC Hydro does not compare metered consumption on the primary supply line with historical or predicted consumption patterns, it is unnecessary to consider these arguments further.

[176] This is sufficient to dispose of dTechs’ allegations of infringement. I will nevertheless comment briefly on dTech’s assertion that Awesense is liable for inducing or procuring BC Hydro to infringe the 087 Patent, or indirectly liable pursuant to the legal doctrine of common design.

[177] In order to infringe a method claim, an alleged infringer must carry out the claimed method. With the possible exception of “providing a meter” in independent claim 1, Awesense does not perform any of the essential steps of the method described in the 087 Patent.

[178] There is no infringement of a patent in selling an article that does not in itself infringe the patent, even when the vendor knows that the purchaser buys the article for the purpose of using it

in the infringement of the patent (*Uponor* at para 285). Awesense's supply of hardware and software to BC Hydro cannot in itself infringe the asserted claims.

[179] BC Hydro employees may use Awesense's TGI software to perform calculations and analysis, but this does not mean that Awesense performs those steps. Awesense exercises no control over the manner in which BC Hydro uses TGI. There is no evidence that Awesense ever induced BC Hydro to infringe the asserted claims, or to support an allegation of infringement by common design.

[180] I therefore conclude that neither BC Hydro nor Awesense, individually or together, infringes the asserted claims of the 087 Patent.

XI. Validity

[181] Subsection 43(2) of the *Patent Act* states that a patent is presumed to be valid in the absence of evidence to the contrary. A party alleging invalidity bears the burden of establishing this on a balance of probabilities. The burden therefore falls upon BC Hydro and Awesense.

[182] BC Hydro and Awesense allege that the 087 Patent is invalid on the grounds of anticipation, obviousness, insufficiency, inutility, overbreadth, and non-patentable subject-matter.

A. *Anticipation*

(1) Legal Principles

[183] Pursuant to s 28.2 of the *Patent Act*, a patent claim is invalid for anticipation if the subject matter defined by the claim was disclosed in such a manner that it became available to the public more than one year before the filing date of the application, if disclosed directly or indirectly by the patentee (s 28.2(1)(a)), or at any time before the claim date, if disclosed by any other person (s 28.2(1)(b)), and was enabled to a skilled person (*Eli Lilly Canada Inc v Mylan Pharmaceuticals ULC*, 2015 FC 125 at para 145). Disclosure need not reveal an exact description of the subject matter of a claim, but must be sufficient so that, when read by a PSA who is willing to understand the invention, it can be understood without undue burden. The requirement of prior disclosure means that the prior patent must disclose subject matter which, if performed, would necessarily result in infringement of the patent (*Apotex Inc v Sanofi-Synthelabo Canada Inc*, 2008 SCC 61 [*Sanofi*] at para 25).

[184] If the disclosure requirement is satisfied, the second requirement to prove anticipation is enablement, *i.e.*, whether the PSA would have been able to perform the invention. Trial and error experimentation is not permitted at the disclosure stage, but is permitted at the enablement stage. For the purposes of enablement, the question is no longer what the PSA would think the disclosure of the prior patent meant, but whether he or she would be able to work the invention (*Sanofi* at para 27).

[185] BC Hydro alleges that the 087 Patent is anticipated by BC Hydro's prior use, Mr. Morrison's "Operation Lights Out" proposal [OLO Reference], and a publication by Saptarshi De, Rahul Anand, A. Naveen and Sirat Moinuddin titled "Solution for checking energy thefts and streamlining revenue collection in India" [De Reference].

(2) BC Hydro's Prior Use

[186] BC Hydro says that the method of the 087 Patent was known and commonly used by its investigators from the early 2000s onwards. BC Hydro relies on the evidence of Mr. Trustham, who conducted energy theft investigations as part of his employment with BC Hydro.

[187] dTechs denies that BC Hydro's prior use is anticipatory for three reasons: the method used by BC Hydro at the relevant time differed from that of the 087 Patent; BC Hydro's method was not disclosed to the public; and the testimony of Mr. Trustham was uncorroborated and is therefore unreliable.

[188] According to Mr. Trustham, prior to 2006 BC Hydro personnel would:

(a) attend at a neighborhood without any prior tip or knowledge of any energy diversion occurring or any marijuana grow op being present;

(b) monitor a primary line over a period of time (including during the day and again at night) with an ammeter such as a DRA – examples of DRAs used by BC Hydro at

this time include the SensorLink Amcorder or VARcorder recording ammeter, as well as the SensorLink Amp Stick;

(c) compare the measured current readings in the previous step with what they would expect the consumption on the primary line to be, based on the number of structures being serviced by the primary line and historical consumption data and/or their experience;

(d) confirm whether there was likely an energy diversion occurring based on a discrepancy in energy consumptions as a result of the comparison in the previous step, *i.e.*, the measured consumption was significantly greater than what was expected;

(e) attempt to identify where the energy diversion may be occurring by locating the transformer that was carrying a higher than normal amount of energy using current readings of each downstream transformer, or temperature readings taken from downstream transformers using an infrared thermometer such as a handheld infrared thermometer with a laser sight; and

(f) ascertain the location of the diversion by load-testing secondary lines (including service lines), and comparing those measurements to metered and/or historical energy consumption of all residences to identify the specific residence of concern.

