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Energy Strategy Submissions
Department of State Growth
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Dear Sir/Madam

Thank you for the opportunity to submit comment on the draft document *Restoring Tasmania's Energy Advantage*.

Stop Smart Meters Australia (SSMA) is a volunteer-based advocacy group which incorporated as an Association in April 2013 in response to widespread community objection to the Victorian State Government mandated Advanced Metering Infrastructure (AMI) rollout. Victorian media reported in December 2011 that "*Almost 90,000 of the more than 900,000 customers approached by [smart meter] installers so far have turned them away*."

Serious concerns about the passing of runaway rollout costs on to consumers have been raised, in conjunction with a growing public awareness of smart meters' dubious energy merits. These concerns, along with increased reporting of adverse health effects alleged to be the result of exposure to smart meters' pulsed microwave emissions, and emerging data privacy, fire and security issues, has led to growing worldwide disillusion regarding the benefits of wireless smart meters and their ability to contribute to energy efficiency. In Victoria, it has also led to the formation of a political party ('People Power Victoria – No Smart Meters') which contested the 2014 state election.

SSMA commends the Tasmanian Government's vision of restoring energy as a competitive advantage for Tasmania. SSMA concurs that the nine outcomes which have been detailed in the draft as an indication of success provide worthwhile goals. Our submission focuses on the aspects of this vision which have assumed that smart meters and cost reflective tariffs are lynchpins in the achievement of this vision.

Deployment of Advanced Metering Infrastructure (AMI) leads to higher energy prices

SSMA contends that the cost benefits associated with smart meter rollouts result in increased costs for consumers, in return for marginal benefits. The disconnect between costs and benefits is accentuated in AMI rollouts which rely on the deployment of wireless technology, as opposed to rollouts which are able to utilise or co-exist with other telecommunication services on a hard-wired network, such as fibre optic cabling.

Some of the factors leading to (permanently) increased energy prices include:

I. Costs associated with replacing electro-mechanical meters with electronic meters

Smart meter technology represents a radical departure from the simple electro-mechanical architecture of traditional accumulation meters. Smart meters have a vastly shorter effective life in view of their electronic components. In Victoria, electricity distributors struggled to obtain 15 year warranties on their AMI meters (Deloitte 2011, p. 48). The likelihood that functionality will need to be altered, or enhanced, is also likely to lead to the need to frequently swap over technology. This means that a transition to smart meters results in consumers being locked into paying for ongoing hardware, firmware and software upgrades.

II. Possible future cost of migrating AMI to new radiofrequency bandwidth

The allocation of the radiofrequency bandwidth currently utilised in Australia for mesh networked (mesh networks currently being the favoured technology in Australia for AMI) wireless smart meters' transmissions is also far from being a 'settled' issue. Existing consumers with smart meters are likely to be subjected to significant costs if bandwidth for smart meter transmissions is re-allocated.

The Australian Communications and Media Authority (ACMA) raised the possibility in 2011 of moving these transmissions, which are currently in the 915 MHz to 928 MHz band, to the 928 MHz to 933 MHz band, due to overcrowding in the current segment, and the likelihood that smart meter communications will interfere with other users (ACMA 2011, p. 45).

Examples of other applications using the 915 MHz to 928 MHz band include movement detectors, video surveillance, wireless loudspeakers, wireless microphones, alarm systems and cordless phones (ACMA 2011, p. 24).

The ACMA stated that it is possible that the level of interference caused by mesh smart meters could become unacceptable. The ACMA also pointed out that use of this band *"is authorised on a '**no interference, no protection'** basis. Therefore, services in this spectrum have no quality-of-service guarantees"* (ACMA 2011, p. 45, emphasis added).

The Energy Networks Association (ENA) pointed out in their response to the ACMA's proposal that "*If the ACMA were to prevent existing users of the 915–928 MHz band from operating mesh radio networks in this band, there would be significant unforeseen costs for utilities that have deployed/ are deploying in this band.*" They also stated that there is "*considerable uncertainty regarding the technical feasibility of this option [moving to the 928 MHz to 933 MHz band], with initial indications of a negative impact on the performance of the mesh radio hardware and the backhaul communications infrastructure*" (ENA 2011, p. 4).

The likelihood is that consumers will be the ones who end up paying for this additional expenditure, in addition to other costs of rolling out AMI. As stated by Doug Houseman, in an article titled '*Who benefits from AMI?*' contained in Appendix B of an advanced metering

infrastructure cost benefit analysis report prepared for the Victorian Government, "*In the end of course the customer will ultimately pay the cost – they always do*" (Deloitte 2011, Appendix B).

III. Cost of deploying AMI in sparsely populated regions

In Victoria, the technical barriers to deployment in rural areas have led to increased costs for both of the distributors deploying smart meter networks in rural areas. It is likely that consumers will be the ones who end up paying for this additional expenditure.

Powercor, which opted for a mesh smart meter network, has increasingly invested in additional infrastructure, such as external antennas, in an effort to overcome the difficulties of providing communications in areas where there are a limited number of smart meters and where there are barriers to communication, such as trees and hills. More than one year after the date that the rollout was supposed to have been completed, this has resulted in a number of smart meters still being unable to join the network. In areas where there are technical barriers, the costs of joining smart meters to the network are likely to be considerably higher than elsewhere, making it harder to justify their inclusion.

AusNet Services, which is the other distributor in Victoria servicing rural consumers, has fared even worse. AusNet Services opted for a WiMAX solution for its smart meter deployment. Choice of this technology resulted in 43% of its network still unable to communicate more than eight months after the original mandated completion date for the rollout. AusNet Services estimated it would require $175 million dollars to remediate the situation, according to its advice to the Australian Stock Exchange (AusNet Services 2014).

IV. Smart meters' vulnerability to fire

There have been numerous reports around the world regarding wireless smart meters' propensity to catastrophic failure. In 2014, the Saskatchewan government ordered the replacement of 105,000 smart meters, in a recall that could cost $15 million dollars Canadian (CBC 2014).

It was also reported last year that 70,000 smart meters were being replaced in Portland, USA due to fire risk (Sickinger 2014) and 10,500 smart meters were being replaced in Florida following fires related to smart meters (Metering International 2014).

Increased costs in Victoria and elsewhere as a result of mandated AMI rollouts

Victorian electricity customers, including small businesses, have been levied an annual charge, since January 2010, to pay for the State Government mandated rollout of smart meters, whether or not a smart meter is installed, and whether or not the meter is functioning as a smart meter. The AER approved charge for 2015 ranges from $109.40 to over $400, depending on which catchment area customers are in, and meter type (AER 2014, p. 35). These additional charges have significantly added to the cost of electricity.

According to Deloitte's advanced metering infrastructure cost benefit analysis, submitted to the Victorian Department of Treasury and Finance on 2 August 2011, over the 2008-28 time-

period the "*Victorian AMI Program will result in net costs to customers of $319 million (NPV at 2008)*" (Deloitte 2011, p. 7). If this net cost of the rollout to customers were expressed in current dollars, and if the figure were to be updated to incorporate subsequent cost pass-throughs approved by the AER, the cost is significantly higher.

SSMA contends that even this amended result understates the magnitude of costs. Deloitte's cost-benefit analysis was fundamentally flawed as it overstated the value of customer benefits whilst downplaying the economic ramifications of emerging issues.

Deloitte's analysis also confined itself to focusing on the costs and benefits to Victorian electricity customers. As such, it did not include *"costs incurred by the Victorian Government, Australian Energy Regulator or consumer advocacy groups, noting that most of these costs are passed onto taxpayers. In addition, we have not included costs incurred by electricity retailers in preparing for and implementing AMI data and processes*" (Deloitte 2011, p. 40). In SSMA's opinion, given the significant ancillary expenditure that the AMI program has given rise to, these costs should have been factored in.

NSTAR Electric Company and Western Massachusetts Electric Company succinctly expressed the lack of benefit for consumers who transition to smart meters in the initial comments of their filed response to an investigation into the modernisation of the electric grid, stating "*For customers who will pay the price of this system [AMI], there is no rational basis for this technology choice*" (NSTAR Electric Company and Western Massachusetts Electric Company 2014, p. ii).

AMI does not lead to energy efficiency

Central to the justification for smart meters is the notion that time-of-use pricing will reduce power consumed at peak times. As the draft points out, the "*main costs for networks is not the total power consumed but how much power is consumed at peak times*" (Department of State Growth 2014, p. 14).