[189] Mr. Trustham testified that BC Hydro personnel shared their investigative techniques with each other, and also with police officers who expressed interest in the method.

[190] dTechs says that the investigations described by Mr. Trustham involved looking for unexpectedly high loads at a single point in time, not comparing patterns of consumption over time as contemplated by the 087 Patent. Mr. Trustham did not use DRAs to compare patterns of consumption, but because the investigators needed to wait for the theft to begin: "a lot of times the theft that was going on was going on overnight or in the evening hours and we could not stay there all night and keep taking readings".

[191] The 087 Patent does not specify when or how "patterns of consumption" and "known consumption patterns" in claims 1 and 21 are to be measured. The Detailed Description of the Preferred Embodiment states only that the invention comprises a meter connected to the primary electrical line to monitor for fluctuations in consumption relative to "a known mean or average consumption which has been determined for a particular area". There is no reason why this would exclude the comparison by BC Hydro's investigators of measured current readings at different time intervals with what they would expect the consumption on the primary line to be, based on the number of structures being serviced by the primary line, historical consumption data and/or their experience.

[192] I am satisfied that the investigative steps performed on behalf of BC Hydro, as described by Mr. Trustham, would infringe the 087 Patent. As the Supreme Court of Canada ruled in *Sanofi*, it is not necessary for the "exact invention" to have been made and publicly disclosed.

The requirement of prior disclosure means only that the prior patent must disclose subject matter which, if performed, would necessarily result in infringement of that patent (*Sanofi* at para 25).

[193] dTechs disputes BC Hydro's assertion that its prior use "became available to the public" within the meaning of s 28.2 of the *Patent Act*. Mr. Trustham said only that he "discussed techniques" with other people, including police officers who had expressed an interest.

[194] The Federal Court of Appeal has defined "the public" as a single person who is "free in law and equity to examine it" (*Baker Petrolite Corp v Canwell Enviro-Industries Ltd*, 2002 FCA 158 at para 42, citing *Lux Traffic Controls Ltd v Pike Signals Ltd*, [1993] RPC 107). Disclosure to "a single member of the public without inhibiting fetter" is sufficient to meet the requirements of s 28.2(1)(a) of the *Patent Act*. Assuming Mr. Trustham's evidence is reliable, disclosure to the public of BC Hydro's prior use is established.

[195] dTechs notes the absence of any documentation to confirm that BC Hydro engaged in any kind of theft investigation on primary MV lines prior to May 31, 2006. In particular, BC Hydro did not produce:

(a) any "Diversion Detail" database report showing use of primary line DRAs prior to May 31, 2006, despite those reports apparently being created for BC Hydro at the time;

(b) any paper file or other record showing the use of a DRA on a primary line for theft investigation prior to May 31, 2006, despite those records having been generated by

Accenture when it performed field investigations for BC Hydro, and Mr. Trustham's statement that linesmen would ordinarily keep records "of what they [were] doing"; and

(c) any polices or procedures related to use of primary line metering for theft detection prior to May 31, 2006.

[196] dTechs asks this Court to draw an adverse inference against BC Hydro. Accenture provided theft detection services to BC Hydro during the relevant period, but no supervisor or employee of Accenture was called to testify in these proceedings. Without supporting documentation or corroboration by other witnesses, dTechs says that Mr. Trustham's testimony cannot be relied upon. He testified in general terms, and did not provide specific dates or instances.

[197] I accept dTech's admonition that uncorroborated witness evidence of prior use must be weighed with caution (*Camso Inc v Soucy International Inc,* 2019 FC 255 at para 117). A witness' recollection of events that occurred many years in the past is subject to the frailties of memory, even where the witness has no particular interest in the matter.

[198] However, I disagree with dTechs' assertion that Mr. Trustham's evidence was uncorroborated. In the course of his testimony, he produced examples of the equipment that he used to monitor current on the primary line prior to 2006, specifically a SensorLink Amcorder and a Sensorlink VARcorder, as well as a SensorLink AmpStik. Photographs of the devices were entered into evidence as exhibits.

[199] Mr. Trustham's testimony is also consistent with that of Mr. Shaigec, a witness called on behalf of Awesense. Mr. Shaigec investigated energy theft on behalf of Fortis BC, and was employed by Accenture in the same group that conducted investigations on behalf of BC Hydro. Mr. Shaigec testified that, as early as the fall of 2005, he was investigating power theft using both the SensorLink Ampstik and the SensorLink VARcorder.