SSMA believes that the effectiveness of implementing high peak time pricing as a means of driving down demand is a contentious issue, given the conflicting results given by trials and as borne out in actual practice. For instance, a report produced by the University of Melbourne contended that "*Time-of-use tariffs have had only very modest success in eliciting demand side responses in trials both overseas and in Australia. In California, for example, TOU tariffs achieved only a 4.71% reduction in peak demand in a state-wide pilot during the summer months, while* ***overall consumption actually increased.*** *Moreover, the impact of TOU on consumers' energy loads waned overtime, with TOU tariffs eliciting* ***only a 0.6% reduction in peak demand*** *towards the end of the trial'* (McGann & Moss 2010, p. 62, emphasis added).

It appears that, although consumers initially respond to price signals, over time this response significantly wanes.

More recently, Ontario's Auditor General passed scathing comment on the lack of success which its own smart meter rollout has had in reducing peak demand. The 2014 Annual Report stated:

"The Smart Metering Initiative has spent nearly $2 billion of electricity ratepayers' money, but the intended outcomes of significantly reducing electricity peak demand usage using smart meters and time-of-use pricing (TOU) rates, and of reducing the need for new sources of power generation, have not yet been achieved. Under the initiative, ratepayers were supposed to use less electricity during peak times; as a result, Ontario would not need to immediately expand its power-generating capacity. Peak demand reduction targets set by the Ministry of Energy have not been met, ratepayers have had significant billing concerns, and ratepayers are also paying significantly more to support the expansion of power-generating capacity while also covering the cost of the implementation of smart metering" (Office of the Auditor General of Ontario 2014, p. 6).

Unfortunately, as a *Frontier Economics Client Briefing* summed it up in response to COAG's 2012 energy reforms, which encouraged the uptake of smart meters across Australia, this amounts to *"spending more to save less"* (Sood & Price 2012, p. 1). Frontier Economics contended that the Federal energy policy which promotes smart metering ignores the evidence of its costs and benefits.

Communications technology expert, Dr Timothy Schoechle, author of *'Getting Smarter about the Smart Grid'* says that smart meters have become "*confused and conflated with the much broader concept of the smart grid*" pointing out that smart meters and their dedicated networks are primarily for the benefit of power distributors (Schoechle 2012, p. 2). Dr Schoechle's report outlines why smart meters do not lead to energy sustainability or contribute to the possibility of a more efficient and responsive grid.

AMI increases the vulnerability of energy supply

Outcome 4 aspires to consumers having the benefit of a safe, secure and reliable energy supply.

Wireless networks, which in turn rely on a host of computer-controlled infrastructure, are by their very nature considerably more vulnerable to solar electromagnetic pulse (EMP) events, man-made high altitude nuclear (HEMP) and non-nuclear EMP events than electro-mechanical devices and cabled networks. The UK House of Commons' Defence Committee views space weather as a global threat as a direct consequence of our vastly increased reliance on computer-based technology, with the UK National Security Council classifying space weather as a Tier 1 risk (Stop Smart Meters Australia, 2012, p. 3).

SSMA believes the Department of State Growth needs to take into account the increased vulnerability to supply that a transfer to AMI technology entails as a result of either environmental or deliberate electromagnetic pulse interference.

In addition, cyber experts have pointed out the high vulnerability of wireless networks to hacking, to the extent that an entire grid could be shut down or destroyed by hackers, terrorists, foreign powers or even a disgruntled employee. In a 2012 hearing before the United States Senate to examine the *Status of action taken to ensure that the electric grid Is protected from cyber attacks* it was reported that "*According to the Director of National*

Intelligence, there's been a dramatic increase in the frequency of malicious cyber activity, targeting U.S. computers and networks, including a more than tripling of the volume of malicious software, since 2009" (U.S. Senate 2012). It was stated that many of the hearing witnesses noted "*that you simply cannot protect an entity from all potential cyber-attacks... or the critical infrastructure we're trying to protect will become too expensive to run*."

Unintended consequences of draft energy strategy

SSMA believes, in light of potential unintended consequences which may flow from pursuing the draft's vision, that it is incumbent on the Department of State Growth to further expand on its existing nine 'indication of success' outcomes. Whilst the current posited outcomes provide a solid yardstick in terms of success in relation to energy advantage, they fail to take into account the fact that these outcomes are part of a wider picture. Possible unintended consequences follow.