[200] The affidavit of Gary Lee Hielkema, President of SensorLink Corporation, was entered as an exhibit on consent. Mr. Heilkema appended to his affidavit the specification sheet and calibration report for the Sensorlink VARcorder. The specification sheet for the VARcorder confirms that the device had a resolution of 0.1A. The calibration report for the VARcorder confirms that the device was available in October 19, 2005, demonstrating that the device was in use prior to that date.

[201] According to records retained by Fortis BC, on March 26, 2006, Mr. Shaigec investigated a possible electricity theft at a large property in Kelowna that comprised three metered structures. He and a colleague placed a SensorLink VARcorder on the primary line that supplied the suspect property. The amperage and power factor readings collected by the VARcorder were subsequently reconciled with the metered consumption at the property. No further action was taken, as the VARcorder readings were consistent with the metered data.

[202] The evidence of both Mr. Trustham and Mr. Shaigec establishes that, prior to 2006, investigators retained on behalf of utilities were using DRAs with a resolution of 0.1A on the primary MV line to identify atypical consumption patterns. The meter readings on the primary

line were then compared with known consumption patterns at customer service points on secondary lines in order to identify a suspect transformer and, from there, a suspect property.

[203] Contrary to Mr. Morrison's understanding, high-resolution DRAs were in fact available and used to measure current on primary lines before 2006. Mr. Trustham's testimony, which was challenged on cross-examination only with respect to his record-keeping, was corroborated in important respects by the testimony of Mr. Shaigec, contemporaneous documentation, and the actual devices he used to investigate electricity theft from the early 2000s onwards.

[204] Mr. LaPlace did not dispute Mr. Shepherd's opinion regarding BC Hydro's prior use, except by noting that BC Hydro's investigative techniques did not involve comparison with "same-time consumption patterns". I have found "same-time consumption patterns" to be excluded from the construction of claims 1 and 21. There is therefore no evidence to contradict Mr. Shepherd's conclusion that BC Hydro's prior use anticipates and enables independent claims 1 and 21. The same is true of Mr. Shepherd's opinion that BC Hydro's prior use anticipates and enables dependent claims 5 to 9 (but not claim 4), 13 to 20, 23 to 29 (but not claim 22) and 33 to 35. I therefore conclude that these claims of the 087 Patent are anticipated by BC Hydro's prior use, and are invalid.

(3) OLO Reference

[205] The OLO Reference was authored by Mr. Morrison and is dated October 7, 2004. The OLO Reference discloses an early version of the invention that eventually became the subject of the 087 Patent.

[206] dTechs says that the OLO Reference cannot be anticipatory, because it was not disclosed by Mr. Morrison "before the one-year period immediately preceding the filing date", or "in such a manner that the subject matter became available to the public in Canada or elsewhere", as stipulated in s 28.2(1)(a) of the *Patent Act*. The filing date of the 087 Patent is May 31, 2006. According to dTechs, the only disclosure made by Mr. Morrison of the OLO Reference prior to May 31, 2005 was internally to his superiors at the CPS, and by them to the utility ENMAX.

[207] dTechs asserts that disclosure by Mr. Morrison to the CPS was in the context of a proposed police operational plan, and was done in confidence. The disclosure by the CPS to ENMAX was to permit the utility to assess the technical viability of the proposal. Mr. Morrison testified that confidentiality was an inherent aspect of the working relationship between ENMAX and the CPS, because it concerned the identification of illegal drug operations.

[208] As previously discussed, the public is defined as a single person who is free at law and in equity to use the information. Disclosure to a single member of the public without inhibiting fetter is sufficient to meet the requirements of s 28.2(1)(a) of the *Patent Act*.

[209] The CPS owed no obligation of confidentiality to Mr. Morrison. It was Mr. Morrison's intention that the police approve the implementation of his operational plan. The CPS was free to use the OLO Reference as it saw fit, and it did so. It shared the document internally and with ENMAX. There is no direct evidence to establish that the utility owed an obligation of confidentiality to Mr. Morrison or the CPS.

[210] Mr. Morrison's hearsay evidence that ENMAX understood the importance of treating police information confidentially does not constitute an inhibiting fetter in law. Nor is it consistent with Mr. Morrison's admission that the ideas contained in the OLO Reference, and possibly the document itself, were shared with a City of Calgary Councillor named Diane Colley-Urquhart. Ms. Colley-Urquhart was part of a coalition to stop marijuana grow-ops, and later served on the Calgary Police Commission.

[211] Mr. Morrison could not say whether Ms. Colley-Urquhart received a copy of the OLO Reference, but she clearly knew of its existence and the fact that it had been submitted to ENMAX. Mr. Morrison hoped that Ms. Colley-Urquhart would persuade ENMAX to "take another look" at his idea. He says he learned subsequently that she had been told the method would not work. There is no dispute that the disclosure of the OLO Reference within the CPS and to ENMAX, and possibly to Ms. Colley-Urquhart, all occurred in late 2004.

[212] Mr. Morrison was not always present when the OLO Reference was discussed within the CPS or ENMAX. He exercised no control over the persons to whom the document was distributed, or what the recipients did with it. Both the CPS and ENMAX were free at law and in

equity to use the information contained in the OLO Reference. Mr. Morrison's disclosure of the OLO Reference was therefore a public disclosure within the meaning of s 28.2 of the *Patent Act*.

[213] dTechs' primary argument respecting the OLO Reference is that it was not disclosed by Mr. Morrison within the relevant time period. However, dTechs also maintains that the OLO Reference did not divulge a number of important aspects that were subsequently included in the 087 Patent, such as same-time data reconciliation and the use of an ammeter.

[214] BC Hydro acknowledges that the OLO Reference did not disclose the use of smart meters, and therefore could not anticipate claim 4. However, BC Hydro says that all of the other asserted claims are anticipated by the OLO Reference. The only requirement of anticipation is disclosure of a single embodiment that falls within the claim.

[215] Mr. LaPlace agreed with Mr. Shepherd that the OLO Reference does not anticipate claim 4 of the 087 Patent. Regarding the remaining elements, Mr. LaPlace said only the following (Expert Report of Carl LaPlace dated August 25, 2020 at para 32):

> With respect to the "comparing the patterns of consumption to known consumption patterns for identifying suspect consumption patterns" element of claim 1 and 21, the OLO Reference is restricted to comparing against a "a simple formula of common averages of usage, plus a … added tolerance" ([OLO Reference] at page 2). Therefore, the comparison is against historical "common averages", and not same-time consumption patterns, to detect deviations. This is more restrictive than claims 1 and 21, which allow for comparison against both historical and same-time consumption patterns. […]
>
> With respect to the "resolution for detecting electrical consumption in a range of less than 1 amp" or "about 0.01 to about 0.1 amp" elements referenced in claims 7, 8, 27, 28, those elements specify

> that the meter used in the claims is an ammeter, as noted by Mr. Shepherd at pages 40 and 41 of his report. The meter specified in the OLO Reference is an "electrical profiling device" that "will monitor the electrical load ... and ... electrical usage" ([OLO Reference] at page 2). In this context, it is my opinion that a skilled person would interpret an "electrical profiling device" that measures electrical usage as being an energy meter and not an ammeter. […] a system that uses an energy meter is a meaningfully different system than one that relies only on an ammeter in terms of measurement methodology, safety, cost and accuracy.

[216] Mr. LaPlace's first point is premised on the assumption that claims 1 and 21 of the 087 Patent include comparison against both historical and same-time consumption patterns. I have rejected this construction of claims 1 and 21, and accordingly this does not provide a basis for distinguishing the disclosure of the OLO Reference from the 087 Patent.

[217] Mr. LaPlace's second point draws a distinction between an energy meter and an ammeter. According to his expert report, the OLO Reference contemplates use of only an energy meter, and excludes an ammeter. However, Mr. LaPlace also expressed the view that the PSA would not consider using an energy meter to detect electricity theft on the primary line (Expert Report of Carl LaPlace dated August 25, 2020 at para 43(a)):

> […] In 2006, there were no commercially available "easy to install" energy meters that could be installed along the primary/feeder line without the need to interrupt power. And in 2006, a person skilled in the art would have considered it impractical to take sufficiently accurate energy measurements at the primary/feeder level only (*i.e.*, not in conjunction with transformer meters) to allow energy balancing with associated secondary loads and/or service points sensitive enough to detect atypical patterns of consumption associated with energy theft, especially in the higher density urban service areas and near feeder substations.

[218] I am therefore not persuaded that the PSA would read the OLO Reference as permitting only the use of an energy meter, and excluding the use of an ammeter. I accept Mr. Shepherd's opinion that all of the asserted claims of the 087 Patent, with the exception of claim 4, are anticipated and enabled by the OLO Reference. These claims of the 087 Patent are therefore invalid.

(4) De Reference

[219] The De Reference is a short academic study that proposes a solution to the problem of "lean revenue collection in lieu of energy supplied due to energy thefts and network losses" in India. Its date of publication is not immediately apparent, but the document is copyrighted 2003. There is no dispute that it pre-dates the 087 Patent by a number of years.

[220] According to the Introduction of the De Reference:

> The e-metering architecture proposed in this study is a multifunctional approach to read the energy meters located at the consumer sites (residential, industrial or commercial). The readings are remotely collected and after processing used for theft detection. The data are also used for calculation of transmission and distribution (T&D) losses. It can also be extended for real time monitoring of the power distribution network and implementation for *distribution automation*. [Emphasis original.]