I. Proliferation of AMI leads to loss of amenity for other spectrum users

Anecdotally, SSMA is aware of a number of reports of people experiencing problems as a result of interference due to the introduction of wireless smart meter communications. In areas with marginal mobile phone communications, deployment of AMI infrastructure has also resulted in instances of loss of mobile phone communications (Stop Smart Meters Australia n.d.).

As the rapid and unprecedented take-up of radiofrequency spectrum continues, Australia's atmosphere will inevitably be clogged up with ever-increasing amounts of traffic in the microwave segment of the radiofrequency spectrum. Mesh networks, from a technical perspective, represent a particularly inefficient use of spectrum due to the large volume of transmissions which they generate.

According to information which Pacific Gas and Electric (PG&E) was required to file in court, scheduled readings of six times per day result in a median of **9,600 transmissions per day at each meter (**Pacific Gas and Electric Company 2011)**.** A worst case scenario results in **190,000 transmissions per day**. PG&E use the same technology (from Silver Spring Networks) as deployed by Powercor, CitiPower, Jemena and United Energy in Victoria, and by Western Power in WA for its Solar City trial (Silver Spring Networks 2015).

The Australian Radiation Protection and Nuclear Safety Agency's study, titled *ARPANSA Preliminary Measurements of Radiofrequency Transmissions from a Mesh Radio Smart Meter* (Wijayasinghe & Karipidis 2013)*,* supports PG&E's filed data, although their study measured transmissions at a single smart meter, as opposed to the 88,000 deployed meters referenced by PG&E.

The astonishing number of transmissions generated in mesh smart meter networks is an outcome of the need for data to be relayed from meter to meter (the exact route being dynamic, and subject to a variety of factors) before reaching its destination (i.e. the collector or the destination smart meter, depending on the direction the data is travelling) in addition to network 'handshaking' operations.

Clearly, the vast amount of traffic generated by only six daily updates imposes a significant burden on our available spectrum, as well as leading to the ever-increasing likelihood of data transmission errors.

II. Environmental costs as a result of wireless AMI rollouts

Dr Isaac Jamieson's review, *Smart Meters – Smarter Practices,* details a number of possible critical environmental effects from wireless smart meter technology. These are based on research into effects of microwaves on vegetation, amphibians, birds and insects (Jamieson 2011, pp. 137-144). Effects include plant and tree die-off, drastic decline in wild amphibian populations and an increase in the number of deformed amphibians being found, reduced bird density in areas of increased field strength and increased bird aggression, and alteration in worker bees' behaviour and physiology. India's Ministry of Environment and Forests' *Report on Possible Impacts of Communication Towers on Wildlife Including Birds and Bees* (Ministry of Environment and Forests 2011) triggered India's government, in 2012, to reduce its radiofrequency standard to one tenth of its previous exposure limits (Jayadevan 2012).

SSMA believes that the promotion of AMI take-up must consider the complete picture, and needs to factor in the environmental costs to the community of increased electro-pollution as a result of wireless emissions.

III. Cost to consumers of installing new household wiring to accommodate AMI

There is evidence that the high frequencies transmitted by smart meters may couple on to household wiring, given the close proximity of meters to conductive wiring. Isotrope Wireless's *Report on Examination of Selected Sources of Electromagnetic Fields at Selected Residences in Hastings-on-Hudson* concluded that it is likely that some of the microwave signal from smart meters is being conducted into residences by this means (Isotrope Wireless 2013). Their testing revealed that there was a substantial conducted 915 MHz component on wiring. They pointed out the possibility of the emissions radiating from outlets and along house wiring. In addition, Isotrope Wireless's testing showed that "*when in close proximity to conductive objects (house wiring, outlets, metal lamp) the measured levels increased.*" They attributed this to the known behaviour of objects to "re-radiate" RF energy.

Sage and Biergiel stated in *Wireless Smart Meters and Potential for Electrical Fires* that household wiring is not designed to carry the high frequency harmonics generated by "*very short, very high intensity wireless emissions*". The higher frequency means more energy, equating to greater heat, which could lead to a fire situation if there is compromised wiring at any point within a house (Sage & Biergiel 2010). The possibility arises that the fire could occur a substantial period of time after the smart meter is installed, and at some distance from the smart meter itself.

The Victorian Government claims that, on the contrary, the AMI rollout has "*uncovered and rectified more than 20,000 pre-existing electrical defects in Victorian homes since the smart meter rollout began in 2009 – potentially saving property and lives at risk from faulty switchboards and unsafe wiring that may otherwise have remained undetected*" (State

Government of Victoria 2015). However, replacing existing wiring is a costly exercise. The question must be asked as to whether consumers should be forced to upgrade in order to accommodate technology which is placing heavier demands on household wiring.

Anecdotally, there has also been a large number of reports of appliances, such as computers, dishwashers and ovens, failing following the installation of smart meters (Collier 2011). This gives support to the claims that wireless smart meters are, as an unintended by-product, creating high frequencies on household wiring. Although in some instances consumers are receiving compensation from power distributors, failure of household assets following the installation of a smart meter has been a source of considerable frustration for households.

IV. Loss of privacy as a result of AMI

The deployment of AMI provides unprecedented opportunities for information to be gathered about consumers. As a result of the granularity of the data, near real-time surveillance can occur, determining sleeping patterns, when a home is unoccupied, and what appliances are being used.

Although this data is of potential financial benefit to distributors for data mining by interested parties such as marketeers and law enforcers, wireless AMI also exposes consumers to a major security risk.

It was reported in The Age on 25th September 2012 that "*detailed information about electricity customers' power usage, which gives insights into when a house is occupied, is being shared with third parties including mail houses, debt collectors, data processing analysts and government agencies*" (Chadwick et al. 2012).

SSMA believes that the Government needs to give consideration to the increased security risk to consumers as a result of the deployment of AMI.

V. Customer dissatisfaction soars with the introduction of AMI

Around the world, the introduction of AMI has led to a massive surge in complaints regarding meter exchanges, unexpectedly high bills, delayed bills and billing errors. The Energy and Water Ombudsman of Victoria (EWOV) experienced a 60% increase in smart meter cases in the first quarter of 2012 compared to the first quarter of 2011, despite a 10% drop in these cases since the July to September 2011 quarter. This represented 1,343 new smart meter cases and registration of 2,358 smart meter issues during this quarter alone (EWOV 2012, p. 4). (N.B. The EWOV estimated that by the end of this quarter 1,100,000 smart meters had been installed in Victoria.)

According to figures released by the EWOV to the Herald Sun in February 2012, "*the watchdog has been bombarded with more than 76,000 electricity billing complaints and inquiries in the past five years. These include 11,000 alleged billing errors*" (Collier 2012).

It is unclear why the transition to smart meters so often causes bills to increase, sometimes quite dramatically. A typical story is that reported in New Zealand, where a single mother of

three reported that her monthly power bill increased from between $140 to $190 to "*more than $500 and $600 monthly*" following the installation of a smart meter (Taylor 2013).

The increase in complaints represents a major financial burden on agencies charged with assisting consumers. In addition, it demonstrates that, for many customers, the transition to smart meters leads to unexplained increases in energy costs.

SSMA believes that the Department of State Growth needs to factor into its outcomes a means of measuring customer satisfaction.

VI. Transfer of cash flow out of Tasmania due to AMI

The elimination of meter reading jobs is viewed as a key benefit by power distributors. However, the Department of State Growth needs to consider how the transition to AMI would impact on the aim of growing Tasmania's economy.

Moving to smart meter technology is likely to lead to a substantial cash flow out of the economy, to pay for hardware (smart meters, relays and access points), much of which is sourced from overseas. Coupled with the loss of local jobs, the overall impact could be significant.

SSMA suggests that the Department of State Growth should add an outcome which measures the impact of energy policy on overall contribution to Tasmania's economy.

VII. Health consequences of wireless AMI

Written evidence submitted to the UK Parliament in 2013 attested to the fact that the pulsed radiation from smart meters has resulted in thousands of health complaints world-wide. More than 10,000 health-related complaints were submitted to the California Public Utilities Commission alone, and included personal testimonies from medical doctors, psychotherapists and nurses regarding their own symptoms (Stop Smart Meters! 2013).