[221] The "e-metering architecture" proposed in the De Reference entails the installation of numerous energy meters, or "nodes", in multiple "layers":

> The layer architecture is chosen to reduce the complexity of the network. The first layer consists of Energy Meter Unit (EMU) located at the sub-stations, feeders, distribution transformers and consumer premises. A cluster of approx. 500 nodes (EMUs) is connected to a local node, which is the second layer. A number of such nodes are connected to form a Local Node Center (LNC), which is the next layer.
>
> Then comes the fourth layer called the Area Collection Center (ACC) that is connected to the LNCs under its jurisdiction. The topmost layer of the distributed data network is called the Master Control and Information Center (MCIC), which is connected to all the ACCs.

[222] BC Hydro describes this as "smart grid" solution that deploys meters throughout the distribution system, including at substations, on feeders, at transformers, and at customer premises. BC Hydro says that this combination of meter locations is similar to the configuration it uses to monitor for theft and other losses. According to BC Hydro, the De Reference anticipates all of the asserted claims of the 087 Patent even if dTechs' proposed construction of claims 1 and 4 is accepted.

[223] dTechs responds that the widespread deployment of transformer metering is a fundamentally different metering strategy from the one described in claims 1 and 21 of the 087 Patent, which describe metering on the primary line alone. The purpose of the step-based approach to theft detection is to avoid the cost of having to deploy transformer meters system-wide: a single primary line meter monitors an area served by a "plurality of transformers", and transformers are investigated only once a discrepancy is identified on the associated primary line.

[224] According to the Description of the 087 Patent, one of the stated objectives of the invention is to "minimize the number of meters by about 10-fold over conventional transformer-

based metering". dTechs argues that the widespread deployment of transformer metering proposed by the De Reference negates the benefit of the method described in the 087 Patent. In the words of Mr. LaPlace, "[i]f you're monitoring at the transformer levels for theft detection, you don't even need primary metering. So you could just throw the primary metering out."

[225] The difficulty with dTech's position is that it is inconsistent with its assertion that BC Hydro's use of a "smart grid" solution that deploys meters throughout the distribution system is capable of infringing the 087 Patent. I have found that BC Hydro's method does not infringe the 087 Patent, but this has nothing to do with the configuration of the meters it uses to monitor for theft and other losses. The reason that BC Hydro's system does not infringe the 087 Patent is that it compares patterns of consumption to same-time data from smart meters. BC Hydro's system is otherwise comparable to the one described in the De Reference.

[226] dTechs says that the De Reference does not anticipate the use of an ammeter, as contemplated in claims 7, 8, 13, 14, 15, 27, 28, 33, 34 and 35. Instead, an energy meter is specified. Mr. LaPlace explained that deploying an energy meter to a primary line is more difficult and less safe than deploying an ammeter, because an energy meter must also measure the high voltage running through the primary line and not just the current. While an ammeter provides less accuracy for theft detection, it can be deployed to MV lines more easily and safely.

[227] The meter described in the De Reference is capable of recording multiple parameters, including "line current" measurements. It can therefore function as an ammeter. Claims 1 and 21

are silent about whether the meter is an ammeter, capable of measuring only current, or an energy meter, capable of measuring both current and voltage.

[228] All expert witnesses agreed that the De Reference discloses metering on the primary line to identify variations from known (*i.e.*, historical) consumption patterns in order to detect suspicious deviations. The De Reference uses the term "base profile", but this is the same as "known consumption patterns" in the 087 Patent. Similar to the 087 Patent, the De Reference teaches the use of a threshold for triggering an investigation (10-15% over an expected value in the De Reference, compared to 25% in the 087 Patent).

[229] The De Reference describes the System Features as follows (at page 656):

> The system will create a base energy profile of each EMU for six month [*sic*] or one year. A database of the base energy profiles of each EMU is maintained and will be updated if required. Any deviation of 10-15% between the metered profile and the base profile will indicate a possible case of fault or energy theft.
>
> In case of a significant deviation, the distribution utility is required to send its vigilance team to the suspected sub system for verifying reasons for the deviation and take appropriate actions. […]

[230] According to Mr. Shepherd:

> The Skilled Person would understand "base energy profile" described in De to be "known consumption patterns", and the "metered profile" to be "patterns of consumption". The Skilled Person would further understand that De explains that when there is a deviation between the metered profile and the base profile over a certain threshold, the "metered profile" is suspect.

> This "comparison" step is enabled in De by providing the criteria of 10-15% deviation being a trigger for a suspect situation. Apart from the magnitude of the deviation, this is the same approach described in the 087 Patent […]

[231] BC Hydro compares sending a "vigilance team" in the De Reference to "notifying the utility" and sending "Utility Trouble Service personnel" to investigate in the 087 Patent. The De Reference also discloses energy balancing with smart meters in a manner that is similar to claim 4 of the 087 Patent. The meters in the De Reference are "smart meters", and energy reconciliation using smart meters is described as an "additional advantage" of the system.