SSMA is in receipt of in excess of 250 (unsolicited) reports alleging a variety of adverse symptoms, some of which have been life-threatening, as a result of exposure to smart meter emissions. This cohort is viewed as being the ‘tip of the iceberg’. The majority of the population and medical fraternity have no previous experience, nor training, in identifying biological changes as a result of increased radiation exposure and are unlikely to link the rollout of AMI technology with the symptoms which have been triggered. The emissions from Victoria’s smart meters appear to have caused the exacerbation of existing symptoms, as well as triggering new symptoms in parts of the population that had not previously exhibited sensitivities to wireless technology.

The impact on people’s lives has been profound in some cases, resulting in high personal costs for the people and their families, as well as the community. Outcomes which SSMA has been advised of include a number of cases where people have ceased employment as a direct result of smart meters, have undergone unnecessary medical procedures, have ended up being hospitalised, have outlaid many thousands of dollars to partially shield their homes

from smart meter emissions, are no longer able to access parts of their homes and gardens, and the relocation of families interstate to escape the emissions.

A PubMed-listed, peer-reviewed study of 92 Victorian cases offers the hypothesis that "*some people can develop symptoms from exposure to the radiofrequency fields of wireless smart meters*" (Lamech 2014, p. 38). The study's conclusions point to the "*possibility that smart meters may have unique characteristics that lower people's threshold for symptom development*" and calls for caution in the rollout of wireless AMI.

To-date no study, anywhere in the world, has shown that long-term (or even short-term) exposure to wireless smart meter radiation is safe. Although Victorian AMI emissions have been shown to be a fraction of the radiofrequency limits set down by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), this offers little comfort in view of the fact that 40% of the world enjoys significantly better protection. Radiofrequency exposure guidelines in place elsewhere are ten to thousands of times more rigorous than the ARPANSA standard, which is based on ICNIRP guidelines (Jamieson 2014, p. 4).

Australia's radiofrequency standard is aimed at guarding against gross thermal effects as a result of an increase in the temperature of body tissue. It does not give protection against the many, and varied, biological effects – as shown in thousands of studies – which occur prior to acute effects.

The U.S.A. Naval Medical Research Institute listed over 2000 studies in a report dated as early as 1972 giving evidence of adverse biological effects as a result of radiofrequency (RF) radiation (Glaser 1972).

Current research concurs, showing that adverse outcomes include DNA single strand and double strand breaks, breaching of the blood-brain barrier and increased production of heat-shock proteins (Maret 2012, p. 19). Not surprisingly, and similarly to the prolonged cover-up of other pollutants such as tobacco, it has been found that industry-funded studies only have a 30% likelihood of finding an adverse effect as compared to independent studies, where the likelihood is 70% (Ishisaka 2011).

Physicist Dr. Ronald Powell analysed wireless smart meter emissions, in light of the conclusions reached by the *BioInitiative 2012 Report,* a report compiled by 29 experts from ten countries which reviewed 1800 new scientific studies on non-ionizing radiation since the *BioInitiative 2007 Report* (which had, in turn, reviewed over 2,000 studies). He concluded that the power density at 100 metres from a smart meter is "*higher than the power density that triggered biological effects in 6 of the 67 studies*" which he considered. His analysis also showed that the RF power density from a smart meter does not drop down to the level of the RF exposure limits proposed by the *BioInitiative 2012 Report* until distances of *180 to 200 metres* from a smart meter are reached (Powell, 2013, p. 12). This may explain why some individuals are being adversely affected by emissions from neighbouring smart meters, even when they do not have a smart meter.

Home Area Networks (HANs), in conjunction with Home Display Units, are often touted as promising to be a key benefit for customers, in order to 'empower consumer choice'. It is supposed that consumers will avail themselves of the data provided to alter their energy

consumption patterns. Promotion of these (costly) devices ignores the fact that it is already possible for consumers to obtain this information, albeit for one appliance at a time, through the purchase of inexpensive plug-in devices.

More worrying, is that promotion of HANs would mean that the Tasmanian Government is encouraging increased microwave traffic within homes. This is particularly problematic, because of the increased unpredictability of wave movement, due to the likelihood of smooth surfaces (such as is found in kitchens) causing wave reflection and therefore increased field strengths (Smith 2013, p. 12).