[232] Mr. LaPlace implicitly acknowledged that the De Reference discloses the embodiment of the 087 Patent that involves a comparison of meter data with historical consumption patterns (Expert Report of Carl LaPlace dated August 25, 2020 at para 28(b)):

> With respect to the "comparing the patterns of consumption to known consumption patterns" element of claims 1 and 21, the De Reference is restricted to comparing against a "base energy profile of each EMU for six months or one year" ([De Reference] at page 656). Therefore, the functional intent of the EMU is to compare against historical energy profiles, and not same-time consumption patterns, to detect any significant deviations. This is more restrictive than claims 1 and 21, which allow for comparison against both historical consumption patterns and same-time consumption patterns.

[233] Once again, it appears that Mr. LaPlace has premised his opinion on the assumption that claims 1 and 21 encompass the comparison of patterns of consumption with same-time data obtained from smart meters. I have rejected this claim construction above. Furthermore, as Awesense points out, the implication of Mr. LaPlace's conclusion that the De Reference is "more

restrictive" that the 087 Patent is that it must inevitably anticipate claims 1 and 21: the only requirement of anticipation is disclosure of a single embodiment that falls within the claim.

[234] In light of Mr. LaPlace's concession that the 087 Patent differs from the De Reference only with respect to its comparison of consumption patterns with same-time data from smart meters, there is no evidence to contradict Mr. Shepherd's opinion that the De Reference anticipates and enables independent claims 1 and 21 of the 087 Patent, as well as dependent claims 4 to 9, 13 to 20, 22 to 29 and 33 to 35. These claims of the 087 Patent are therefore invalid.

[235] BC Hydro relies on a number of additional anticipatory references, but these are offered in the alternative should this Court adopt the construction of claims 1 and 4 advocated by dTechs. Because I have rejected this construction of claims 1 and 4 of the 087 Patent, it is unnecessary to examine these alternative anticipatory references.

B. *Obviousness*

[236] Pursuant to s 28.3 of the *Patent Act*, a patent cannot be issued for an invention that was obvious on the claim date to a person skilled in the art or science to which the patent pertains. Obviousness is to be assessed as of the priority date: February 10, 2006.

[237] Obviousness is generally considered to be a factual determination, or a question of mixed fact and law (*Wenzel Downhole Tools Ltd v National-Oilwell Canada Ltd,* 2012 FCA 333 at para

44). It must be assessed on a claim-by-claim basis (*Zero Spill Systems (Int'l) Inc v Heide*, 2015 FCA 115 at paras 85, 87-88).

[238] When considering obviousness, hindsight is prohibited. To determine whether a claim is obvious, courts generally follow the four-part test found in *Sanofi* at paragraph 67:

(a) identify the PSA and the relevant common general knowledge of that person;

(b) identify the inventive concept of the claim in question or, if that cannot readily be done, construe it;

(c) identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed; and

(d) viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

[239] The fourth step of the inquiry may require consideration of whether the claimed invention was "obvious to try". This aspect of the test tends to arise in areas of endeavour where advances are often made through experimentation, and where numerous interrelated variables may affect

the desired result (*Sanofi* at paras 68-71). None of the parties suggested that consideration of the fourth step is required in this case.

[240] The PSA and the common general knowledge are discussed above, under the heading Claim Construction.

[241] Mr. Shepherd said the following about the inventive concept of the 087 Patent (Expert Report of J. Bradley Shepherd dated June 9, 2020 at para 167):

> […] it is my opinion that the inventive concept of claim 1 and claim 21 is the same, *i.e.*, a method for detecting and locating the source of atypical electrical consumption wherein a primary supply line is measured for values indicative of electrical consumption and these values are compared to historical or known electrical consumption patterns to identify a suspect consumption pattern, and then monitoring the associated transformers to identify a suspect transformer and testing secondary (service) lines associated with the suspect transformer for purposes of identifying the source of the atypical electrical consumption.

[242] Mr. Shepherd continued in the following paragraph:

> […] Taken as a whole, the combination of steps of this inventive concept discloses no difference relative to the state of the art. Even if it was found that there was a difference(s), in my opinion, that difference(s) cannot possibly be a difference(s) that would have required any degree of invention for all of the reasons I have set out above. In other words, to the extent there was any difference(s) between the state of the art and the foregoing inventive concept, that difference(s) would have been entirely obvious to the Skilled Person.

[243] BC Hydro's argument respecting obviousness draws heavily on its position that the 087 Patent is anticipated and therefore invalid. To the extent that there is any difference between the state of the art and the methods claimed in the 087 Patent, BC Hydro says there is no inventive step required for the PSA, equipped with the anticipatory references and the common general knowledge, to arrive at the claimed method of the 087 Patent directly and without difficulty.

[244] BC Hydro maintains that in-field investigative steps to identify current diversions, or an unusually high load on the distribution network, were well known and part of the common general knowledge at the relevant time. Monitoring transformer characteristics for high loads (including with the use of infrared technology), load-testing secondary lines, and confirming an energy diversion by comparing meters on a service line with customer meters, were all known techniques and within the PSA's common general knowledge.

[245] BC Hydro also maintains that meters, including smart meters, energy meters and ammeters, and all their associated parameters were well known. Before 2006, investigators working on behalf of both BC Hydro and Fortis BC were monitoring the primary supply line (without a prior tip about a marijuana grow op or diversion), including on feeders between the substation and distribution transformers.

[246] dTechs notes that it took BC Hydro a considerable period of time to design and implement its "smart grid" solution for detecting electricity theft and other loss. According to dTechs, after setting out in 2005 to develop a plan for automating theft detection, BC Hydro "cast about for five years" before finally settling on the method described in the 087 Patent.

[247] Mr. LaPlace identified four reasons why the difference between the state of the art and the inventive concept of claims 1 and 21 would not have been obvious to the PSA in 2006:

(a) the PSA would have considered monitoring on the primary line alone to be insufficiently accurate to detect theft, particularly in high-density areas, where there is a plurality of transformers serving a plurality of customers, as contemplated in the 087 Patent;

(b) the PSA would have known that high-resolution meters that could be easily and safely deployed on the primary line on a long-term basis were not readily available – the SensorLink VARcorder had limited application at low load levels, relied on a battery, and did not have wireless communication capabilities;

(c) the PSA would not have considered using an ammeter on the primary line, as opposed to an energy meter, for theft detection; and

(d) the PSA would have understood that smart grid approaches to theft detection were directed towards transformer-level metering, where accuracy was known to be sufficient and meters were known to be safely deployable.

[248] The Federal Court of Appeal has instructed that prior art available to the public at the relevant date should not be excluded when considering the differences between the state of the art and the claimed invention (*Hospira Healthcare Corporation v Kennedy Trust for Rheumatology Research*, 2020 FCA 30 [*Hospira*] at para 86). It is not necessary to demonstrate

that the prior art would have been discovered by the PSA following a reasonably diligent search. BC Hydro therefore takes the position that all of the prior art cited in support of its allegation of anticipation may be considered in the obviousness analysis.

[249] However, the Federal Court of Appeal acknowledged that the discoverability of a prior art reference may be relevant to the fourth step of the obviousness analysis (*Hospira* at para 86):

> The likelihood that a prior art reference would not have been located by a PSA may be relevant to consideration of step 4 of the obviousness analysis (whether differences between the state of the art and the inventive concept constitute steps which would have been obvious to the PSA) in that the uninventive PSA might not have thought to combine that prior art reference with other prior art to make the claimed invention.

[250] Even if the PSA lacks the ingenuity to combine more than one prior art reference to achieve the claimed invention, the De Reference alone discloses monitoring on the primary MV line to detect electricity theft or other losses. The EMUs described in the De Reference are located throughout the distribution network, including at "sub-stations, feeders, distribution transformers and consumer premises." Mr. Shepherd confirmed that the PSA would understand the EMUs at "sub-stations" and "feeders" to be meters on the primary supply line.

[251] Three other prior art references cited by BC Hydro each disclose monitoring on the primary MV line to detect electricity theft or other losses:

(a) A. Ilo, "On-line estimation and location of non-technical losses in a distribution system" (2003) 424 e & i Elektrotechnik und Informationstechnik [Ilo Reference];

(b) PA Government Services Inc, “Improving Power Distribution Company Operations to Accelerate Power Sector Reform” (2005) [USAID Reference]; and

(c) Brent Hughes, “AMI and Theft Detection” (Presentation delivered at the Ontario Smart Metering Symposium, Notawasaga, Ontario, November 2005) [AMI Reference].

[252] Figure 1 of the Ilo Reference illustrates a system with meters installed on distribution feeders. The USAID Reference describes a program implemented in India which included “[i]nstallation of meters and data logging equipment on all 11 kVa feeder lines in order to audit supply against metered sales and to monitor for any unusual operating patterns”. The AMI Reference describes a system that includes meters on “feeder” lines in the rural configuration depicted on page 5. The PSA would not have needed to combine the prior art to understand that electricity theft could be detected by monitoring on the primary line.