Elsewhere in the world a number of authorities and institutions have taken a precautionary approach in regards to the use of wireless enabled devices. For instance, the French national library announced in 2007 that it was replacing all Wi-Fi connections with wired connections due to health issues (Bibliothèque Nationale de France 2008). Russia's peak radiation authority issued a statement in 2012 warning against children's exposure to wireless emissions in kindergartens and schools (Russian National Committee on Non-Ionizing Radiation Protection 2012) as their bodies are at particular risk of absorbing radiation. Legislation, which was two years in the making, was passed this year in France banning wireless devices in "*the spaces dedicated to the care, resting and activities of children under 3 years*" and requiring wireless internet in elementary schools to be disabled when not in use for teaching purposes (Le Hir 2015).

Given that pulsed microwave transmissions from wireless AMI irradiate the population 24/7, unlike other wireless devices which allow an element of choice over exposure patterns, and given the possibility that Australia will also catch up with world best-practice in the future, investing in wireless infrastructure could prove to be a costly mistake.

Deploying wireless AMI in Australia is of particular concern due to the high levels of housing stock with electricity meters operating in close conjunction to where people are sleeping. According to Dr. Dart et al., in a report titled *Biological and Health Effects of Microwave Radio Frequency Transmissions,* which was prepared in response to a proposal to establish a wireless AMI network, "*Nocturnal exposures are more problematic than daytime exposures, because of RF's potential to suppress nocturnal melatonin secretion and disturb sleep, and because night is the time when we rest and heal from stresses (including oxidative stress*)" (Dart et al. 2013, p. iii).

Alternative means of increasing energy efficiency

Paradoxically, many of the devices, including smart meters, that are being promoted to improve energy efficiency add to the burden of energy inefficiency due to the unintended generation of harmonics.

These higher frequencies, which can range up into the radiofrequency range, are a by-product and serve no useful purpose. However, they take up assets (e.g. distribution and transmission lines), ultimately meaning that more energy is required to compensate for the loss of Power Factor. The Institute of Electrical and Electronic Engineers **(**IEEE) has stated that "*Harmonic pollution is a growing problem caused by the widespread use of power*

supplies and other non-linear loads. It can result in power loss and equipment damage and it may also be related to environmental safety issues" (IEEE 2011).

In the case of smart meters, the switch-mode power supply, which provides the switching mechanism between AC and DC, is the culprit. The conversion between the two wave forms is not a seamless process, resulting in the dissipation of energy. The promulgation of higher frequencies also impacts upon biological tissue.

Dr Paul Héroux, who commenced his career involved in the design of high-voltage power lines prior to following his research interests into the effect of electromagnetic fields (EMFs) on health, believes that the solution is to migrate the electricity grid to one that is entirely configured for DC currents. He believes that the electrical industry is slowly moving in this direction. A DC grid would accommodate our growing reliance on electronics, virtually all of which require DC, as well as accommodating renewables such as solar, which generate a DC waveform.

According to Dr Héroux's McGill University text, this could lead to an outcome where there is a reduction in global energy consumption of twenty percent.

"A dc grid deployment in the future may reduce global energy consumption by 20%. As dc sources are easily paralleled, a dc network would allow easier compatibility of electrical network of all sizes: between power utilities, eliminating stability problems, and between utilities and small distributed suppliers of wind and solar energy. This would make the power grid more democratic, reliable and green. It would allow people with electric cars to easily use them in case of grid power failures.

The capacity of present power lines would increase without cost by 30% due to the fact that voltage is maximum 100% of the time on a dc network and to the elimination of the *skin effect*.

Corrosion of metallic structures (pipelines, steel reinforced concrete) by induced currents would be eliminated.

It would allow signal cables to double as power cables, reducing the number of wiring connections."

Héroux 2015, *Health Effects of Electromagnetism*, McGill Course OCCH-605, pp. 1-24.

Dr Héroux contends that the health effects on living systems as a result of AC EMFs, which cause molecular, biologically significant oscillation (Héroux 2015, pp. 5-21), could be eliminated by a transition to DC transmission, distribution and consumption of electric power (Héroux 2015, pp. 1-24).

Conclusion

SSMA hopes that the Department of State Growth will give consideration to the issues which we have raised and looks forward to seeing the outcome. The Minister for Energy pointed out in his foreword that there "*has been a sense that policy decisions and*

investment decisions have been made without sufficient regard to the practical consequence they may have for people."

We hope that our submission casts light on some of the consequences of incorporating AMI into the Tasmanian Government's aim of restoring Tasmania's energy advantage.

Yours sincerely

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