[253] The unimaginative PSA, presented with the problem of inefficient monitoring on inaccessible secondary lines at the transformer level, would directly and without difficulty arrive at the solution of monitoring on the primary line instead. This was clearly disclosed in several separate pieces of prior art, and was likely already within the PSA’s common general knowledge. The need for a meter with sufficient resolution to detect variations from known consumption patterns on the primary supply line would be self-evident, and was dictated by basic and well-established electrical concepts. As explained by Mr. Shepherd, all of the essential elements of independent claims 1 and 21 would be within the common general knowledge of the PSA (Expert Report of J. Bradley Shepherd dated June 9, 2020 at paras 131-145):

- connecting a meter to a primary supply line, the meter having sufficient resolution to detect variations from known consumption patterns on the primary supply line;

- monitoring the primary supply line at predetermined time intervals for consumption of electricity;

- collecting data for determining measures indicative of patterns of consumption;

- comparing the patterns of consumption to known consumption patterns for identifying suspect consumption patterns;

- when a suspect consumption pattern is identified, monitoring characteristics of the plurality of transformers for identifying a suspect transformer; and

- load-testing secondary lines from the suspect transformer to identify a suspect structure.

[254] The essential elements of the other asserted claims of the 087 Patent would also be within the common general knowledge of the PSA (Expert Report of J. Bradley Shepherd dated June 9, 2020 at paras 146-164):

- the use of smart meters to reconcile the sum of all consumption at each structure with consumption on the primary supply line (claim 4);

- monitoring the "heat signature" of transformers, and the devices used to monitor the heat signatures (claims 5, 6, 25 and 26);

- the specific resolution of the meter connected to the primary supply line (claims 7, 8, 14, 15, 27, 28, 34 and 35);

- the criteria for determining a "suspect consumption pattern" (claims 9 and 29); and

- the type or characteristics of the meter used on the primary supply line (claims 13, 16, 17, 18, 19, 20, and 33) – DRAs were a well-known type of meter that would record measurements at predetermined time intervals, have a memory (or buffer) to store the recorded values, and provide certain additional functions, such as transmitting recorded data via a communications link to a computer that analyzed (or processed) the data for the purpose of determining or illustrating the measured consumption patterns.

[255] BC Hydro notes that Mr. Morrison has no electrical training, and no direct experience of maintaining an electrical distribution system. Mr. Morrison is significantly less qualified than the PSA, yet he appears to have had little difficulty conceiving the method described in the 087 Patent. Mr. Morrison considered it "clear and self-evident that to put the meter at the primary line instead of at the transformer level was the better way to do it", given the advantages he had identified. The only testing he conducted was to confirm basic and well-established electrical concepts.

[256] I therefore conclude that the asserted claims of the 087 Patent are invalid on the ground of obviousness.

C. *Conclusion re Validity*

[257] The asserted claims of the 087 Patent are invalid on the grounds of anticipation and obviousness. In light of these conclusions, it is unnecessary to consider BC Hydro's arguments that the asserted claims of the 087 Patent are also invalid on the grounds of insufficiency, inutility, overbreadth, and non-patentable subject-matter.

D. *Additional Defences*

[258] BC Hydro and Awesense argue that dTechs lacks the requisite standing to allege infringement or defend the validity of the 087 Patent, because Mr. Morrison conceived of his method in the course of his employment with the CPS. Both Defendants therefore maintain that Mr. Morrison was never the lawful owner of the 087 Patent, and could not have assigned ownership to dTechs.

[259] BC Hydro also raises a defence of "prior use" pursuant to s 56 of the *Patent Act*, and says that it made use of its theft detection methods prior to the claim date of the 087 Patent.

[260] In addition, BC Hydro raises a defence of statutory authority. BC Hydro says it cannot infringe the 087 Patent because the establishment, procurement, and use of its distribution

system metering devices were authorized by the British Columbia *Clean Energy Act*, SBC 2010, c 22 and the *Smart Meters and Smart Grid Regulation*, BC Reg 368/2010 made thereunder.

[261] In light of my conclusions respecting non-infringement of the 087 Patent and invalidity of the asserted claims, it is unnecessary to consider these additional defences.

XII. Disposition

[262] Neither BC Hydro nor Awesense, individually or together, infringes the asserted claims of the 087 Patent.

[263] Independent claims 1 and 21 of the 087 Patent, as well as dependent claims 4 to 9, 13 to 20, 22 to 29 and 33 to 35 of the 087 Patent, are invalid on the grounds of anticipation and obviousness.

JUDGMENT

THIS COURT'S JUDGMENT is that:

1. Neither British Columbia Hydro and Power Authority nor Awesense Wireless Inc, individually or together, infringes the asserted claims of Canadian Patent 2,549,087 [087 Patent].

2. Independent claims 1 and 21 of the 087 Patent, as well as dependent claims 4 to 9, 13 to 20, 22 to 29 and 33 to 35 of the 087 Patent, are invalid on the grounds of anticipation and obviousness.

3. If the parties are unable to agree upon costs, they may make written submissions, not exceeding seven pages, within 21 days of the date of this Judgment. Responding submissions, not exceeding three pages, may be made within 10 days thereafter.

"Simon Fothergill"
Judge

FEDERAL COURT

SOLICITORS OF RECORD

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